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Teachers' beliefs about assessment for learning: Introducing rubric in Secondary Education

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ABSTRACT

The general purpose of this qualitative case-study research is to develop an understanding of teachers' beliefs about assessment for learning; the main purpose was divided to the following goals:

- To understand teachers' beliefs about assessment.
- To describe the assessment strategies they apply in the classroom.
- To analyze the reasons that prevents teachers to apply new forms of assessment.
- To use rubric as an assessment for learning tool and spot the light on students and teachers opinion about its benefits, and the difficulties they face when using it.
- To help the teachers reflect on the current practices that they use to assess their students, in order to enhance it.
- To understand the changes that could happen to the teachers' beliefs related to the use of rubric

Interviews and diary for the teachers, and questionnaire and exam for the students, were used to collect data. The data analysis progressed in two phases by the researcher. In the first phase the vertical or *within case analysis* the individual teacher was taken as the unit of analysis. The fixed structure in the individual reports was the starting point for the second phase in the analysis, the horizontal or *cross case analysis*.

The results show that secondary mathematics teachers mainly use traditional assessment methods such as paper and pencil exams. Alternative assessment methods are not used. In addition, teachers showed dissatisfaction with this situation and expressed their preference to direct observation method of assessment.

According to the teachers, alternative assessment methods are not used for the following reasons: First, the great amount of time and effort consumed in applying alternative methods. Second, the large number of students in a class. Third, certain difficulties caused by the evaluation system such as the design of the evaluation policy. Fourth, parents and students factors, and finally, factors related to the subject itself.

The findings of this study disclosed some important beliefs that affect teacher's decision in choosing a method for evaluation. In addition, the results of this study show that giving teachers the opportunity to use new assessment tools such as a rubric contributed to change in some of their beliefs.

KEYWORDS. Assessment for learning, Teacher's beliefs, Mathematics teacher, Secondary educational, Holistic and analytical Rubrics, Peer evaluation, Self-evaluation.

To all women in the world who suffered any kind of abuse and discrimination, especially those who live with the terrible anguish of waking up every morning under war-insecurity and the fear of losing their families and friends. In addition, I dedicate this study to all people who have no food and no place to live and to learn. Moreover, I dedicate this study to all those who believe in the richness of learning.

A todas las mujeres que sufren en el mundo cualquier tipo de maltrato o discriminación, en especial a las mujeres del mundo que viven con la terrible angustia de despertar cada mañana bajo la guerra, que no pueden ir a escuelas, que sufren de la inseguridad, que temen perder a su familia o a sus amigos, que no tienen comida ni sitio para vivir.

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لجميع النساء في العالم الذين عانوا من أي نوع من سوء المعاملة والتمييز، وخصوصا النساء اللواتي يعشن تحت ظل الاحتلال والحروب ويعانون من انعدام الأمان، وفقدان الأهل والأصدقاء، والذين ليس لديهم طعام، ولا مكان للعيش.

لجميع أولئك الذين يؤمنون بثراء التعلم

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Maha A. I. Dandis
2013

TABLE OF CONTENTS

APPENDICES (CD-ROM)

Information out of the field:

- Mathematics 3º ESO evaluation criteria.
- Rubric.
- Permission to use the rubric.

Information collected from the field:

- Interviews teacher (A) and (B).
- Teachers (A) and (B) diary.
- Teachers (A) and (B) students questionnaire.
- Teacher (A) and Teacher (B) students' exam.

LIST OF TABLES

LIST OF FIGURES

Creencias de los profesores sobre la evaluación para el aprendizaje: Introducción de la rúbrica en Educación Secundaria

RESUMEN

El objetivo general de este estudio de casos es comprender las creencias del profesorado sobre la evaluación del aprendizaje, y las formas que utilizan para evaluar la comprensión de los estudiantes.

El propósito principal se divide en los siguientes objetivos:

- Comprender lo que el profesorado cree acerca de la evaluación.

- Describir las formas de evaluación que aplican en sus clases.

- Analizar las razones que dificultan e impiden a los profesores aplicar nuevas formas de evaluación.

- Utilizar las rúbricas como una herramienta de evaluación para el aprendizaje, centrándose en las opiniones de los estudiantes y los profesores sobre sus beneficios y las dificultades que enfrentan cuando las utilizan.

- Ayudar al profesorado a reflexionar sobre las prácticas actuales que emplean para evaluar a sus estudiantes, con el fin de mejorarlas.

- Comprender los cambios que pueden experimentar las creencias de los profesores relacionadas con el uso de la rúbrica.

Estamos ante un estudio cualitativo que, en la forma de estudio de casos, adopta una estrategia de investigación de tipo inductivo. Claramente los objetivos de este estudio se preocupan por acercarse a una comprensión profunda de las reflexiones y creencias del profesorado sobre la evaluación en el aprendizaje. Es decir, este estudio de casos ofrece un diseño adecuado y adaptado para dar cabida a estas inquietudes.

Con el fin de captar el contenido de las reflexiones del profesorado la metodología utilizada en este estudio debía ser de tipo cualitativo. El diseño del trabajo junto con el método aplicado está totalmente vinculado con el objetivo del análisis y la recogida de datos. Se utiliza un método de muestreo intencional donde se involucran dos profesoras de Matemáticas de un Instituto bilingüe (español/inglés) que están interesadas en el uso de rúbricas con fines evaluativos. Dichas profesoras son seleccionadas debido a su proximidad física con el trabajo del investigador y a su interés en el tema. El número de estudiantes participantes en el estudio es 16 de 3º de Enseñanza Secundaria Obligatoria (ESO) y 8 alumnos de 4º de ESO (14 – 16 años de edad).

Las herramientas del estudio se basan en entrevistas, diarios de profesores, cuestionarios y exámenes como fuente de recogida de datos. Las entrevistas son semiestructuradas con el objeto de recoger información que ayuda al investigador a conocer las reflexiones de las profesoras acerca de la evaluación en el aprendizaje. Las preguntas diseñadas para la entrevista se derivan de la revisión de literatura y de los objetivos del estudio propiamente dichos. Dichas entrevistas son realizadas en cuatro sesiones, dos entrevistas fueron hechas antes de utilizar la rúbrica y las otras dos después. Las entrevistas son grabadas digitalmente con el debido consentimiento de los entrevistados. En cuanto a los diarios de las profesoras, estos son utilizados como herramienta de trabajo para recoger información y se considera este instrumento especialmente necesario: Se pidió a las profesoras redactar un diario reflexivo para describir sus experiencias usando rúbricas. La intención de aplicar el método de los diarios era acercarse a la propia experiencia del profesor a la hora de aplicar la rúbrica e introducirnos dentro de lo posible en las reflexiones del profesor para conocer dichas creencias a la hora de evaluar el aprendizaje.

Después de consensuar con cada profesora, así como abordar y analizar los principales asuntos o temas a tratar y los criterios a seguir para definir y evaluar cada competencia que los alumnos debían dominar respecto al tema a estudiar (en este caso se escoge "*las funciones*"), se hizo un trabajo bibliográfico para buscar una rúbrica que coincidiera con todas las competencias en las que estábamos interesados. Dicha rúbrica fue adaptada por la investigadora de una originaria de la Junta de Educación del estado de Illinois (USA). Fue traducida, revisada y modificada por dos profesores de Matemáticas que trabajan en el mismo instituto y que estuvieron involucrados en el estudio y dos

profesores de la Universidad de Granada. Se considera que dicha rúbrica es la más acorde por coincidir con los objetivos de la enseñanza de Matemáticas, en este tema, para estudiantes entre 14-16 años.

Al acabar cada tema, se les hizo un examen a los alumnos y después cada par de alumnos debían corregir el examen usando la rúbrica. Después la investigadora pidió a las profesoras reflexionar y dar sus opiniones sobre los resultados del trabajo de los estudiantes. La intención de hacerles el examen a los estudiantes fue para desarrollar en el campo el modo de resolver problemas usando una rúbrica por parte de los estudiantes así como tener una idea sobre las ventajas y desventajas (dificultades) de usar rúbricas.

Un cuestionario de preguntas abiertas dirigido a los estudiantes fue utilizado después de utilizar la rúbrica como una herramienta de evaluación para el aprendizaje para explorar así sus percepciones y reflexiones sobre las rúbricas como método didáctico y evaluativo al mismo tiempo. Dicho cuestionario fue diseñado para ayudar a la vez a profesora e investigadora para acercarse a las reflexiones de los alumnos sobre el uso de una rúbrica, y por consiguiente, las visiones sobre el método para mejorar y replantear sus trabajos.

Sobre las preguntas planteadas en el cuestionario debemos decir que se enfocan hacia:

- Las ventajas y desventajas de una rúbrica.
- Las dificultades a las que se enfrentan a la hora de usarla.
- Las vías de mejorar su uso y su aplicación.
- Sus opiniones sobre los efectos producidos sobre su uso en sus compañeros.

Una vez entregadas y verificadas las respuestas del cuestionario, se enfoca la atención sobre la hermenéutica del texto, es decir sobre cómo interpretarlo y leerlo repetidamente dejando anotaciones y frases claves que podrían ser relevantes para el trabajo. Para ello se utiliza el programa NVivo 10©. Por otra parte fragmentos transcritos con los mismos códigos fueron agrupados, y el proceso de codificación inició el análisis interpretativo de los datos de las entrevistas en términos del marco teórico del estudio.

La investigadora desarrolla el análisis de la información en dos fases: En primera fase, un desarrollo vertical o lo que es lo mismo, *análisis intra-casos*. La profesora de forma individual es considerada como la unidad básica del análisis. Esta cuidadosa

codificación y transcripción de datos da lugar a un informe de caso estructural e individual para cada profesora con una respuesta reactiva del profesor en forma de validación comunicativa y abarcando todos los resultados del análisis, así como fragmentos de entrevista ilustrativa. La estructura fijada en los informes individuales es el punto de partida de la segunda fase del análisis, que es un *análisis horizontal o transversal* donde intentamos fijarnos en similitudes y diferencias sistemáticas entre los dos casos.

En cuanto al proceso cíclico de leer, interpretar y verificar datos, el énfasis se centra en interpretar y comprender patrones sobre las creencias y reflexiones del profesorado en lo referente a la evaluación en el aprendizaje, así como los métodos que utilizan para evaluar a sus estudiantes, todo ello con el fin de refinar, mejorar y verificar conclusiones preliminares.

Conclusiones

El profesorado de Matemáticas participante en este estudio pone de manifiesto que se utilizan principalmente métodos de evaluación tradicionales, como exámenes de lápiz y papel, con un baremo que comprende 70% evaluación del trabajo de los estudiantes por exámenes escritos, 15% actitud de los estudiantes y el 15% restante el trabajo diario en casa y en clase (por métodos escasamente objetivos).

Una parte del 30% de la calificación del trabajo de los estudiantes proviene del cuaderno. La calificación del cuaderno se realiza cada semestre, pero todos los días el profesor echa un vistazo a los cuadernos de sus estudiantes y comprueba si hicieron su tarea y si está limpio o no. Las profesoras del estudio no asignan una calificación numérica a diario, pero se suelen poner expresiones como bueno, malo, regular, positiva o negativa, como parte del trabajo diario.

Las profesoras utilizan preguntas directas para ver si los estudiantes entienden lo que quieren. Generalmente explican y luego hacen una pregunta, y si todos los estudiantes permanecen en silencio significa que no entienden. Las profesoras evalúan a sus estudiantes con exámenes escritos durante todo el año y siempre evalúan la competencia adquirida por los estudiantes después de cada unidad (o varias unidades conjuntamente),

nunca lo hicieron durante la unidad. Están acostumbradas a proporcionar a sus estudiantes muchos exámenes y la nota final del estudiante es el promedio de todas las notas que tiene durante el año.

Por otro lado, las profesoras informaron sobre la utilización de algunas herramientas de evaluación alternativa, pero de forma esporádica. Es el caso del trabajo en grupo, la evaluación basada en las competencias, la observación directa, proyectos, o incluso mencionan la invitación a los padres a participar en la evaluación. Las profesoras no utilizaban las rúbricas antes y no tenían ninguna idea acerca de ellas.

Además, las profesoras muestran su descontento con esta situación y expresan su preferencia por la observación directa como método de evaluación. Expresan su queja en este sentido, porque en numerosas ocasiones no están satisfechas con el método tradicional, pero dicen no tener otra opción ya que se encuentran en una situación que viene determinada por el Departamento de Matemáticas.

Las dos profesoras expresan su deseo de evaluar a los estudiantes mediante la observación directa, y no tanto por exámenes de lápiz y papel, simplemente observando el trabajo y la evolución de los estudiantes, pero según las profesoras es imposible, debido al gran número de estudiantes que tienen en clase (a veces superior a 30 alumnos).

Además las profesoras están dispuestas a utilizar las rúbricas con sus estudiantes, y proponen utilizar la evaluación por pares y la autoevaluación con sus alumnos porque creen que, a medida que los estudiantes se involucran en el proceso de evaluación, pueden ver sus puntos débiles y fuertes. También expresan su deseo de evaluar la competencia matemática del estudiante y las exposiciones de Matemáticas, para que de esta manera los estudiantes puedan comprobar que lo que están aprendiendo se puede utilizar en la vida real.

Según las profesoras, los métodos de evaluación alternativos no se utilizan por las siguientes razones: En primer lugar, la gran cantidad de tiempo y esfuerzo que se consume en la aplicación de los métodos alternativos. En segundo lugar, el gran número de alumnos en clase. En tercer lugar, ciertas dificultades causadas por el Departamento

de Matemáticas y otras dificultades del sistema de evaluación, tales como el diseño de la política de evaluación común en ESO. En cuarto lugar, factores referidos a los padres y estudiantes, por último, los factores relacionados con el tema en sí.

Las profesoras también se quejan de que no tienen la información necesaria para desarrollar nuevas formas de evaluación, ya que sólo estudiaron Matemáticas en la Universidad, y no tanto cómo enseñar Matemáticas en general o sobre los métodos de evaluación en particular. También expresan su malestar por el gran número de estudiantes por clase, por lo que señalan que la mejor forma de evaluar 30 estudiantes es el examen.

También las profesoras señalan que los métodos de evaluación están determinados a partir del departamento de Matemáticas y que tienen que seguir el plan del departamento. No pueden elegir otras maneras. También hablan del poco tiempo de que disponen para terminar el plan de estudios, y que utilizar nuevas formas de evaluación consumirá más tiempo y esfuerzo por parte del profesor. Por otra parte, las profesoras señalaron que las Matemáticas como asignatura tampoco permiten utilizar muchas formas distintas de evaluación; es más fácil usar herramientas de evaluación alternativas con la enseñanza de idiomas.

Después de usar la rúbrica las profesoras manifiestan haberse enfrentado a diversas dificultades, tales como: (1) los alumnos no están acostumbrados a este método, (2) utilizar la rúbrica depende mucho del grupo de estudiantes, si los estudiantes están motivados o no, y si los estudiantes aceptan que están siendo evaluados con nuevas formas de evaluación, (3) el diseño y el lenguaje de la rúbrica es difícil de entender, (4) requieren una gran cantidad de tiempo y trabajo de los estudiantes y del profesor, (5) la rúbrica es muy larga y los estudiantes no están acostumbrados a leer. Las profesoras dan algunas recomendaciones para superar estas dificultades.

Los resultados de este estudio revelaron algunas reflexiones y creencias que afectan a la decisión del profesor a la hora de elegir un método de evaluación, habiéndose distinguido principalmente algunas de estas creencias:

(1) Creencias acerca del aprendizaje de los alumnos.
(2) Creencias acerca de la evaluación para el aprendizaje.

(3) Creencias sobre la relación entre aprendizaje, enseñanza y evaluación.
(4) Creencias sobre los objetivos finales de la evaluación.
(5) Creencias acerca de los propios beneficios de la evaluación.
(6) Y finalmente las creencias en lo referente a las diferentes formas de evaluación.

Además los resultados de este estudio muestran que dar la oportunidad al profesorado de utilizar nuevas herramientas de evaluación tales como una rúbrica contribuye a modificar en parte algunas de sus creencias.

Contribuciones e implicaciones de este estudio

Este estudio añade a la limitada literatura relacionada con la evaluación del aprendizaje de las Matemáticas las siguientes contribuciones:

- En primer lugar, expone con todo detalle las experiencias de dos profesoras españolas a la hora de utilizar nuevos métodos de evaluación (una rúbrica) como herramienta de aprendizaje en las clases de Matemáticas. La difusión de estas experiencias a la hora de aplicar nuevas técnicas de evaluación del aprendizaje promete ser beneficiosa para otros colegas españoles por permitir lo que sería una reflexión, apreciación y comprensión de estas técnicas.

- En segundo lugar, este estudio revela algunas de las creencias más importantes que afectan a la decisión del profesorado a la hora de elegir un método de evaluación tales como las creencias sobre diferentes formas de evaluación, creencias relacionadas con los objetivos de la evaluación, creencias sobre la relación entre aprendizaje, enseñanza y evaluación, creencias sobre evaluación del aprendizaje, creencias sobre el aprendizaje de los estudiantes y creencias sobre los beneficios de la propia evaluación. Estas creencias pueden contribuir a sacar a la luz numerosas ideas erróneas y paliar la falta de información sobre el proceso de la evaluación en sí y sobre otras herramientas de evaluación alternativas. Cabe destacar que las creencias pueden considerarse, en este sentido, como punto de partida para cualquier proceso de reforma educativa. Dentro de la misma línea destacamos que este estudio contribuye a modificar algunas de las creencias que podrían abrir las puertas para distintos procesos de reformas educativas empezando por dirigirse a las creencias del profesor y después diseñar sesiones de entrenamiento que podrían ayudar a los

profesores a cambiar sus visiones así como adaptar nuevas formas de evaluación que podrían mejorar el proceso de aprendizaje de los estudiantes.

- La tercera contribución de este trabajo ayuda a iluminar algunas lagunas en el sistema de evaluación actual comúnmente utilizado, como el predominio de los sistemas tradicionales de evaluación y la escasez de otros métodos de evaluación alternativos. El trabajo muestra cómo los modelos actuales de evaluación se continúan centrando principalmente en el aspecto evaluativo del resultado y se desentienden totalmente de lo que es el proceso de aprendizaje. Por otra parte en este estudio se muestra el descontento del profesorado con el actual sistema de evaluación aplicado habitualmente en los centros de Educación Secundaria, y la necesidad urgente de tomar serias decisiones por parte de las autoridades educativas para mejorar las prácticas de evaluación actuales, prestar mayor atención a las necesidades de los profesores y darles mayor libertad de elegir la vía adecuada de evaluar a sus alumnos. Según el criterio de Frankland (2007), el profesor de la asignatura es el sujeto más familiarizado con el contenido del aprendizaje, y por tanto él o ella deberían tener carta blanca a la hora de elegir la técnica de evaluación más acorde para que los métodos de evaluación estén alineados con los resultados del aprendizaje de la asignatura. Cabe decir que existe un gran abanico de técnicas que podrían ser utilizadas además de los exámenes y pruebas tipo test tales como cuestionarios (ítems abiertos, cerrados con muchas variaciones), asignaciones de tareas, estudio de casos, proyectos, presentaciones, sesiones de pósters o carteles, entrevistas, Jornadas reflexivas, etc. En otras palabras, un profesor/a debe tener vía libre para disponer y aplicar estas técnicas de evaluación basándose en criterios propios y valorar el más adecuado de entre todas.

- La cuarta contribución de este estudio se enfoca hacia las dificultades que obstaculizan la aplicación de nuevas formas de evaluación por parte del profesorado. Algunas de estas dificultades serían: la falta de tiempo, la masificación de las aulas y el trabajo administrativo que el profesor debe realizar paralelamente. Por otra parte, una de las principales críticas del docente va dirigida hacia el actual sistema de evaluación propio del sistema educativo, descrito como "sistema guiado por las notas", más con fines numéricos que fines enfocados al aprendizaje del alumno en sí. Otro de los factores que obstaculiza el uso de nuevas técnicas de evaluación es la

falta de conocimiento y preparación en la aplicación de herramientas alternativas de evaluación. El hecho de poner estas dificultades sobre la mesa podría ayudar a las autoridades educativas competentes, directores de centros educativos y padres de alumnos a comprender el problema al que se enfrentan los docentes a la hora de realizar las evaluaciones de aprendizaje y superar juntos estas dificultades, y esto a su vez facilitaría la tarea de los investigadores interesados en integrar nuevas técnicas de evaluación para valorar y tratar de evitar así estas dificultades durante el diseño y la aplicación de sus ensayos o estudios.

- Por último cabe destacar que este estudio ofrece sugerencias para mejorar el actual sistema de evaluación en el marco de la enseñanza secundaria, que podrían suponer un potencial a la hora de mejorar el actual sistema de evaluación, ya que dichas sugerencias están fundamentadas sobre la propia experiencia de las profesoras participantes.

En este estudio se exponen, de modo global, las siguientes recomendaciones para poner en práctica las técnicas de evaluación del aprendizaje:

- En primer lugar se debe prestar especial atención a las creencias y reflexiones de los docentes en relación con la evaluación del aprendizaje y sus técnicas, ya que dichas creencias juegan un papel esencial durante el ejercicio profesional y la toma de decisiones en el aula.

- Los resultados de este estudio han destacado la importancia de formar y entrenar a los profesores sobre el uso de técnicas de evaluación de aprendizaje, y que los docentes deben participar de forma activa en cursos y seminarios de desarrollo profesional relacionados con el uso de técnicas y conocimientos de evaluación.

- Por último, los resultados de este estudio ponen de manifiesto la necesidad de establecer colaboraciones entre los distintos sectores de la comunidad educativa para prestar ayuda a los docentes en el uso de herramientas de evaluación alternativas de forma voluntaria, sin la imposición del empleo de ciertas herramientas de evaluación.

Por otra parte la investigadora pone a disposición de los interesados en la materia las siguientes implicaciones en el uso de una rúbrica como una herramienta dentro del marco de la evaluación del aprendizaje:

- Se considera necesario que profesorado y estudiantes desarrollen una comprensión lúcida sobre la importancia y el valor del uso de rúbricas como una herramienta de naturaleza instruccional didáctica y calificativa, y que esto debería utilizarse desde el comienzo y seguir con ello a lo largo del año escolar. Por otra parte los profesores deberían ser formados y entrenados sobre su correcto uso para así conseguir resultados óptimos y en la instrucción y calificación.

- Se considera esencial la participación de los estudiantes en el diseño de una rúbrica. Dicha participación dentro de la toma de decisiones didácticas les facilita estar más comprometidos y activos dentro del marco de su propio aprendizaje. En otras palabras, la participación activa en el diseño de una rúbrica dirige a los estudiantes a superar con éxito las dificultades en comprender las expectativas del profesor, lo que a su vez mejoraría los resultados del aprendizaje.

- Una tercera implicación en el uso de una rúbrica sería la discusión interactiva entre profesorado y estudiantes sobre soluciones planteadas fuertes y débiles, que podría a su vez ayudar a los alumnos a entender los objetivos establecidos en la rúbrica.

- En relación con lo anterior, el desarrollo de una rúbrica debe ser establecido dentro del marco de las sugerencias de los alumnos. También se debe prestar atención a la longitud de la misma y la claridad del lenguaje utilizado en ella. Por otra parte tenemos que subrayar que los comentarios hechos por el profesor sobre el trabajo de los alumnos es esencial a la hora de promover un trabajo interactivo con el alumno.

- Como punto final cabe destacar que una rúbrica puede ser utilizada como una forma mejor para perfeccionar la enseñanza si profesores y alumnos la utilizan de forma frecuente. Esto implica que las rúbricas deben ser utilizadas por los alumnos para resolver los ejercicios diarios con el fin de perfeccionar su aprendizaje.

Recomendaciones para futuras investigaciones

Este trabajo revela algunas de las creencias y reflexiones del profesorado en lo referente a las técnicas de evaluación, por lo que sería beneficioso llevar a cabo un estudio para valorar la magnitud de estas creencias, ya que comprender las creencias de los profesores sobre métodos educacionales afecta considerablemente al éxito de su implementación.

Esta investigación demuestra que la rúbrica es un concepto nuevo para los participantes en el estudio, y debido a ello la investigadora considera necesario averiguar la medida en que el profesorado español conoce y usa rúbricas en la evaluación y el aprendizaje, con una muestra amplia y significativa. Por otra parte recomienda llevar a cabo un estudio cualitativo enfocado al grado en que la preparación del plan de estudio o el temario por parte del profesor podría proporcionar valor a la evaluación del aprendizaje mediante rúbricas así como a otras técnicas alternativas de evaluación.

Desde la introducción de las rúbricas en la mayoría de los países desarrollados, estudios cualitativos deberían llevarse a cabo con el objetivo de averiguar el modo en que estos países tienen éxito en el empleo de técnicas de evaluación para la mejora del aprendizaje en sus escuelas. Tales estudios deberían analizar y examinar las políticas educativas, las normas de evaluación, los cursos de preparación y entrenamiento del docente, y los programas de estudios de los estudiantes en aquellos países que fomentan el uso de la evaluación para el aprendizaje.

Por otra parte, se recomienda llevar a cabo estudios similares basándose en técnicas y herramientas alternativas de evaluación tales como portafolios, entrevistas y técnicas de observación, etc. con el fin de acercarse más a las reflexiones y creencias del profesorado en relación con los métodos de evaluación para el aprendizaje, así como los cambios que podrían experimentar estas creencias y conseguir reacciones y respuestas (feedback) basadas en experiencias in situ respecto a la evaluación de las herramientas del aprendizaje.

Tal y como muestran los resultados del estudio, los docentes no suelen usar por regla general nuevas tecnologías a la hora de evaluar a sus estudiantes, y por ello sería recomendable diseñar un estudio para investigar si el enfoque de la evaluación de los

futuros docentes está relacionado con sus conocimientos en nuevas tecnologías en materia de evaluación, el contenido de dicho conocimiento y su contenido pedagógico y la materia pedagógica de dicho conocimiento.

Por otra parte sería recomendable llevar a cabo una replicación del mismo estudio pero con el uso de una rúbrica diseñada y desarrollada por un profesor y sus alumnos/as, en lugar de que la rúbrica haya sido adoptada desde una fuente externa, así como hacer una réplica del mismo estudio utilizando una rúbrica electrónica.

PALABRAS CLAVE: Evaluación para el aprendizaje, Creencias del profesor, Profesores de Matemáticas, Educación Secundaria, Rúbricas holística y analítica, Evaluación por pares, Autoevaluación.

CHAPTER ONE: INTRODUCTION

1. Introduction and justification

Through my experience as a school and a university student, I realized that our teachers used traditional evaluation methods, which aimed to assign grades to students' work. This way of assessment and evaluation shaped our learning strategies where the grade, not learning was our goal. We learned according to teachers' style in examination, focusing mainly on rote learning, and ignoring genuine understanding. Evaluation process was detached from learning process; I realized that neither students nor teachers see that the evaluation process is an important component of teaching and learning process.

On the other hand, through my experience as a mathematics teacher, for primary and secondary levels in Palestine, I had the opportunity to understand many problems that face Palestinian teachers. Some of these problems were that the evaluation policy at Palestinian schools focuses mainly on paper and pencil exams and the evaluation content concentrates on memorizing facts, skills and definitions which are the most basic and simple mathematical knowledge. Palestinian students are used to traditional methods of evaluation, and are not accustomed with assessment and evaluation methods used in national standardized test s such as the PISA and the TIMSS exams.

Thus, the current Palestinian evaluation system at primary and secondary schools needs improvement. There is a need for experts to upgrade the Palestinian evaluation policy and practices. This motivated me to carry out this study in a well-developed country such as Spain. This study allows me to explore the evaluation policies and practices in Spain based on actual experience, which is expected to develop my ability in enhancing Palestinian evaluation system and practices. In addition to acquiring experience from Spanish teachers in the field, the learning courses at the University of Granada are expected to provide me with the latest knowledge related to evaluation policies and practices at schools.

Studying in Spain in general and doing this research in particular are considered a discovery journey for me. Having the chance to understand the Spanish educational system through the eyes of the participant, exploring teachers' beliefs about assessment for learning were my main goals, as understanding teachers' beliefs affect their decisions when choosing an evaluation method.

Beliefs derive actions; affect what people perceive and how people behave (Yero, 2010). For any new educational program, if teachers believe that this program is based on solid foundation, they will find ways to make it works. So, teachers rely on their core belief systems rather than academic knowledge when determining classroom actions (Nespor, 1987). Stiggins (2004) asserted that we need to change our understanding of assessment, and rethink of the relationship between assessment practices and schools effectiveness, "if we wish to create a different reality and tap the full potential of assessment as our ally in improving student learning, we must refocus our efforts around new overarching assessment beliefs" (Stiggins, 2004, p.26). Therefore, this case study aims to explore secondary mathematics teacher's beliefs about using rubrics as an assessment for learning tool, the forms they use to assess their students, and the changes that happened to their beliefs. It also explore about integrating rubrics as learning and assessment method after applying a rubric as assessment for learning method by secondary graders in a public school in Spain. This kind of studies seems highly relevant according to the National Council of Teachers of Mathematics (NCTM) "assessment should not merely be done to students; rather, it should also be done for students" (2000, p. 22).

Assessment directly contributes to learning both by clarifying what is desirable and by closing a feedback loop between students learning, efforts, and their achievements. Telling the student what is required will assess them to direct their own effort (Isaacs, 2001).

Today's mathematics education philosophy is influenced by the constructivists' perspective which states that students should learn to connect, organize and integrate mathematical knowledge in order to actively construct their own learning experience (NCTM, 2000). In accordance with this current view, evaluation in mathematics

curriculum now focuses more on assessing problem solving skills and advanced mathematical thinking skills such as reasoning, communications and mathematical connection skills (NCTM, 2000). Frankland (2007) agreed that the different learning outcomes need a different assessment method.

This requires assessment techniques that focus on assessing what students know as well as what they do not know, and called for the use of multiple and complex assessment tools including written, oral, and demonstrations formats. Therefore, alternative assessment tools, such as rubrics, concept maps, portfolios, student journals, self-assessments, and peer/group assessments are necessary to determine what students actually known and where they are in the learning process (Anderson, 1998; Birgin, 2011).

Rubrics are not only an assessment method but also instructional illumination (Popham, 1997). Hence, unless teachers believe that rubrics are useful assessing and learning tool, and not time wasting program, rubrics will not be seriously used in classroom practices.

Rubrics not only are valuable to teachers, but also are helpful to students as well. "Instructional rubrics make teachers' expectations very clear. Traditionally, educators have kept their criteria and standards to themselves. The answers to the test were secret, and teachers tended not to articulate what counted when they gave grades" (Andrade, 2000, p.15). The rubric of an assignment helps students to know what is expected of them and allow them to self-regulate by empowering them to monitor their learning and evaluate their own work. Rubrics also provide students with the needed feedback about their strengths are and weaknesses in order to enhance their work (Andrade, 2000).

Good body of literature describes rubrics as an assessment for learning tools (Hafner and Hafner, 2003; Luft, 1997; Popham 1997; Stuhlmann, Daniel, Dellinger, Denny and Powers (1999); Wiggins, 1991; Pessoa, 2012). Rubrics fulfil the requirements mentioned by Shepard (2001). First, rubrics are used to assess significant assignments, which are designed to measure types of higher order learning, such as complex thinking, information processing, and effective communication (Marzano, Pickering and McTighe, 1993). Second, rubric-referenced assessment is an ongoing process integrated

with instruction. Teachers prepare rubrics before instruction to clarify learning goals and to spell out quality levels. Next, students use rubrics in conjugation with self and peer assessment in an ongoing reflection and evaluation process of their performance (Andrade, 2000; 2005; Andrade, Du and Wang, 2008; Cooper and Gargan, 2009; Goodrich, 1997). By this way, students become thoughtful judges (Goodrich, 1997).

Alternative assessment is based on the constructivism philosophy, Piaget's and Vygotsky's emphasize the importance of students constructing and supplying responses rather than selecting or choosing them (Dogan, 2011).

Johnsen (1996) added that the purposes of alternative assessment are to motivate students to do their best work, build the self-confidence and self-concept of students, show improvement in students' work over time, and show the best work of students in a specific area. Alternative assessment require that students to have a clear understanding of what they are expected to do and learn. In partnership with their instructors, students monitor and adjust their own progress and play a role in communicating evidence of their own learning (Stiggins, 2005).

Alternative assessments encourage students to think critically and draw their own conclusion to complex problems rather than asking them to select answers to short, discrete questions - often devoid of real world context or application. Alternative assessments require students to create extended responses, using multiple modes of representation (Travis, 1996).

Nasri, Roslan, Sekuan, Bakar, and Puteh (2010) on their study that aim to understand teachers perceptions on using alternative assessment, pointed that teachers perception should be taken in consideration before integrating any alternative assessment, because if the teachers have positive perceptions on alternative assessment, they will support the assessment and make sure the alternative assessment succeeded in reality.

Pajares (1992) pointed that the teacher is the key in any educational reform, so when trying to enhance the assessment system in education we have to start from teachers' beliefs, since their beliefs affect their practices, as well as the instructional and assessment methods they choose.

After reviewing previous researches that are related to assessment for learning, it is found that there is absence of researches that focus on discovering mathematics teacher's beliefs about assessment for learning at a secondary school in Spain; hence, this study is expected to add to the knowledge assessment for learning.

Resulting from this investigation, educators would be able to draw a clear picture about teacher's beliefs, assessment for learning, and integrating a new assessment form "rubric" in a secondary mathematics class. In this study, I am not going to evaluate or generalize; I will rather listen, interpret, and try to understand teacher's beliefs about assessment for learning. Understanding these beliefs will be beneficial to teachers and principals in Spain, because they will have the opportunity to know other beliefs and experiences, which will allow them to reflect, appreciate and understand others points of view .

Decision-makers in Spain and other sectors could also benefit from this study. They will have a feedback about the current assessment forms in secondary mathematic classes, the reasons that prevent teachers from applying new forms of assessment; also it will highlight the effect of using the rubric on teacher's beliefs. This feedback could influence their strategic plans to enhance assessment practices at secondary school.

Researchers could also benefit from reading the results of this research, they could find some strengthen points in teacher's beliefs which need further study; and also, they may find some problems that had to be solved. Thus, the findings of this study may help every one of them to reflect on current classroom practices and plan for reform steps and; as a result, our students will enjoy higher level of education.

For me as a researcher, the benefit is expected be double. As an international student, conducting this research will expand my knowledge of Spanish culture and the school assessment system in Spain. Also, I will be able to carry the knowledge and understanding I will gain to my home country. The knowledge produced at the end of this journey could provide teachers, principals, researchers and decision makers in Palestine with some ideas or models to analyze and reflect on, in their pursuit to enhance education for Palestinian students.

2. Statement of the problem

During the early 1980, Spanish governments had implemented a large amount of legislation that aims to enhance students' performance. Some of this legislation focused on educational reform and on extending the period of compulsory education to 16 years. However, Spanish students' performance has not met the expectations. High rates of school leaving, high rates of school failure, in accompany with poor educational standing among European Union and The organisation for Economic Co-operation and Development (OECD) countries highlight serious problems in the Spanish educational system (Mora, Escardíbul and Espasa, 2010; Peraita, and Pastor, 2000).

In the Spanish educational context, the meaning of evaluation has been strongly contaminated; it is usually identified with exam, final test, and qualification (Rico, 1992). Despite the wide spread efforts to change the overall philosophy of assessment, many mathematics teachers' still use multiple-choice and short answer question exams to assess students' progress in mathematics. These formats assess mainly memorization and recalling of facts and do not assess higher order-thinking. These assessment methods do not encourage creativity and innovation, so the traditional teaching and assessment strategies create distance between students and lecturers and encourage students to focus on retention of facts (Kim and Noh, 2010).

Wiggins (1993) asserted that the main problem in any assessment reform must take in account aligning assessment with learning. Stiggins (2004) asserted that educators still assess student learning the way their predecessors did 60 years ago because they have not been given the opportunity to learn about these new strategies that enhance students learning.

The actual model of evolution in Spain is basically centered on paper and pencil tests in which students must demonstrate their mastery of facts, skills and definitions which are the most basic and simple mathematical knowledge. Rarely proposed students with creative activities or assessed their competence to deal with tasks no previously tested and those with which test all their knowledge in a particular field (Rico, 1992).

The current assessment and grading procedures help some students to succeed rather than helping all students, and it's causing harm to huge numbers of students. And there is harm caused directly from the failure in connecting assessment to school improvement in meaningful ways (Stiggins, 2008).

Borasi (1990) pointed that assessment practices that teachers use send a powerful message to students about what types of mathematical thinking and content are valued. The choice of these assessment practices is highly affected by their beliefs about assessment and learning (Beswick, 2008; Pajares, 1992; Wilkins, 2008).

Buhagiar (2007) argued that in order to provide every one with the best learning opportunity, traditional ways of assessment should be replaced by alternative forms of assessment:

> "If we truly believe in inclusion and diversity-which builds on the understanding that everyone is capable of learning and worthy of the best possible investment in his or her education-it becomes unsustainable to continue using an assessment model that has traditionally developed to focus on selection, certification and accountability"(p.41).

Recently the need for students who have cognitive skills such as problem solving, critical thinking, analyzing data, and presenting them orally and written format have increased that demand alternative forms of assessment to assess both learning process and learning outcomes (Dochy, 2001). NCTM (1995) recommended that assessment should contribute to students' learning. Black and William (1998a) pointed that; assessment should be integrated in the teaching and learning process. Assessment is to be seen as a moment of learning, and students have to be active in their own assessment and to picture their own learning in the light of an understanding of what it means to get better.

Having a look at the current educational system in Spain we can notice that it suffers from high rates of school failure 25.9%, high rates of school leaving 28.4%, and lower achievement at standardized tests such as the Program for International Student Assessment (PISA) than the OECD average in Mathematics, Science and Language. In addition, the Global Education Digest 2012 shows that the southern region of Spain

(Andalucía) suffers most with school failure rates of 39.0% and school leaving rate of 36.7%. Moreover, the students in Andalucía score much lower at Program for International Student Assessment (PISA) than the Spanish average. The PISA (2009) report shows that Andalucía's scores in math, science and language are 462, 469, and 461 respectively (UNESCO, 2012a).

The EU sat a goal to reduce early secondary school leaving rates to below 10% by 2020. The 2020 target is considered a rising priority given the fact that 53% of early school leavers were unemployed in 2010. EU member states are seeking to adopt targeted measures to high-quality technical and vocational education and training intended to meet the needs of young people and employers. Lifelong learning strategies are also acknowledged as an effective tool to facilitate access to the labor market among young unemployed and low-skilled adults. However, according to the Council of the European Union and the European Commission (2012), European Union (EU) member states have made slow progress towards achieving this target. The highest dropout rates are found in Malta 37%, Portugal 30% and Spain 29%, and the lowest rates in Slovakia 4%, the Czech Republic 5% and Slovenia 5%.(UNESCO, 2012 b).

Moreover, Spanish students performed poorly relative to other EU member states in standardized tests. In PISA (2009), Spain achieved below the OECD average. The Spanish students have scored 481 in reading, 483 in mathematics, and 488 in science. Were the OECD average is 493, 496 and 501 respectively, also remarked the difference with other EU countries, such as Finland 536, 541 and 554 or the Netherlands 508, 526 and 522 (UNESCO, 2012b).

In addition, the Trends in International Mathematics and Science TIMSS (2011), results showed that the average of all the countries participating in TIMSS-Math is 491. Spain has 482 points, below the OECD average. Romania and Poland are the only European countries that have lower average score than Spain, although the differences are not significant. The difference from English-speaking countries such as England or the United States is about 60 points. The distance score with Hong Kong-China, the country with the highest average is 120 points (PIRLS, 2012).

The need to make changes in student evaluation methods from "assessment of learning" through "assessment for learning" is widely demanded, we need assessment that concentrate on the quality of learning rather than examination and grading. It must aim to develop students' creativity and practical abilities to help students to give meaning to their learning (Kim and Noh, 2010).

Therefore, this case study aims to explore secondary mathematics teacher's beliefs after and before using a rubric as an assessment for learning tool, as teacher's beliefs affect their teaching and evaluating decisions (Nespor, 1987; Pajares, 1992). In addition, it highlights the forms they use to assess their students, and the changes that happened to their beliefs. In addition to the difficulties that faced the teacher and the students in using the rubric.

3. Purpose of the study

As a researcher, I am to develop an understanding of teacher's beliefs about using the rubric as an assessment for learning tool, and the strategies they use to assess students' understanding. Also this study will highlight the reasons that prevent teachers from applying new forms of assessment, since scholars agreed that teacher's beliefs affect their classroom practices and decision–making (Nespor, 1987; Pajares, 1992). So, the main focus of this research is exploratory, descriptive and interpretive in nature.

This study will spot the light on the rubrics as an assessment for learning format which teachers can use in the classroom to collect information that helps them to understand and support both learning and teaching processes.

Scholars agree that teacher's beliefs affect their teaching and evaluating decisions (Nespor, 1987; Pajares, 1992). Bliem and Davinroy (1997) asserted that if a researcher aims to improve education by integrating a new assessment strategy, he or she should understand the beliefs underlying teacher's approach to evaluating their students. So in order to use assessment for learning, the beliefs of teachers about it should be explored in order to start planning toward a fundamental shift in teachers own thinking (Stiggins, 2008).

4. The objectives of the study

This study was designed to investigate teachers' beliefs about using the rubric as an assessment for learning tool in a secondary mathematics class, as teacher's beliefs affect their classroom practices and decision–making (Pajares, 1992).

Specifically, the study sought:

O1: To understand teachers' beliefs about assessment.

O2: To describe the assessment strategies they apply in the classroom.

O3: To analyze the reasons that prevents teachers to apply new forms of assessment.

O4: To use rubric as an assessment for learning tool and spot the light on students and teachers opinion about its benefits, and the difficulties they face when using it.

O5: To help teachers reflect on the current practices that they use to assess their students, in order to enhance it.

O6: To understand the changes could happen to the teachers' beliefs related to the use of rubric.

5. Concept map

The map presents the flowchart of the work, starting with determining the main goals of this research, and then the literature was reviewed in order to have better understanding of the research topic, and to have a clear idea of what others have written about this topic.

The study methodology was chosen to address the purpose of this study, the qualitative research method was used, and the sampling method is purposeful sampling, where two math teachers, who can speak Spanish and English languages and who are also interested in using rubrics for assessment, were involved in this study.

More than one method was used to collect the data triangulation: rubric, interviews, and diary and students' questionnaire and exam. The interview consists of four sessions, two sessions to be applied before using the rubric and two after using the rubric, the teachers were asked to write a reflective diary to describe their experience with using the rubric.

*Concept map:

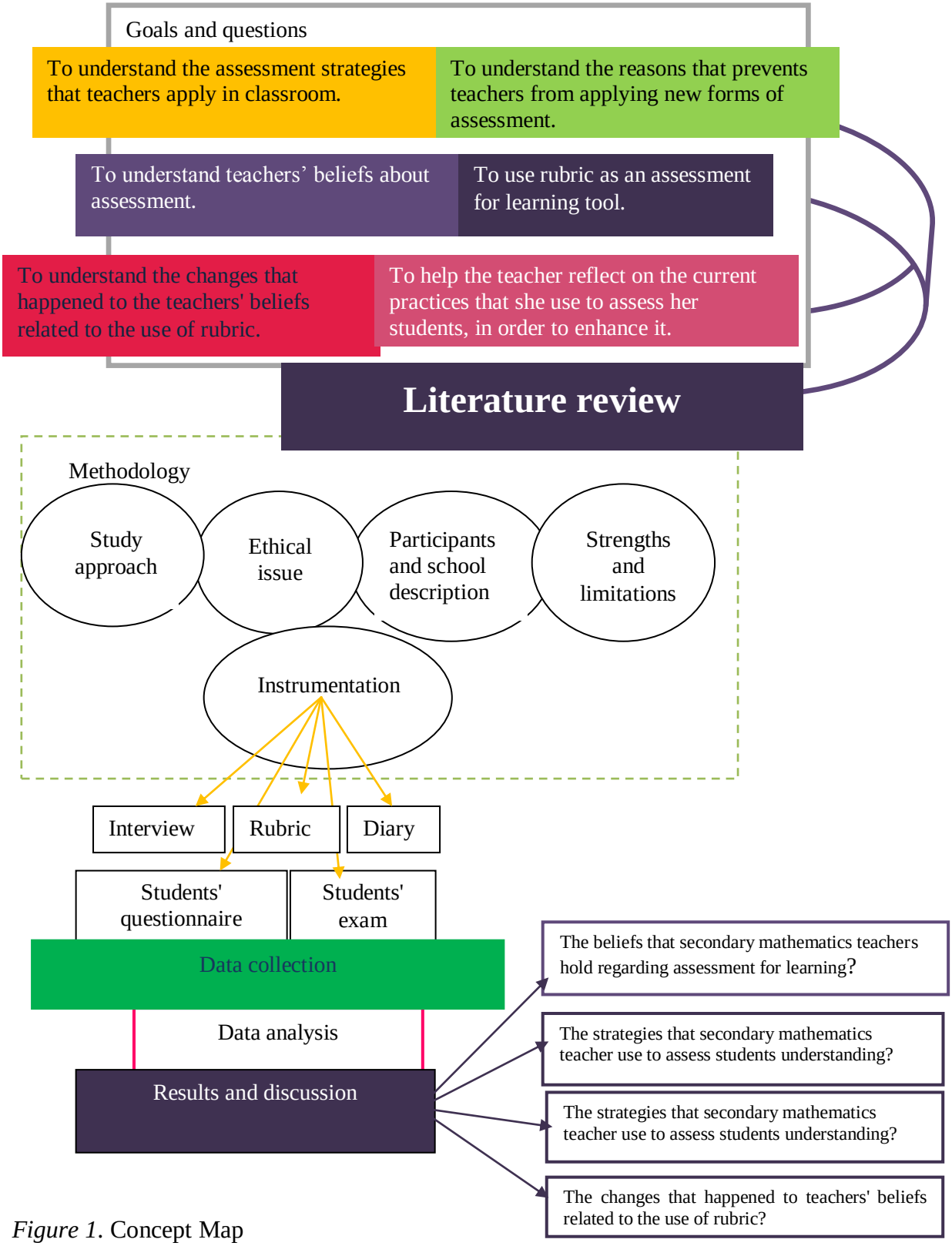


Figure 1. Concept Map

At the end of the teaching unit the students had an exam, and they were asked to correct it in peers using the rubric, the teachers were asked to reflect their opinions about the results. Also students' open-ended questionnaire was used to explore their perceptions about rubrics as a method of learning and assessing. The research design, along with the methods engaged for the purpose of data collection and analysis are outlined in the subsequent sections.

Data was analysed by using Nvivo software, and the literature was reviewed in order to convert the theoretical structure of each category and the relation upon them into an empirically based theory.

6. Overview of the report structure

This thesis is organised in six chapters, while the first introductory chapter present the introduction, the study problem, the purpose of the study, and the research questions.

The second chapter present a review of the literature; the literature was reviewed in order to have better understanding of the research topic, and to have a clear idea about what other researchers have written about this topic. Where attention is drawn to teachers' beliefs, relationship between beliefs and knowledge, assessment and learning, as well as formative and summative assessment, peer and self- assessment, rubric, how to design a rubric, it also includes definitions of terms.

The third chapter outlines the methodological framework adopted in this study. The study methodology was chosen to address the purpose of this study, the qualitative research methods was used, and the sampling method was purposeful sampling, where two math teachers, who can speak Spanish and English languages and who were also interested in using rubrics for assessment, were involved in this study. More than one method was used to collect the data triangulation: rubric, interviews, and diary and students' questionnaire and exam. The interview consists of four sessions, two sessions to be applied before using the rubric and two after using the rubric, the teacher was asked to write a reflective diary to describe her experience with using the rubric, at the end of the teaching unit the students had an exam, and they were asked to correct it in

peers by using the rubric. Teachers were asked to reflect their opinion about the results of their students. Also a student's open-ended questionnaire was use to explore students perceptions about rubrics as a method of learning and assessing.

Also this chapter include participants and school description, assumptions underlying the method, strengths and limitations of the method. And finally considerations of ethical issues pertinent to this study are addressed.

Chapter four, attention is turned to the vertical or *within case analysis* using the Nvivo software. The major themes, with attendant sub-themes were articulated. The individual teacher was taken as the unit of analysis. This careful transcribing and coding of the data resulted in an individual, structured case report for each teacher *"teacher A and teacher B"*, which was feedback to the participant for communicative validation, encompassing all the results of the analysis as well as illustrative interview and diary fragments.

The fixed structure in the individual reports was the starting point for the horizontal or *cross-case analysis* where we looked for systematic differences similarities across the two cases (e.g., supporters and opponents). The findings are explored with reference to relevant literature and attention paid to aspects that were expected, and those were not, indications are provided of where the current findings support those of the earlier studies in the literature, and where they diverge.

The finding and the discussion is presented in four sections. The first section presents teachers' beliefs about assessment, and the second section present the changes that happened to the teachers' beliefs related to the use of rubric. The third section presents the methods that a secondary mathematics teacher uses to assess their students, and the last section presents the reasons that prevent teachers from using new forms of assessment.

Chapter five present summarises the key findings. In closing, the contribution of this study, the limitations and the implication of the study and advances some recommendations for further research.

CHAPTER TWO: LITERATURE REVIEW

1.Introduction

The chapter presents a summary and discussion of the major documents that concern on assessment for learning using rubrics. The discussion takes into account the methods and the results or findings of the most relevant researches.

This chapter is divided into four main sections. The first section gives an overview on teachers' beliefs, the changes of teachers' beliefs and the relationship between beliefs and knowledge. The second section spot the light on competences evaluation, assessment for learning, formative and summative assessment, and peer and self-assessment. The third section presents information about introducing rubric and overview studies about rubric. Finally, the last section presents types of rubrics, debate on using rubrics and how to develop a rubric.

2. Teachers' beliefs

Pajares (1992) asserted that beliefs in the literature can be called on different forms, for example conceptions, perceptions, attitudes, values, judgments, opinions and dispositions.

Yero (2002) defined beliefs as judgments and evaluations that people make about themselves, others and the world around them. He considered beliefs as generalizations about things such as causality or the meaning of specific actions.

The term teacher's beliefs usually refer to educational beliefs held by a teacher that has to do with specific domain such as teacher efficacy, motivation and self-esteem (Pajares, 1992). Wallace and Kang (2004) added that teacher's beliefs about teaching involve their beliefs about students, learning, and nature of science, epistemology and roles of teachers.

A growing body of literature shows that mathematics teachers' beliefs affect their classroom practices (Pajares, 1992; Beswick, 2008; Wilkins, 2008). Nespor (1987) asserted that teachers rely on their core belief systems rather than academic knowledge when determining classroom actions. In addition, beliefs play a major role in teachers' decision-making about curriculum and instructional tasks. Bandura (1986, cited on Ballone, 2001) asserted that behavior is better predicted from an individual's beliefs and that beliefs are believed to be the best indicators of the decisions individuals make throughout their lives. He also revealed that people regulate their level and distribution of effort in accordance with the effects they expect their actions to have. Pajares (1992) showed that teachers' beliefs have valuable function including evaluation, making assumptions and comparison. He also added that teacher's beliefs strongly influence perception and strongly affect behavior.

Yero (2002) posited that there is an interactive relationship between beliefs and actions. Beliefs are thought to drive actions; at the same time, beliefs not only affect how people behave but what they perceive (or pay attention to). If teachers believe a program they have been told to use is based on a solid foundation and if the program is based on beliefs similar to their own, they will notice ways in which the program works. If what they believe is a waste of time, they will notice evidence supporting that belief. It is imperative to recognize that teachers are interpreting the same events in different ways. They unconsciously assign different meanings to the event in order to support their prior belief. As a result, teacher beliefs play a critical role in defining behaviour and organizing knowledge and information. Therefore, understanding of beliefs structures of educators is essential to improving teaching practices as they ultimately affect the behaviour of the teacher in the classroom (Ballone, 2001).

Hampton (1994) noted that teachers believes determine classroom actions, these beliefs may be general or very specific, some of these beliefs are changeable but others are difficult or impossible to change. The teacher beliefs system is dynamic and changeable through assessment of their experiences and beliefs; and added that teachers reconstruct their beliefs system continuously (Breiteig, Grevholm and Kislenko, 2005).

Mapolelo (2003) studied whether changes in teachers' beliefs accompanied changes in their classroom practices and more importantly, what influenced the teachers to commit

to change. The results reveal that one from the two participants modified some of his beliefs about mathematics teaching. The changes identified indicated a shift in perception of the teacher as an authority to that of a teacher concern with initiating a learner-centred process and using students' knowledge and errors as starting points. The other participant's perceptions of the teacher remained to be of authority; giving explanations and demonstrations followed by students doing assigned problems. The results, however, reveal that the two participants' beliefs on how to learn mathematics changed from emphasizing algorithms to understanding concepts.

Hough, Pratt and Feikes (2006) conducted a research that aimed to measure changes in preserves elementary teachers' beliefs in mathematics content courses. Results show that prospective elementary teachers can change their beliefs about mathematics and it can be changed by focusing on how children learn and think about mathematics.

Teachers' believes some times led students to panic and anxiety. For example, if a teacher believes that mathematics is a collection of rules and procedures, then success in mathematics is determined by one's ability to memorize the rules and procedures and produce them at appropriate moments in the problem-solving process. For routine exercises and practice problems, this belief system allows success and comfort. If an appropriate rule or solution path is not apparent during a problem-solving situation; however, the learner is at a closed way since there is no mechanism in place for modifying and/or developing rules or procedures. This situation causes feelings of panic, inadequacy and anxiety (Carter and Yackel, 1989).

Stiggins (2004) argued that to believe that once a year standardized assessments alone can provide sufficient information and motivation to increase student learning is a mistake we have made at all levels and added that the main problem that our assessment systems have been built on a fundamentally flawed set of beliefs is how to use assessment for educational improvement. These mistaken beliefs have forced educators to approach standardized testing far more as a matter of compliance with political demands for test scores than as a matter of pedagogy.

He cited four wrong commonly held beliefs about the use of assessment as a school improvement tool:

Mistaken belief 1. High-stakes standardized tests are good for all students because they motivate them to learn.
He argued that High-stakes tests without supportive classroom assessment environments harm struggling students.

Mistaken belief 2. It is the instructional decisions of adults that contribute the most to student learning and school effectiveness.
He argued that students are crucial instructional decision makers whose information needs must be met.

Mistaken belief 3. The instructional decisions that have the greatest impact on student learning are those made once a year.
A more productive belief in his opinion, the instructional decisions that have the greatest impact are made day to day in the classroom.

Mistaken belief 4. Teachers and administrators do not need to know about and understand the principles of sound assessment practice -the professional testing people will take care of that for us.

He argued that teachers must possess and be ready to apply knowledge of sound classroom assessment practices. Therefore, the new belief must be that, without question, teachers need to know and understand the principles of sound assessment (Stiggins 2004).

Grimison (1992) on his paper titled attitudes of some New South Wales secondary mathematics teachers to alternative methods of assessment in mathematics analyzed the reasons beyond the firm belief that using tests in mathematics will be fairer on all the students, that mathematics teacher's hold as follows:
* Secondary mathematics teachers have been opposed to use alternative methods of assessment and relay on traditional forms of assessment that based on written exams, as they were used to the traditional forms of assessment, they themselves were assessed by these forms and they consider it to be fair and equal.

* On the other hand, mathematics is seen to be objective in comparison to subjects as humanities and social sciences, which make it more objective to correct and mark mathematics assignments compared with essay on Humanities and social Sciences.

Tasouris (2009) in his research that aims to investigate physics teacher's beliefs in Cyprus about the use of technology in the classroom pointed that the key issues regarding the use of technology in the classroom are teachers' beliefs about both technology and teaching and learning and the nature of physics education itself.

An, Kulm and Wu (2004) illustrated two kinds of teaching beliefs regarding students' learning, learning as knowing and learning as understanding. Teachers who hold the belief of learning as knowing are often satisfied with students' knowing or remembering facts and skills but are not aware of students' thinking or misconceptions about mathematics and this led to a disconnected knowledge. On the other hand, teachers who belief in learning as understanding, realize that knowing is not sufficient, they make sure that their students understand and are able to apply the concepts and skills, teachers who hold this belief, develop systematic and effective ways to identify and develop their students' thinking.

Adnan (2010) conducted a research to determine the beliefs of pre-service mathematics teachers; he divided teacher beliefs into three categories, beliefs about mathematics as nature, beliefs about learning mathematics and beliefs about the teaching of mathematics. The findings showed that pre-service teacher's beliefs mathematics can be used in everyday life. For the beliefs about learning mathematics, the respondents agreed that students should be able to give reasons to support each solve mathematical problems. And about the beliefs on mathematics teaching, the respondents agreed that the teaching of mathematics to students should be encouraged by explaining the mathematical ideas.

Chong, Wong and Lang (2005) asserted that teachers' beliefs play an important role in the acquisition and interpretation of knowledge and how hidden beliefs may hinder the integrating of new teaching methods.
They classified two main categories of beliefs, attitudes and expectations that pre-service teachers hold towards teaching and professional development:

1. Beliefs, attitudes and expectations towards teaching and the teaching profession.
2. Beliefs, attitudes and expectations of the teacher preparation programme.

Beswick (2008) in his study that aims to identify particular centrally held beliefs of secondary mathematics teachers that underpinned the establishment of classroom environments that were consistent with the principles of constructivism identified nine beliefs. This identification was held by one or the other of two teachers and it was classified into three categories as follow:

- Beliefs about the nature of mathematics.
- Beliefs about mathematics learning.
- Beliefs about the role of the teacher.

Chester and Quilter (1998) in their study that aimed to understand the in-service teachers' perceptions of educational assessment asserted that teachers' perceptions play a major role in choosing or misusing different forms of assessment and that teachers' perceptions of classroom assessment affected their assessment classroom practices and that in-service training should focus on helping teachers see the value of assessment methods rather than "how to" do assessment.

Ponte (2001) in his study that investigated the role of teachers' beliefs and knowledge about assessment and instruction indicates that teachers' participation in the design and implementation of portfolio assessment holds promise as a tool to help teachers reflect on their own practices and that portfolio assessment has the potential to provide students with learning environments aligned with current reform efforts of language education and that teachers need support when trying out these new forms of assessment and they need to be given several opportunities to try them out.

Guthrie (2005) conducted a research in which she investigates teachers' beliefs about techniques adopted in the name of formative assessment. The study critically evaluates whether techniques adopted can be considered as formative assessment conceptualized as 'assessment for learning' and whether these techniques change teachers' ideas about teaching writing. A multi-method approach was used, incorporating positivist and interpretative dimensions. Views of teachers were gathered using a self-completed

questionnaire and semi-structured interviews. Views of student were collected using students response templates. Further evidence was collected using direct lesson observations and documentary analysis of teacher's short-term planning for literacy, targets set for literacy and samples of children's writing (Guthrie, 2005).

Most teachers found that the formative assessment techniques they adopted of sharing learning intentions, planning and modeling success criteria had a positive impact on specific elements of their teaching. Some results highlighted that these formative assessments techniques could not be globally applied across the full primary age-range. The research suggests that approaches based on more behaviorist traditions were more applicable for younger children; they also showed that the techniques promoted comprise only the teacher-centered. Aspects of formative assessment if a more robust approach is to be used, in order to promote a more authentic approach to assessment for learning the student dimensions of formative assessment need to be much more actively encouraged (Guthrie, 2005).

Susuwele-Banda (2005) conducted study that investigated teachers' perceptions of classroom assessment in mathematics, and their current classroom assessments practices. The study reveals that teachers perceive classroom assessment as tests that teachers give to their students at specified time intervals and since teachers perceived classroom assessment as tests, they showed limited ability to use different methods and tools to assess their students while teaching. The teachers' perceptions of classroom assessment have influence on their classroom assessment practices and that teacher experience and teacher education program did not seem to contribute much to teachers' perceptions of classroom assessment; however, teacher's academic qualification seemed to influence teachers' flexibility to accept new ideas.

Pajares (1992) offered some findings and some inferences and generalizations about teachers' beliefs that could be taken in consideration when initiating a study of teachers' educational beliefs:

- Beliefs are formed early and tend to self-perpetuate, persevering even against contradictions caused by reason, time, schooling or experience.
- Individuals develop a belief system that houses all the beliefs acquired through the process of cultural transmission.

- The belief system has an adaptive function in helping individuals define and understand the world and themselves.
- Knowledge and beliefs are inextricably intertwined, but the potent affective, evaluative and episodic nature of beliefs makes them a filter through which new phenomena are interpreted.
- Thought processes may well be precursors to and creators of belief, but the filtering effect of belief structures ultimately screens, redefines, distorts or reshapes subsequent thinking and information processing.
- Epistemological beliefs play a key role in knowledge interpretation and cognitive monitoring.
- Beliefs are prioritized according to their connections or relationship to other beliefs or other cognitive and affective structures. Apparent inconsistencies may be explained by exploring the functional connections and centrality of the beliefs.
- Belief substructures, such as educational beliefs, must be understood in terms of their connections not only to each other but also to other, perhaps more central and beliefs in the system.
- By their very nature and origin, some beliefs are more incontrovertible than others are.
- The earlier belief is incorporated into the belief structure, the more difficult it is to alter.
- Newly acquired beliefs are most vulnerable to change.
- Belief change during adulthood is a relatively rare phenomenon, the most common cause being a conversion from one authority to another or a gestalt shift. Individuals tend to hold on to beliefs based on incorrect or incomplete knowledge, even after scientifically correct explanations are presented to them.
- Beliefs are instrumental in defining tasks, selecting the cognitive tools, make plan and decisions regarding such tasks; hence, they play a critical role in defining behavior and organizing knowledge and information.
- Beliefs strongly influence perception, but they can be an unreliable guide to the nature of reality.
- Individuals' beliefs strongly affect their behavior.
- Beliefs must be inferred and this inference must take into account the congruence among individuals' belief statements, the intentionality to behave in a predisposed manner and the behavior related to the belief in question.

- Beliefs about teaching are well established by the time a student gets to college.
- Pajares (1992) indicated that researchers should separate teacher's general beliefs and educational beliefs. In addition, that researcher should focus on specific areas of beliefs, which are important for their study. Considering Pajares indication, this particular study is focused on teacher's educational beliefs towards assessment and mathematics teaching including the use of rubrics.

2.1. Changes in teachers' beliefs

It has been assumed for some times that changing beliefs of teacher is difficult although not impossible, Hampton (1994) noted that teachers believes determine classroom actions, these beliefs may be general or very specific, some of these beliefs are changeable but others are difficult or impossible to change. Teacher beliefs system is dynamic and changeable; teachers reconstruct their beliefs system continuously (Breiteig et al. 2005). Pajares (1992) argued that teachers' beliefs seem to be drawn from previous vivid episodes or events in their lives. Kagan (1992) added that learning new theories and concepts may have little effect in changing preserves teachers' general beliefs about teaching practices.

Hart (2002) argued that since most beliefs are formed through experience over time, pedagogical practices that support constructivist theory can be nurtured by engaging novice teachers in constructivist experiences both in learning mathematics and in teaching mathematics. The experience alone does not ensure change, but certainly facilitates it. Change is limited when preservice teachers learn mathematics content differently than they learn mathematics methods. Given the limited amount of time preservice programs have to impact teacher development, if the mathematics content is taught by lecture and the methods courses use a constructivist environment, the experience is diluted and the chance for change is significantly decreased.

Through reviewing the literature about teachers' beliefs change, three perspectives were found. The first perspective suggests that it is very difficult to change teachers' beliefs. Tillema and Knoll (1997) examined action and belief change in teacher candidate who were engaged in a conceptual change process and found that while the changed some teaching behavior , they didn't change beliefs, they suggested that without changes in

beliefs, changes in performance will be superficial. Schram and Wilcox (1988) found that pre service teachers' beliefs about what it means to know mathematics were challenged when conceptual development, group work and problem-solving activities were emphasized during a mathematics content course. However, emphasizing these components had little effect on the pre service teachers' beliefs about what should be included in elementary school mathematics education.

The second perspective is that teachers' beliefs can be changed through special programs. Stuart and Thurlow (2000) redesigned the mathematics and science elementary methods class using mathematics beliefs, to challenge pre service teachers to explore long held beliefs regarding the nature of mathematics, themselves as learners and the teaching and learning process. The course met for 13-week semester , 4 days per week, for 2 ½ hour each day, excerpts from per service teachers journals and interviews and observations that many students did successfully reevaluate and change their believes about teaching mathematics and science method course.

Feiman-Nemser, McDiarmid, Melnick and Parker (1989) examined teacher candidates in an introductory course. And found that a number of conceptions changed, such as believing that teaching was more complex than they had originally thought, however while some changes may occur, change is not always found in all students depending considerably on the beliefs that they bring in to the class with them.

Hart (2002) added that there is substantial evidence that teachers' beliefs about mathematics affect their teaching of mathematics. Given this evidence, it is appropriate that teacher education programs assess their effectiveness, at least in part, on how well they nurture beliefs that are consistent with their philosophy of learning and teaching. To explore this perspective a study was conducted with preservice elementary teachers participating in an alternative certification program for teaching in an urban setting. Students were required to take 6 hours of mathematics and 6 hours of mathematics education taught as a seamless course over three semesters. Before and after the program students completed a mathematics belief instrument. Descriptive statistics were used to study trends across the group (N=14). Higher mean scores were found in all three parts of the post survey. Qualitative data were collected over the year in the form

of weekly teaching logs. Results suggest that the program was successful in changing preservice teacher beliefs.

Vacc and Bright (1999) examined changes in pre service elementary school teachers' beliefs about teaching and learning mathematics and their abilities to provide mathematics instruction that was based on children's thinking. The (34) participants in their study were introduced to Cognitively Guided Instruction (CGI) as part of a mathematics methods course. CGI is an approach to helping "teachers use knowledge from cognitive science to make their own instructional decisions" (Carpenter and Fennema, 1991, p. 10). Children's knowledge and the teacher's understanding of that knowledge are central to instructional decision making. Teachers plan instruction using research-based knowledge about children's mathematical thinking and well-defined taxonomies of problem types and children's solution strategies for arithmetic operations (Carpenter and Fennema, 1991). Teachers seek specific information about individual students' thinking and understanding and then adjust the level of content to match individual students' performance levels. Belief-scale scores indicated that significant changes in their beliefs and perceptions about mathematics instruction occurred across the 2-year sequence of professional course work, student teaching during their undergraduate program but that their use of knowledge of children's mathematical thinking during instructional planning, and teaching was limited.

Mapolelo (2003) in his research that aim to document whether changes in teachers' beliefs accompanied changes in their classroom practices and more importantly, what influenced the teachers to commit to change. The results reveal that one (from the 2) participant modified some of his beliefs about mathematics teaching. The changes identified indicated a shift in perception of the teacher as an authority to that of a teacher concern with initiating a learner-centered process and using students' knowledge and errors as starting points. The other participant's perceptions of the teacher remained to be of authority; giving explanations and demonstrations followed by students doing assigned problems. The results, however, reveal that the two participants' beliefs on how to learn mathematics changed from emphasizing algorithms to understanding concepts.

Hough et al (2006) studied the changes in pre service elementary teachers' beliefs in math content courses when utilizing a supplement designed to help them understand how children learn mathematics connecting mathematics for elementary teachers. Helping pre service teachers to understand how children learn and think about mathematics, may be one means of influencing their beliefs about mathematics, teaching mathematics, and how children learn mathematics (Vacc & Bright, 1999).

The CMET curriculum development project attempts to help pre service elementary teachers connect the mathematics they are learning in content courses with how children learn and think about mathematics and in so doing ties research on children's learning of mathematics to practice. For this reason, a supplement was developed that parallels the typical mathematics content course topics. The CMET materials primarily consist of descriptions, written for prospective elementary teachers, about how children think, misunderstand and come to understand mathematics. Results show that prospective elementary teachers can change their beliefs about mathematics and its teaching by focusing on how children learn and think about mathematics (Vacc & Bright, 1999).

Wong (2013) examines whether there are changes in students' teaching practices as a result of their experiencing an overseas Professional Development Course PDC this overseas PDC model is based on a sociocultural learning perspective, emphasizing that learning and professional growth depend on individual endeavor and improvement, which are socially and culturally situated. In addition, this study concentrate on the process of any such changes, and whether any changes found are sustainable in the long term. Therefore, the conceptual framework adopted by this study is the work of Brody and Hadar (2011), a four-stage model that is dynamic in nature. Although Brody and Hardar tested their model on a group of teacher educators, this study found their model perfectly applies to in-service teachers' professional development process. The four stages are (1) - anticipation and curiosity; (2) - withdrawal; (3) - awareness; and (4) - change. Three forms of data gathering are used, lesson observation, in-depth interviews and email correspondence, in order to compare and capture the fluidity of changes over time. Results indicate that the teachers' fundamental belief in certain concepts of teaching and learning did indeed change, but ultimately certain teaching practices could not be altered in the teachers' home country due to the reality of its assumptions about teaching.

Vaino, Holbrook and Rannikmaea (2013) conducted a research aim to explore the role of collaborative action research in eliciting change in teacher beliefs. The beliefs were those of five chemistry teachers in implementing a new teaching approach, geared to enhancing students' Scientific and Technological Literacy (STL). STL also includes the ability to apply scientific and technological concepts and process skills to the life, work and culture of one's own society. It therefore includes attitudes and values enabling one to distinguish between worthwhile or inappropriate uses of science or technology. The close cooperation, in the format of collaborative action research and especially through teacher group reflections and perceived collegial support, did support teacher professional development including change in their beliefs towards the new teaching approach.

The third perspective shows that teachers do not change their beliefs but they fit existing beliefs to their new experiences. Schram and Wilcox (1988) concluded that instead of changing beliefs, some pre service teachers fit existing beliefs to their new experiences. Ball and McDiarmid (1990), who indicated that many pre service teachers resisted change even when a course was designed specifically to challenge their underlying beliefs about mathematics education, supported these conclusions. Despite their experiences in the course, most of the pre service teachers in his study ended the course still believing that a teacher’s role is to explain the answer instead of to help students develop understanding. It appears that even full-time teaching during a teacher preparation program.

Two hypotheses are suggested, and have been investigated as to why perspective teachers' beliefs are difficult to change during the teacher education program (Richardson, 2003). One is suggested by Weber and Mitchell (1996) that certain of these beliefs and images are as powerful as to be impossible to change during the short teacher education program. Weber and Mitchell made this suggestion based on a study that asked teacher candidate and elementary teachers to draw a picture of an elementary school teacher, the overwhelming image was one of a pleasant, traditional, female teacher who points and explains.

The second suggestion is that programs designed to change teacher candidate beliefs probably should involve them in field work in class room such that they experience the

classroom and therefore develop beliefs on the basis of procedural and practical knowledge. This theory of change suggests that the teacher candidate experience dissonance in their understanding and beliefs as they enter the role of teacher that challenge their beliefs about teaching in the student role. Recall that one of the strongest influences on their entering beliefs is experience as students in the classroom. Thus, these students have developed a form of procedural beliefs over the period of up to 14 to 16 years; it will be very difficult to change these beliefs in some courses.

Kagan (1992) based on a review of 40 learning-to-teach studies conducted between 1987 and 1991 identified three elements that seem essential for changing pre service teachers' beliefs. First, pre service teachers need to have extended opportunities to interact with and study students. Second, the content of their university courses needs to be connected to the exigencies of classroom teaching; university courses need to focus on procedural knowledge and practical strategies as well as theory. Third, their field experiences need to include opportunities to work with classroom teachers who engage in ongoing self-reflection by questioning and reconstructing their own pedagogical beliefs.

Lowery (2003) found that change in teacher beliefs and/or practices can occur through reflection and discourse. Participation in learning activities that encouraged deep reflection and discourse led the teachers from her study to confront their own perspectives about the nature of mathematics. Teachers then developed a better conceptual understanding as they explored mathematics topics to inform instruction and assessment. Eventually, they acknowledged that their current testing procedures were inadequate and realized the need for further research. This realization led teachers to conduct their own personal action research and they discovered why there was a need for reform in assessment.

Posner, Strike, Hewson and Gertzog (1982) suggested that for existing beliefs to be replaced or reorganized, new beliefs need to be intelligible and appear plausible. For example, the framework underlying the content presented in mathematics methods courses needs to be consistent with the framework of the mathematics education program that pre service teachers observe and implement during field experiences. If the

two frameworks are in conflict, the theories and concepts presented during the mathematics methods course may not seem plausible and they may be rejected.

Becker and Pence (1996) however, report having identified several, aspects of the teacher development program were positively related to teacher change. They identified the need for support network as teachers tried to implement change, the opportunity for teachers to engage in conversations about mathematics teaching and learning and the length of time in staff development as some of the positive aspects of the program.

2.2. Relationship between beliefs and knowledge

There was debate about distinguishing beliefs from knowledge; Underhill (1991) asserted that "all knowledge is a set of beliefs" (p.5). Most scientific discoveries have started from the point that somebody believes in its validity and universality. If one does not believe in what one wants to prove then it is impossible to do that. According to constructivists knowledge without belief is contradictory (Confrey, 1990).

Leder, Pehkonen, Gunter and Torner (2002) summarised three dimensions which distinguish beliefs from knowledge:
-The degree of inter subjective consensus.
-The type of argument needed for the acceptance of beliefs and knowledge respectively.
-Knowledge is related to truth and certainty, while beliefs are more associated with doubts and disputes.

Philipp (2007) argued that many researchers defined knowledge as "belief with certainty", this notion that knowledge must be associated with truth has influenced many definitions of knowledge. Therefore this indicates that a belief is not knowledge unless it is true. This truth requirement alarms many, because the means by which truth is determined is debatable and the history of science indicates that what was taken as true at one point in time was generally modified or subsumed into more encompassing theories at other times.

Leder et al. (2002), asserted that individual beliefs result from different social contexts in which one participate and added that beliefs refers to what I believe to be true regardless the fact that others agree with me or not, regardless of the fact that others

"know" it to be true or not, from an epistemological perspective, beliefs are individual construct, while knowledge is essentially asocial construct, knowledge must satisfy a true condition but beliefs are independent in there validity.

McAninch (1993) highlighted three major sources of teacher beliefs: personal experience, experience with schooling, instruction and experience with formal knowledge –both school subjects and pedagogical knowledge.

Pedagogical content knowledge is defined as the knowledge of effective teaching which includes three components, knowledge of content that consists of broad mathematics knowledge as well as specific mathematics content knowledge at the grade level being taught, knowledge of curriculum which include choosing materials that is suitable for the goals and knowledge of teaching which include knowing students' thinking, preparing instruction and mastery of modes of delivering instruction (An, Kulm and Wu, 2004).

Shulman demonstrates that Pedagogical Content Knowledge (PKC) exist in the intersection between content knowledge and pedagogical knowledge, Shulman's asserted that this intersection contains within it, the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations and demonstrations in a word, the ways of representing and formulating the subject that make it comprehensible to others (Shulman, 1986, p. 9).

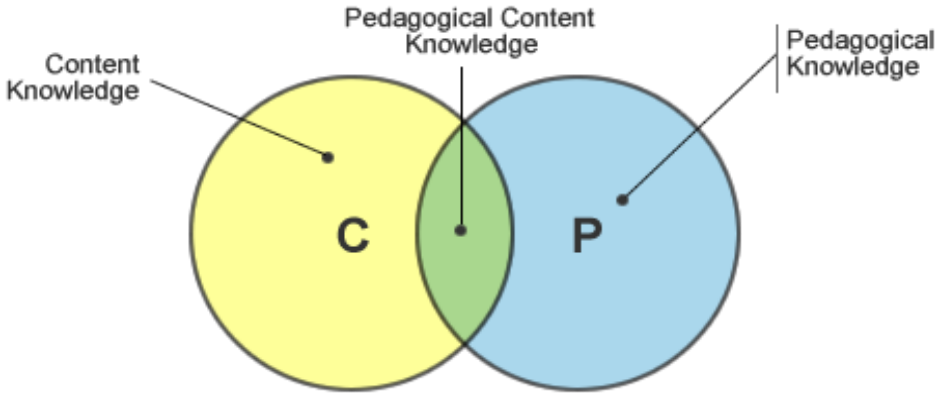


Figure 2. PCK exists at the intersection of content and pedagogy.

Park and Oliver (2007) identified five components of PCK for science teaching, they regarded them as "distinct components for the development of assessment tools for PCK", (1) orientations to science teaching, (2) knowledge of students' understanding in science, (3) knowledge of science curriculum, (4) knowledge of instructional strategies and representations for teaching science and (5) knowledge of assessments of science learning.

An et al.(2004) also revealed that there is an interactive relationship between teachers' beliefs and their pedagogical content knowledge, pedagogical content knowledge plays an important role in shaping teachers' beliefs and in determining the effectiveness of their mathematics teaching and in turns the teachers believes system have an important impact on their pedagogical content knowledge.

In order to understand the complex ways in which teachers think about how particular content should be taught and chose the suitable method of assessment, Schulman argued for "pedagogical content knowledge" as the content knowledge that deals with the teaching process, including "the ways of representing and formulating the subject that make it comprehensible to others" (Schulman, 1986, p. 9).

Acquiring PCK alone does not confer teaching expertise, but it is a useful starting point. PCK helps us recognize that mathematics teachers' knowledge of assessment is not relegated to domain-independent strategies, but rather entails considering what and how to assess in mathematics classrooms (Magnusson, Krajcik, and Borko, 1999).

Abell and Siegel (2011) organized assessment PCK into (a) - knowledge of assessment purposes, (b) - knowledge of what to assess, (c) - knowledge of assessment strategies and (d) - knowledge of interpretation and action taking. In addition to assessment knowledge, teachers' overarching ideas and beliefs about assessment guide assessment decisions in the science classroom (Abell and Siegel, 2011, p. 212). Thus, attending to teachers' ideas and beliefs about assessment is critical while preparing assessment-capable teachers (Black and Wiliam, 1998a).

Both discipline-specific knowledge of assessment principles and views about learning and assessment have led researchers to propose the notion of assessment literacy— what teachers should know and be able to do with assessment (Siegel and Wissehr, 2011).

King's College offered a model of the multi-layered relationship between Knowledge of students, Classroom Practices and Pedagogical Knowledge and teacher's own beliefs. They describe the need for a relationship between teachers' beliefs pedagogical knowledge and classroom practices to become a competent teacher. The King's College team also stresses the need for teachers to be aware of the relationship between knowledge of their students, their own pedagogical knowledge and craft skills and how these attributes can determine the nature of student responses (Guthrie, 2005).

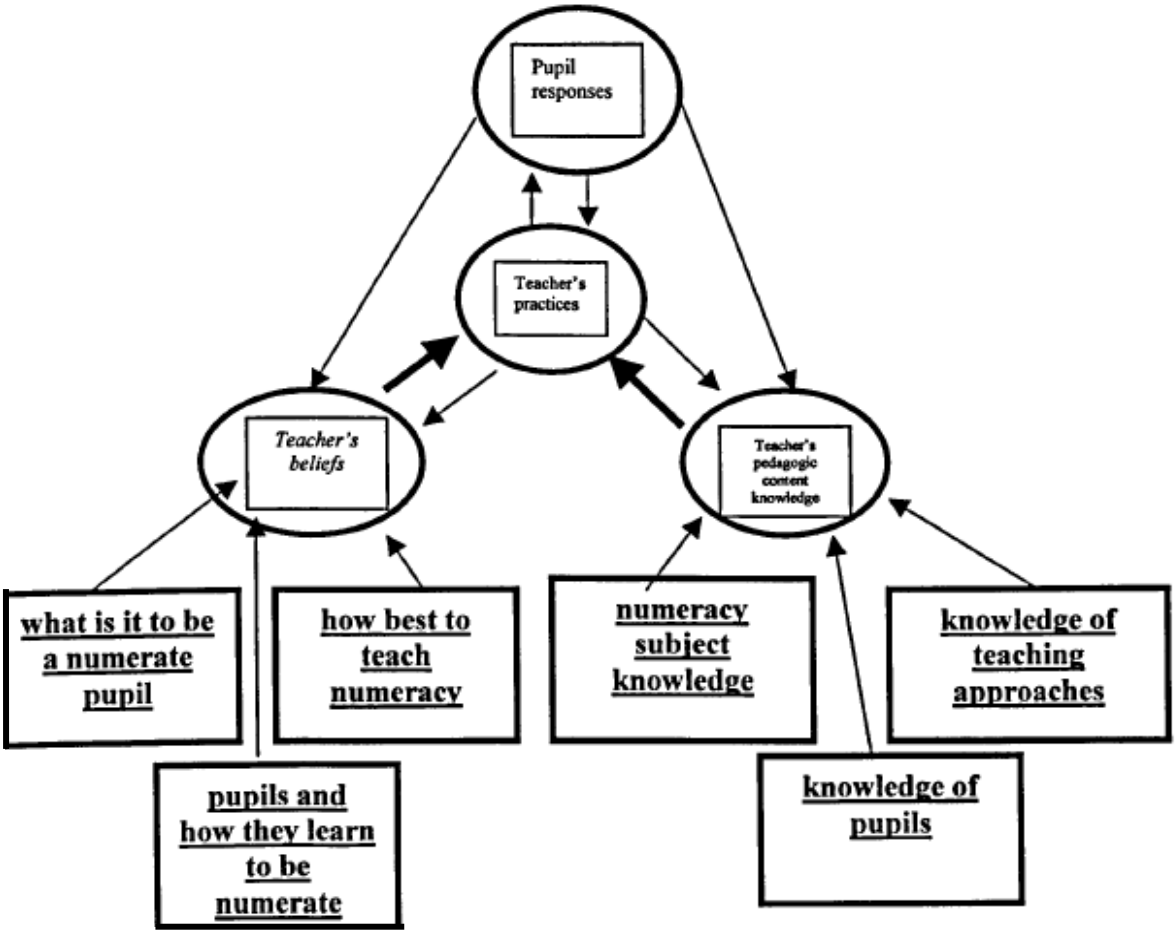


Figure 3. Illustrates the king's college model of the multi-layered relationship between Knowledge of students, Classroom Practices and Pedagogical Knowledge and teacher's own beliefs (Guthrie, 2005).

3. Questions about assessment

On this part the researcher will try to answer some questions about assessment.

*** Why Assess?**

To answer this question we have to determine the purpose of the assessment, how do we intend to use the information? Is it for administrative or instructional purpose, for example is it for learning, grading, placement or certification?

The Centre for Advanced Research on Language Acquisition (CARLA) University of Minnesota, (2009) answered this question that we assess:

- To determine what standards students already know and to what degree.
- To find out whether the instruction was affective or not.
- To decide what should be enhanced in the instruction to help all students meet the standards.
- To find out if additional or different approaches is needed.
- To determine if the students are ready for the next step.
- To inform students about their current progress in order to help them improve their learning.
- To gather information to help us take a decision grading and placement and certification.
- To provide students with diagnostic and formative feedback.
- To motivate learners to study and make progress.

University College Dublin (2011) added that we assess student for the following reasons:

1. Assessment drives student learning, since students generally focus on assessment first and foremost, we have to design assessments to encourage students to focus on the development of a deep understanding of key concepts and the application of transferable skills they will need after graduation. What types of learning are important in your discipline / profession?

2. Assessments can be designed to align with learning outcomes including graduate attributes, content areas including key concepts/principles/skills/attitudes, teaching and

learning activities and evaluation. You know what you want students to learn. How do you plan to design/redesign your assessments to motivate students to engage with these learning outcomes?

3. Assessment is a professional activity and judgment required for quality assurance and certification.

Quality Assurance

- To provide feedback to students.
- To provide feedback to lecturers.
- To improve teaching.
- To monitor standards over time.

Certification

- To pass/fail a student.
- To grade/mark.
- To license to proceed/practice.

Cohen (1994, cited on CARLA, 2009) classifies the purpose of the assessment for three categories administrative, instructional and research functions as shown in the following chart.

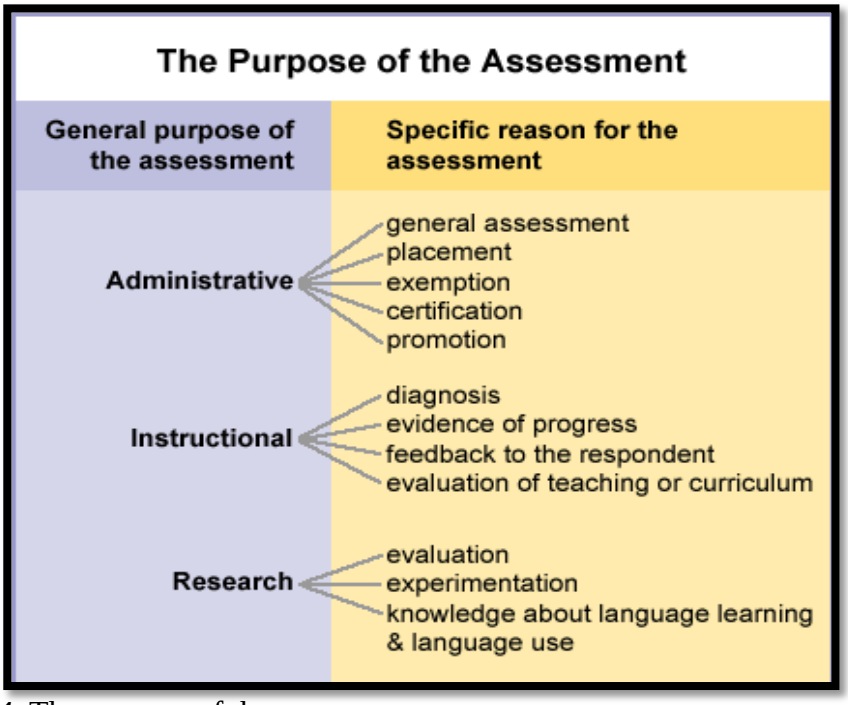


Figure 4. The purpose of the assessment.

In the past assessment was used to rank students from the lowest to the highest achievers in order to channel us into the various segments of our social and economic

system; but in recent years, we began to realize that if all schools do is sort students, then the bottom third of the rank order plus all those who drop out before being ranked will fail to develop the essential reading, writing and math proficiencies needed to survive in an increasingly complex society. So over the past few decades, the mission of sorting has evolved into a mission of ensuring certain minimal competencies; to help all students meet state standards and become competent readers, writers and problem solvers (Stiggins, 2004).

The assessment objectives are to promote students learning student, provide information on that learning and improve the effectiveness of school programs (Evaluación para el aprendizaje, 2006).

Assessment becomes effective when it allows the students:

- To understand the criteria that will be evaluated.
- Analyze their learning and understanding in order to know the parts that need improvement.
- Demonstrate student's ability of understanding, his knowledge and skills.
- Synthesize and apply what they have learned, not just recall data.
- Translate their learning in everyday life and to use it when they face a real problem.
- Focus on performance quality.

An assessment is effective when it allows the teacher to:

- Plan assessment tasks that are integrated into teaching and not to be added to the end of it.
- Identify and evaluate what is important to know.
- Promote collaboration between students and teacher or among students.
- Take into account the different cultural contexts and the different ways of learning and knowing.
- Use a grading system that is both analytical and holistic.
- Provide information that can be transmitted and understood by students, parents, teachers, school managers and school board members, supported by the necessary evidence.
- Use the results at each stage of the process of teaching and learning.
- Plan more activities that address areas that concern the teacher and students (Evaluación para el aprendizaje, 2006).

*** What should be assessed?**

It's clear that what we assess and how send message to the students of what is important and valued (Borasi, 1990), for that teachers need to determine what and how much student have learned in order to monitor the effectiveness of instruction, to plan on going instruction (Genesee, and Hamayan, 1994). Garfield (1994) asserted that we should assess what we value. First we need to determine what students need to know and be able to do as a result of taking a certain course. What ideas you really want students to retain six months after completing your class. And what they need to succeed in future courses or jobs, this information should be translated into clearly articulated goals and objectives (both broad and narrow) in order to determine what types of assessment are appropriate for evaluating attainment of these goals.

As an example adopted from Garfield (1994) showed main goals of an introductory statistics course are:

- To develop an understanding of important concepts such as mean, variability and correlation.
- To understand ideas such as the variability of sample statistics, the usefulness of the normal distribution as a model for data and the importance of considering how a sample was selected in evaluating inferences based on that sample.
- We would like our students to be able to intelligently collect, analyze and interpret data; to use statistical thinking and reasoning; and to communicate effectively using the language of statistics.
- In addition to concepts, skills and types of thinking, most instructors have general attitude goals for how we would like students to view statistics as a result the courses.
- Once we have articulated goals for students in our statistics classes, we are better able to specify what to focus on to determine what is really happening to students as they experience our courses. Are they learning to use statistical thinking and reasoning, to collect and analyze data, to write up and communicate the results of solving real statistical problems?

*** Who Assess?**

There is growing evidence that involving students in the assessment process helps their learning. This is called self and peer assessment, self-assessment is a process where students are involved in the assessment of their own work**.** Peer assessment is where students are involved in the assessment of the work of other students. It can involve the assessment of the work of one student or the work done by a group of students. Group assessment is where the lecturer or peer group assesses the product and/or the process of student group work (Rust, 2002).

The assessment of group can present particular challenges in relation to the allocation of marks if there is an uneven contribution from students within the group. Rust (2002) suggests a number of practical strategies to assess group work:

Group mark. Award a group mark, but allow for a "yellow card" if all the group members feel that a member of the group is not putting their weight. If the offending member changes his behavior before a certain date, the card will be cancelled. If not a 5% penalty in their mark will be imposed. In the worst scenario, a red card can be awarded and the student has to produce an individual piece of work instead.

Individual contracts. Assign individual responsibilities and assess each member on the degree to which they have met their individual responsibilities.

Divided group mark. Allow the group to divide the group mark depending on individual contributions. Let's say that the project is given a total of 100 marks; then the group members decide how to allocate the figure. Group members must reach an agreement and this can be challenging for the students.

Peer-assessed contributions. Only a percentage of the mark is allotted to this process. For example, the lecturer can allocate 80% of the project mark and the group may divide 20% among its members.

Individual mark . The lecturer gives an individual mark to the student. This mark is added to the group mark.

Set a project exam. Again, a common mark is awarded to the group, but the exam will have one or more compulsory questions related to the project.

*** When assess?**

The decision of when to assess depend on how the result of the assessment will be used, Assessing student progress at the end of major unit useful for deciding whether students are ready to proceed to the next unit, assessment at the end of each unit of instruction can also provide useful information about how effective the unit was? Was it too difficult or easy? Was enough time allocated? Were the materials adequate and interesting? Did student have the necessary knowledge and skills? (Genesee and Hamayan, 1994).

Day-to-day assessment provides a wide range of evidence of learning in specific contexts which shapes immediate the following steps. Periodic review of this evidence gives a clear profile of pupils' achievement across a whole subject and informs and shapes future planning and targets for improvement. When required, these judgments and insights can be more formally shared between pupils, parents and teachers at transitional points between year groups, schools and phases (Knigh, 2008).

The key features of these three assessment viewpoints are summarized here:

Table 1

Key Features of Three Assessment Viewpoints

Day-to day	Learning objectives made explicit and shared with pupils
	•Peer and self-assessment in use
	• Pupils engaged in their learning and given immediate feedback
Periodic	Broader view of progress across subject for teacher and learner
	• Use of national standards in the classroom
	• Improvements to medium-term curriculum planning
Transitional	Formal recognition of pupils' achievement
	• Reports to parents/carers and next teacher(s)
	• Uses external tests or tasks

Genesee and Hamayan (1994) asserted that assessment at the end of each unit of instruction may be useful for both internal and external purposes, it's useful for teachers for planning instruction and for students to organize their own learning and for school authorities for accountability and for parents who are interested in their children progress. It's also useful to assess learning after several units, weeks, or month in order to determine how much student have retained from earlier instruction or whether they have consolidated or integrated skills, knowledge ,concepts taught over a longer period of time. Assessment at the end of the year may be required for administrative purpose.

On the other hand assessment after each lesson is most useful for internal purpose-teachers as they plan day to day instruction and for students as they plan their studying and learning activities, it's probably not very useful for external purpose since it provide more detail than is usually necessary, assessment at the end of the year is not particularly useful to teacher as it fails to capture important changes in students learning as they occur throughout the year and it also can't be used to impact on current student learning (Genesee and Hamayan, 1994).

Stiggins (2005) added that what we need is to make balance between these different types of assessment; everyone has its purpose, assessment for learning used to help students learn better. In addition, periodic early warning formative assessments would help teachers see student progress in terms of standards mastered and provide teachers with feedback needed about student's progress and; finally, once-a-year accountability tests would serve to verify the ultimate level of student success.

3.1. Competencies evaluation

-Definition of competences:

Niss (2003) defined mathematical competence as the ability to understand, judge, do and use mathematics in a variety of intra- and extra mathematical contexts and situations in which mathematics plays or could play a role. Necessary, but not sufficient, prerequisites for mathematical competence are lots of factual knowledge and technical skills.

According to the Definition and Selection of Competencies (DeSeCo Project 3), competence means essential knowledge and skills for a complete participation in the society, and the ability to respond to complex demands and carry out various tasks properly. In addition, it is a combination of skills, practical skills, knowledge, motivation, ethical values, attitudes, emotions and other social components and behavioral appropriate to the context that move together to achieve effective action (García and Jiménez, 2011, p.12).

The report of PISA define math competence as: The individual's ability to identify and understand the role of mathematics in the world, do well-founded arguments , to use and engage with mathematics in any moments that present a need in the life of each individual as a constructive citizen, concerned and reflective (García and Jimenez, 2011).

-Mathematical Competencies:

In order to specify in more detail what mathematical competence is, the Competencies and the learning of mathematics (KOM) project set up a list of eight competencies that together constitute the overall competence (Niss, 2003, p. 7).

 Thinking mathematically:

This competency comprises knowledge of the kind of questions that are dealt with in mathematics and the types of answers mathematics can and cannot provide and the ability to pose such questions. It includes the recognition of mathematical concepts and an understanding of their scope and limitations as well as the ability to extend the scope by abstraction and generalization of results.

 Reasoning mathematically:

This competency includes on the one hand the ability to understand and assess an already existing mathematical argumentation (chain of logical arguments), in particular to understand the notion of proof and to recognize the central ideas in proofs. It also includes the knowledge and ability to distinguish between different kinds of mathematical statements. On the other hand, it includes the construction of own chains of logical arguments and hence of transforming heuristic reasoning into own proofs (reasoning logically).

 Posing and solving mathematical problems:

This competency comprises on the one hand the ability to identify and specify mathematical problems (be they pure or applied, open-ended or closed) and on the other hand the ability to solve mathematical problems including knowledge of suitable algorithms). What really constitutes a problem is not well defined and it depends on personal capabilities whether or not a question is considered as a problem. This has to kept in mind e.g. when identifying problems for a certain group of students.

 Modeling mathematically:

This competency also has essentially two components: The ability to analyze and work in existing models (find properties, investigate range and validity, relate to modeled reality), and the ability to "perform active modeling" (structure the part of reality that is of interest, set up a mathematical model and transform the questions of interest into mathematical questions, answer the questions mathematically, interpret the results in reality and investigate the validity of the model, monitor and control the whole modeling process).

 Representing mathematical entities

This competency includes the ability to understand and use mathematical representations (be they symbolic, numeric, graphical and visual, verbal, material objects etc.) and to know their relations, advantages and limitations. It also includes the ability to choose and switch between representations based on this knowledge.

 Handling mathematical symbols and formalism

This competency includes the ability to understand symbolic and formal mathematical language and its relation to natural language as well as the translation between both. It also includes the rules of formal mathematical systems and the ability to use and manipulate symbolic statements and expressions according to the rules.

 Communicating in, with and about mathematics

This competency includes on the one hand the ability to understand mathematical statements (oral, written or other) made by others and on the other hand the ability to express oneself mathematically in different ways.

 Making use of aids and tools

This competency includes knowledge about the aids and tools that are available as well as their potential and limitations. Additionally it includes the ability to use them thoughtfully and efficiently.

A growing body of literature shows that the rubric is a suitable tool to evaluate competences (Cebrián, 2012; Pessôa, 2012; Pérez and Zambrano, 2012; Rivas and Escola, 2012; Vidales and Recalde, 2012). Sastre, López, Aguilar and Domínguez (2012) concluded that the rubric is an adequate tool for the competences evaluation; they designed a rubric to assess generic skills in the "Project Office", the teacher and the students support using the rubric as a tool to evaluate competences. The use of the rubric has facilitated the correction of activities for teachers for this subject with a high number of students, and has been deemed appropriate because it has enabled the assessment of generic skills provided. They have also developed different types of mentoring and supporting communications to explain the student use and purpose. The students have evaluated with high score the use of the rubric, because of their better knowledge and monitoring of the evaluation system in the project office in addition of improving the organization and planning work times to deliver practical activities scheduled.

Morata, Pérez, Cortina-Puig and Cruz (2011) also agreed that the rubric is a suitable evaluation tool for competences they developed a common base rubric that formalizes and unifies the assessment of transversal competences. In order to apply this evaluation system, each professor should adjust the common basic rubric to a specific one for each subject, according to the learning results. For this reason, there has been a horizontal and vertical coordination to define learning results and proficiency levels for each student to ensure that at the end of the degree, students have acquired all the competences defined in their undergraduate degrees.

3.2. Assessment for learning

Popham (2000) argued that the only reason educators ought to assess students is in order to make more defensible educational decisions regarding those students. That’s really why educators should be messing around with measurement-to improve student, if

educational measurement doesn't lead to better learningg for students, then we shouldn't be doing it?

Assessment is a critical link between learning activities and teaching, learning outcomes and content (Flinders University website, 2010).

Moore (2010) argued that good assessment is part of the learning process, not just a means of documenting or judging that learning. Assessment cannot really be separated from instruction; it is an integral part of what good teachers do on a routine basis through their classroom observations, activities, assignments and tests. Moore says "assessment is not something to be despised or ignored as irrelevant or impossible but embraced as an essential aspect of learning and the best way to truly understand and improve that learning" (Moore, 2010, p.1).

Genesee and Hamayan (1994, P215) described assessment as a feedback loop:

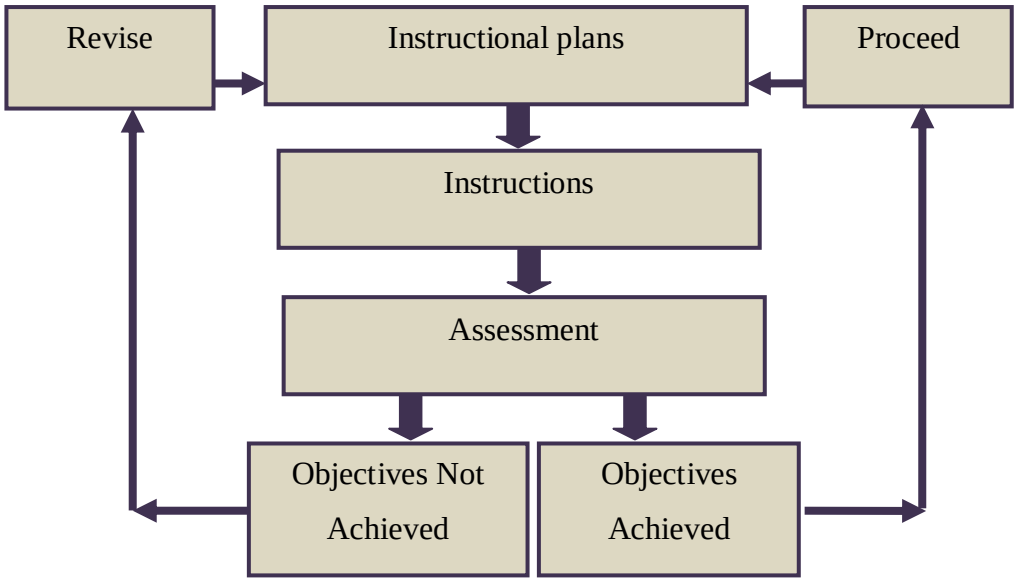


Figure 5. Describe assessment as a feedback loop.

In order to use assessment as a feedback, the following points should be taken in consideration:

* Students' specific learning needs are determined.
* Students should be engaged in learning activities.
* The effect of these instructional activities on students learning is assessed in some way.

* The result of the assessment is used to make decisions about the next round of instruction.
* If assessment indicates that the objectives have been achieved the teacher move on to the next unit of instruction and cycle begins again.
* If the result of assessment indicate that the objectives have not been achieved, decisions need to be made about how to modify further instructional so that more effective.

Assessment for learning (AFL) has been defined as the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there (Assessment Reform Group, 2002).

According to Lee (2006) assessment for learning shape students learning, using evidence of pupils' understanding .Black, Harrison, Lee, Marshall and William (2004) added that assessment for learning concentrates on student learning rather than ranking, or accountability. Assessment for learning provides information that teachers and students can use to enhance teaching and learning activities.

According to the National Council for Curriculum and Assessment NCCA (2012) the differences between assessment of learning and assessment for learning are the purpose. Assessment of learning purpose is to measure students achievement, the judgment is presented as marks or grades; on the other hand, assessment for learning associated more often with the classroom, its purpose is to help the student to improve their learning.

Academics at Alverno College in North America describe assessment for learning as that kind of assessment that is integrated within the learning process and students can use self- assessment according to explicit criteria in this way students can use what they need to make progress (Alverno College, 1994, 2005).

Brookthart, Moss and Long (2008) have claimed that assessment for learning "contributes to student ownership of learning more than any other classroom-based practice" (p. 54).

Sadler (1989) showed that the main characteristics of assessment for learning:

• Is embedded in a view of teaching and learning of which it is an essential part.

• Involves sharing learning goals with students.

• Aims to help students to know and to recognize the standards they are aiming for.

• Involves students in (peer and) self- assessment.

• Provides feedback which leads to pupils recognizing their next steps and how to take them.

• Promotes confidence that every student can improve.

•Involves both teacher and students reviewing and reflecting on assessment information.

Boud (1998) added that assessment should always be judged in terms of its consequences for learning and should not be distracted by the technicalities of grading. It must be viewed through students' eyes. It must be communicated to students in clear sentences, not codes. Thus, the required assessment is that involves students in meaningful learning and encourages students to adopt deep approaches to their learning and encourage learning from each other; and provide rich detailed descriptive feedback about progress in relation to intended learning outcomes.

Stiggins (2007) points that; we need assessment that can give confidence, motivation and learning potential that resides within every student. Susuwele- Banda (2005) summarized the benefits of classroom assessment in the Figure 6.

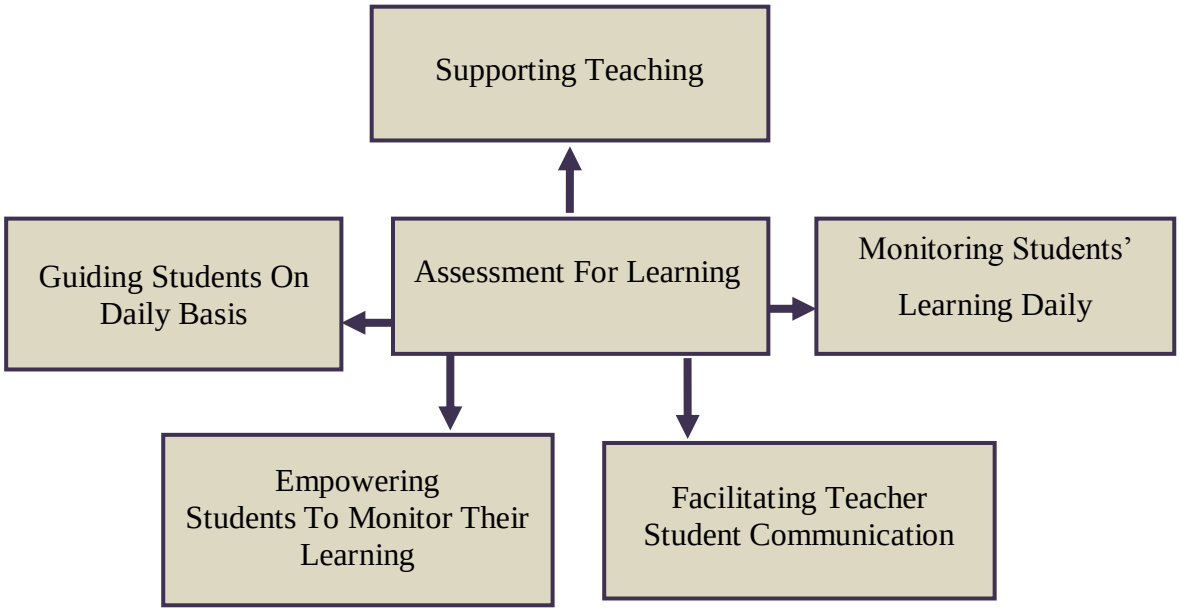


Figure 6. The benefits of classroom assessment.

Assessment for learning helps both students and teacher to understand and support teaching and learning. Assessment for learning empowers the student to monitor their learning and facilitate teacher-student communication. Black and Wiliam (1998a) point that using assessment for learning for the last years enhanced student achievements especially for low achievers, (NCCA) insured that using assessment for learning has a great benefit for students, nearly a rate of 12% of the students' scores showed improvement.

In order for the assessment for learning to be affective, teachers and students should be partners in the assessment for learning process. the teacher have to share the achievement goals with his students, make his expectations clear, taking in consideration the amount and the time, and the student have to do his best to understand what success looks like, to use the feedback to enhance his performance (Stiggins, 2007).

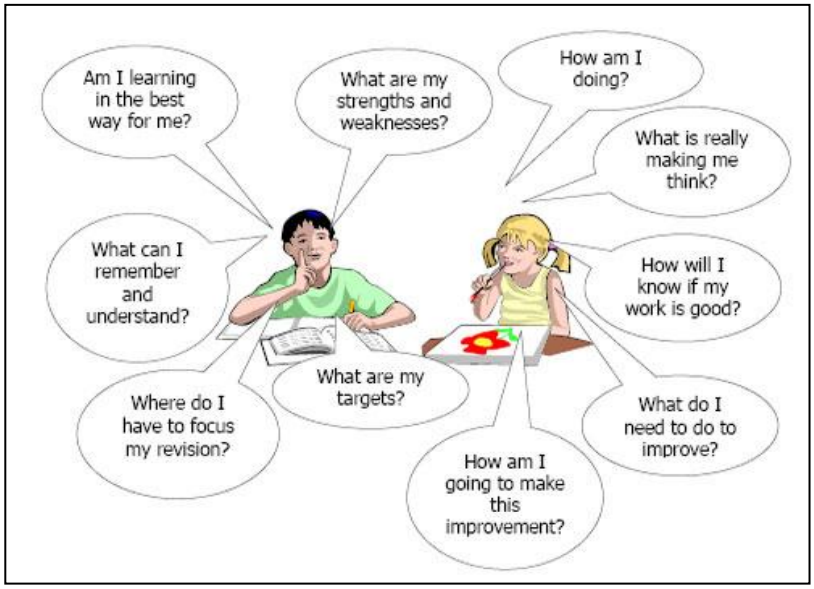


Figure 7. Assessment for learning.

Sting and Chuppi (2005) added that in order to have a better quality of assessment we need to:

- Determine the purpose of the assessment, what do we want our student to achieve.
- Determine what we need to help them meet our expectation, taking in consideration students' need.
- Set a clear explanation of the achievement we are looking for.

- Select proper assessment methods, high-quality items and scoring guides.
- Plan for careful sampling of achievement.
- Teach the students the skills they need to be in control academic success: self-assessment and goal setting, reflection, keeping track of and sharing their learning.

Atkin, Black and Coffey (2001) show that:

- Regular and high-quality assessment in the classroom can have a positive effect on student achievement.
- The information generated must be used to inform the teacher and/or the students in deciding the next step. The results provide effective assessment to improve learning and teaching.
- Student participation is a key component of successful assessment strategies at every step. If students are to participate effectively in the process, they need to be clear about the target and the criteria for good work, to assess their own efforts in light of the criteria and to share responsibility in taking action in light of the feedback.

The assessment reform group (2002) has set out 10 principles for formative assessment. These are that assessment for learning should:

- Be part of effective planning of teaching and learning.
- Focus on how students learn.
- Be recognized as central to classroom practice.
- Be regarded as a key professional skill for teachers.
- Be sensitive and constructive because any assessment has an emotional impact.
- Take account of the importance of learner motivation.
- Promote commitment to learning goals and a shared understanding of the criteria by which they are assessed.
- Enable learners to receive constructive guidance about how to improve.
- Develop learners' capacity for self-assessment so that they can become reflective and self-managing.

In mathematics education, it's important for the teacher to understand that assessment is a part of a circular process; and that the assessment results help the teacher to

understand their students better and help the students to enhance their academic achievement (Whang, 2004).

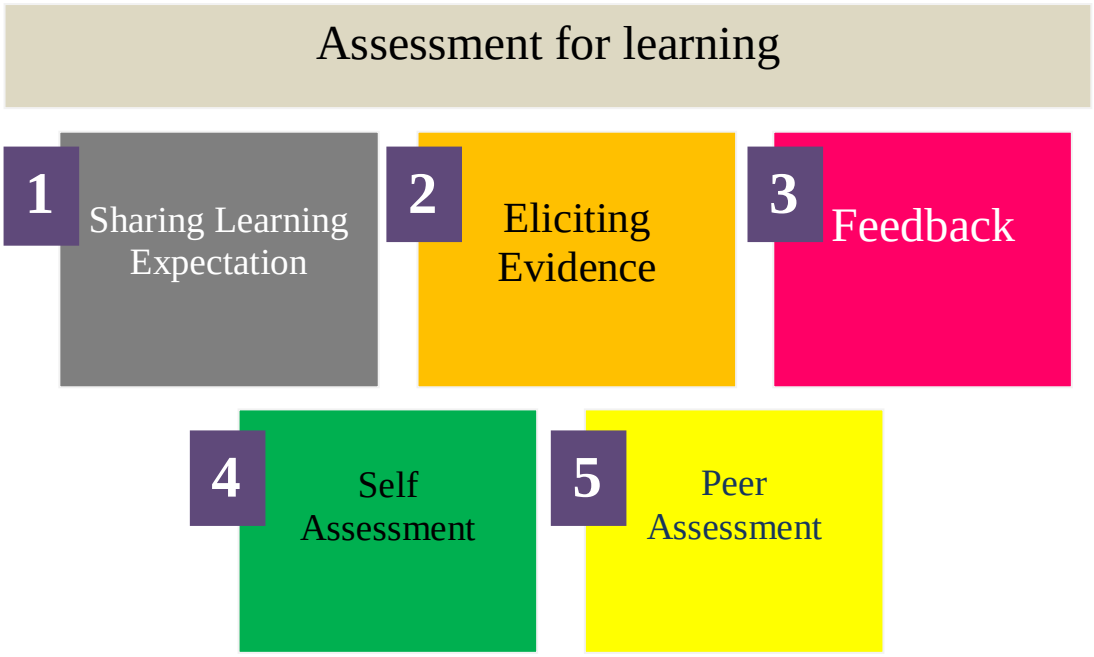


Figure 8. Assessment for learning.

For assessment to be fair for all students the assessment should reflect how each student can best achieve the learning goals, assessment should reflect a clear picture of every student progress and needs. The teacher should be aware of the individual differences and select the assessment methods that are relevant to the information needed and uses the results in planning for curriculum and instruction (Wortham, 2008).

Teachers should determine the goals and expectations and should clarify learning intentions and success criteria and share it with his students, a dialogue between the teacher and the students could be beneficial in developing understanding of expectations and standards and the way to reach it (Wortham, 2008).

It is also important for teachers to see how their students approach the problems and how much mathematical knowledge and at what level students use when solving the problems. That is, knowing how students think in the process of learning or how problem solving makes it possible for teachers to help their students overcome conceptual difficulties and, in turn, improve learning.

The results might tell teachers which students in their classes have not mastered a reading comprehension objective, but they do not tell what kind of instruction those students need to master as their objective, or what errors in thinking led to the incorrect answers. To get that kind of information, teachers need the results provided by the consistent use of classroom-based formative assessments (Centre for comprehensive school reform and improvement, 2008). Through the analysis of data, teacher can understand a lot of things about his instructions and about his students, what worked, what did not and what to do next to enhance it to meet students need?

Also teacher can answer a lot of questions such as Are all of my students making the same kind of error? Do their mistakes show that they don't have the background knowledge they need to understand this new content? Or could my students demonstrate understanding if the question format were changed? These questions will help the teacher to find go forward to the next step (Popham, 2006).

Teacher can use assessment result to evaluate his instructional methods and to determine whether the instructional strategies that he used were successful for his students to learn new concepts and skills, or whether new approaches are needed, the teacher can ask himself: Were the students interested and engaged in the materials or activities? Did the children demonstrate a deeper understanding of concepts as a result of an instructional activity? Was the activity the right length of time? Is it long? What changes might be made to improve the effectiveness of the activity? (Wortham, 2008).
These questions will help the teacher to have better understanding about his strategies, about his student's progress; and also, they will help him concentrate more on the quality of learning rather than achievement (Wortham, 2008).

For example, analyzing the data shows that a student has not learned an important concept or skill, the next step is a corrective instruction and additional opportunities for the student to demonstrate learning. If the teacher used for the first time a certain teaching strategy, then in the corrective step he should change to another one; in addition, teacher can use cooperative activities with the students who have high achievement with those who has low achievement. Or the teacher can provide those students who have high marks with enrichment activities and provide those who

demonstrate misunderstanding with follow-up instruction (The centre for comprehensive school reform and improvement, 2008).

If some students need additional opportunities to learn information and skills, the teacher should be aware of other activities that might accomplish the goal; he can incorporate the concept in different types of activities (Wortham, 2008).

Teacher's feedback shouldn't only contain information about how students worked compared to the standards, but should also help the student to enhance their work in order to close the gap (Sadler, 1989). The biggest impacts occurred when feedback told not just what to do to improve, but also how to go about it. Dylan (2006) and Stiggins (2008) argued that teachers should stop believing that report cards grade and test scores are capable to support student learning.

- Good feedback on assessed work tells the students four things:
- What are the good or successful features of the assessed work?
- What are the poor or less successful features of the assessed work?
- How the student can improve in this piece of work?
- How student might do better work in future (Isaacs, 2001).

Sadler and Good (2006) argued that students must understand the goals or the standards or references level that is required and to compare the actual (or current) level of performance with the standard and to participate in appropriate action which helps the student to bridge the gap between the current level with the standards. Williams and Kane (2009) added that students need dialogue with tutors to help them interpret comments.

Giving student feedback on their learning, often described as formative assessment, has been shown to have powerful positive benefits for student learning and achievement. The timing, type and specification of feedback can also improve student ability to self-monitor. In addition, good feedback should feed into some specific actions that can be used in the next assessment (Nichol and McFarlane-Dick, 2009).
A single score is restricted in the feedback it can provide to students. For example, a student who gets a 70 out of a 100 may not know how to improve his/her performance

on the next assignment (Moskal, 2000). With a single score, students are often left with a lack of clarity on the specific cause of drop in points or how to improve. In contrast, well-written instructional rubrics can provide clearness and equity to the process, can provide the student useful feedback and can precisely indicate performance expectations using a variety of categories that focus on specific criteria. Thus, they assist students in better understanding how the instructor scores their papers (Andrade, 2000).

Feedback need not always be from the academic staff, students themselves are a good resource to each other when given guidance on how to do this. New technologies also open up some efficient feedback opportunities (Nicol and McFarlane-Dick, 2009).

Nicol and McFarlane-Dick (2009) added that good feedback practice is anything that helps the student to become self-regulated; they set seven principles for the good feedback practice:

1. Helps them to clarify what good performance is (goals, criteria and expected standards);
2. facilitates the development of self-assessment (reflection) in learning;
3. Delivers high quality information to students about their learning;
4. Encourages teacher and peer dialogue around learning;
5. encourages positive motivational beliefs and self-esteem;
6. Provides opportunities to close the gap between current and desired performance;
7. Provides information to teachers that can be used to help shape teaching.

Self and peer assessment can serve several goals: as a tool for social control; for assessment; for learning; for learning how to assess; and for active participation of students. Knowing that peers will assess your work, or your behaviour, may be an external motivator to work harder and perform better, in this way teachers can make sure that Students do not get a way with being lazy. Through using peer assessment, they will learn how to assess student. They will benefit from knowing how to define appropriate criteria and to determine themselves whether or not they meet these. Moreover, they should learn how to seek feedback from their environment, when a teacher is no longer available. Finally, engaging students as active participants in their own learning and assessment led to an active participation (Gielen, Dochy, Onghena, Struyven and Smeets, 2011).

The centre for comprehensive school reform and improvement (2008) offered the following guidelines to help teachers when planning to use assessment for learning:
Start with the standards: It is important for any kind of assessment to be aligned with the state academic content standards; Stiggins (2008) describe assessment as powerful tool available to us for ensuring universal student mastery of essential standards so the teacher should determine the scales of the assessment strategy which is relevant to national standards.

When we think to align our assessment with the goal of instruction, we need to ask our self what form of assessment can be useful to monitor our students' progress. Assessment should be considered as opportunities to provide meaningful feedback to the students about their learning (CARLA, 2009).

- Involve learners in the assessment process.
- Provide high-level instructional feedback, the better the feedback to the student, the better their final performance will be.
- Compile and analyse assessment results.
- Differentiate corrective instruction.
- Build the confidence of all learners, Stiggins asserted that if we want all students to meet standards then they must all believe that success is within reach for them if they try. The critical new insight about assessment is, "If students don't feel able to learn, there will be no learning" (Stiggins, 2008, p.5).

3.3. Formative and summative assessment

Formative and summative assessment, both used as a part of gathering information process, the purpose of assessment determines whether to use formative or summative. Formative assessment is assessment for learning. It takes place during a class as an integral part of the learning process; it provides feedback for both students and teacher about how to improve learning and whether learners are walking on the right way to achieve the teaching goals, if not are the teaching strategies need improvement? On the other hand, summative assessment is assessment of learning, it is carried out at the end of a unit of a course it is used to see if learners have acquired the skills, knowledge, behaviour, and it gives an overall picture of the performance (Garrison and Ehringhaus. 2007).

Assessment, according to Black and William (1998a) means the information that is gathered from teachers and students activities that can be used diagnostically to alter teaching and learning.

Formative assessment or assessment for learning can be used to facilitate learning by providing students with the opportunities to judge their own work and learning progress based on feedback to various kinds of teacher-made tests and performance tasks such as student portfolios. A shift in focus from rote learning and the memorization of the content of core subjects to the mastery of higher order thinking skills as well as self-direction skills such as learning how to learn is also driven by the need for 21^{st} century skills, knowledge and competencies (Song and Kohl, 2010).

Assessment become formative when it is used to meet all students' needs and help them to reach the desired level, by trying to bridge the gap that exists by their current level and their desired level; in this way, student will be more motivated to learn and will not feel that they cannot because they do not have the ability (Black and William, 1998a).

According to Perlman (2003), formative assessment has advantages and disadvantages, on the plus side it provide rich learning experience, it can simulate real-world problem solving, it also can encourage student to critically evaluate their own work, it can provide teachers with insights of their students cognitive process. Formative assessment can be an excellent measure of students' abilities to synthesize, evaluate and solve problems, learning to use a scoring rubric can be an excellent stuff development experiences for teachers. On the other hand, formative assessment can be expensive and time consuming to administer and score certain kind of knowledge and skills are more effectively assessed using other assessment forms.

Song and Kohl (2010) conducted a study aims to examine teachers' beliefs about student learning and its relationship with their formative assessment practices. Two self-report questionnaires are developed to measure teachers' beliefs about student learning and their formative assessment practices, the findings show that teachers who believe that students are active participants of learning and who acknowledge students' need to evaluate and monitor their own understanding tend to use formative assessment practices such as questioning and eliciting evidences of understanding, formative

feedback, peer-self- assessment and clarity of task and success criteria. Semi structured interview data were used to deepen understanding of the various factors that underpin teachers' beliefs about student learning and their formative assessment practices.

The quantitative results of Song and Kohl (2010) study showed that:

- Teachers who believe that students are active participants of learning are likely to believe that students need to monitor and evaluate their own understanding and learn by knowledge construction. In contrast, teachers who believe the students learn by knowledge dissemination are likely to believe that students are not active participants of learning.
- Teachers' use of either formal or informal summative assessment outweighs teachers' formative assessment practices.
- Teachers' use formal formative assessment such as the use of criteria-referenced grading, the use of assessment results to inform planning of teaching and the use of student portfolios is least common.
- Teachers' use of informal formative assessment such as rich questioning and eliciting of evidences of understanding through making thinking visible, oral and written feedback as well as clarity of task and quality criteria, are more common than formal formative assessment but less than that of summative assessment.

Lack of assessment training in formative assessment practices – clarity of task and quality criteria could explain why teachers have difficulty with crafting of descriptors for the respective indicators in the criteria. This means that whilst teachers believe that students need to evaluate and monitor own understanding, they may not be competent to formulate a criteria that is clear and explicit.

Wang (2008) conducted a paper to examine teachers' views on the positive aspects and potential problems of conducting formative assessment in the middle schools in China. Questionnaire survey of (100) English teachers from middle schools of rural and urban areas in Shanxi were used to collect the data, the questionnaire survey results were summarized as follows:

Teacher' views on positive aspects of formative assessment:

- Formative assessment helps the teacher to understand the importance of making the language situations and language teaching as realistic as possible, in order to help the student to use the language in their real life easily.
- Formative assessment provides students with the skills of self- assessment and peer assessment, so students can be able to determine where they need to enhance in their work and also, they can have the chance to evaluate other students work.
- Students can have the opportunity to communicate with each other in English.
- Formative assessment helps low achieving students to become more confident by providing them the opportunity to express themselves.
- Formative assessment motivates students to learn English.
- Formative assessment feedback helps teachers and parents to ensure students' progress,
- Formative assessment encourages students to be self-directed and responsible for their own learning.
- Formative assessment enhances students learning strategies and students' capacity to interact with other people.

B. Teachers views on potential problems of formative assessment:

- Teachers do not have a clear understanding of the role and status of assessment in educational reform.
- Teachers don't have a lot of knowledge about evaluation system.
- The evaluation mechanisms offered from the ministry of education in China is not effective to support curriculum reform and development.
- The common assessment form is test / summative assessment rather than formative.
- Teachers don't have enough time to use formative assessment in their teaching.
- Teachers, students and parents are not aware of the examination- oriented education danger.
- Some teachers think formative assessment is too complicated to be applied.
- The large number of students in the class makes it difficult for the teacher to concentrate on every individual progress.
- Some teachers still have the traditional ideas about assessment that hinder them to follow the educational reform.

Stiggins (2005) argued that assessment for learning is different from formative assessment in the following points:

- Formative assessment is about frequent; assessment for learning is about continuous.
- Formative assessment is about providing teachers with evidence; assessment for learning is about informing students about themselves.
- Formative assessment tells users who is and is not meeting state standards, assessment for learning tells them what progress each student is making toward meeting each standard while the learning is happening—when there's still time to be helpful.
- Assessment for learning is obviously different from summative assessment, summative assessment that aims to collect information for accountability and grading. It judges the sufficiency of learning at a particular point in time.

3.4. Peer and self- assessment in more details

Topping (1998) defines peer assessment as "an agreement in which individuals consider the amount, level, value, worth, quality, or success of the products or outcomes of learning of peers of similar status" (p. 250). Majdoddin (2010) added that peer assessment is an assessment method through which the peers of a candidate or student are requested to provide information about his performance. It is considered by many educators and teachers to be a key technique to get students to take more responsibility for their learning. Self-assessment has been defined as the involvement of students in identifying standards and/or criteria to apply to their work and making judgments about the extent to which they met these criteria and standards (Boud, 1994).

Peer assessment and self-assessment are terms that generally refer to "specific judgments of ratings made by pupils about their achievement, often in relation to teacher-designed categories" (Sadler, 2006, p. 21).

Falchikov (2001) defined peer assessment as the assessment that occur when class students assess each other's work using relevant criteria, through these criteria's students can criticize their peers work, they argue and observe each other works; that helps them to understand how their peers think and learn.

Andrade (2008) distinguished between self- assessment and self-evaluation, Self-assessment is formative-students assess works in progress to find ways to improve their performance. Self-evaluation, in contrast, is summative-it involves students giving themselves a grade. She argued that teacher confusion between the two has led to these misconceptions about self-assessment that make many teachers hesitant to try it: (1) Students will just give themselves "A's" and (2) They won't revise their work anyway, so there's no point in taking time for self-assessment, also added that students themselves can be excellent sources of feedback. Under the right conditions, student self-assessment can provide accurate, useful information to promote learning.

Fontana and Fernández (1994) conducted a research that aims to test the effects upon children's academic (mathematical) performance of the regular use of pupil self-assessment techniques taught to a group of 25 primary school teachers on a 40 hours course and subsequently introduced by them as routine procedures in their individual classes. Results showed that the children (N=354) in these classes manifested significant improvements in scores on a purpose-built mathematics test when compared to a control group of children (N=313) in classes where pupil self-assessment was not employed. Also they reviled that student who understand the learning objectives and assessment criteria and have opportunities to reflect on their work show greater improvement than those who do not.

Stiggins (2008) added that the belief that assessment is something that adults do to students, has to change. Adults are not the only ones who can assess students. In fact, students can assess themselves too. "Involving the learner is at the heart of the shift from assessment that measures learning to assessment that promotes learning "(The Center for Comprehensive School Reform and Improvement, 2008, p.1).

Learners can be involved in assessment by providing them with the expectations and standards that explain how their work will be evaluated. Students also can show work that is excellent and work that needs improvement and they can get help analyzing the differences between them (The Center for comprehensive school reform and improvement, 2008).

If we expect our students to do their best possible work, teachers should share the rubric with the students, sharing the rubric with student empower them to evaluate their own work (Perlman, 2003).

- Teachers usually use peer and self-assessment for many reasons:
- To increase student involvement in the learning process.
- To increase social interactions and trust in others.
- To facilitate individual feedback.
- To focus students on the process rather than the product (Noonan and Duncan. 2005).

Self and Peer assessment is effective to both teachers and students as follows:

- It saves the teacher's time since the whole class will be assessed at the same time and every student work will have enough time to be corrected since every student have to assess one work.
- Students can learn from assessing each other's work and every student can have the feedback immediately.
- Students can understand how other students think, the strength and weakness points on their classmate work.
- Helps them to assess their own work and think of the ways to enhance it.
- Finally self and peer assessment help students to understand the useful feedback from assessment (Sadler and Good, 2006).

To develop skills in peer and self- assessment, learning objectives and intended learning outcomes must be made explicit and transparent to students. This will help to ensure that students are able to identify when they have met some or all of the success criteria.
Sadler (1989) argues that it is necessary for teachers to share assessment with the students to help them to have a clear understanding of the evaluation process providing guided but direct and authentic evaluative experience for students enables them to develop their evaluative knowledge, thereby bringing them within the guild of people who are able to determine quality using multiple criteria. It also enables transfer of some of the responsibility for making decisions from teacher to learner. In this way, students are gradually exposed to the full set of criteria and the rules for using them and so build up a body of evaluative knowledge. It also makes them aware of the difficulties

that even teachers face of making such assessments; they become insiders rather than consumers (Sadler, 1989).

McDonald and Boud (2003) conducted a research to examine if the quality of students' work can be improved through training in self- assessment practices. Ten high schools representative of the top, middle and bottom levels of academic achievement in national examinations were chosen and students trained in self-assessment by their normal class teachers as part of their final year curriculum. An experimental group comprising (256) participants received formal training in self-assessment skills for the entire three terms of the academic year. A control group was selected from matched classes not receiving such training. A significant difference favouring those trained in self- assessment was found. They found also that self- assessment training has an impact on student performance.

Kerr, Park and Domazlicky (1995) concluded that students' scoring abilities as well as the quality of their work improved with practice at peer assessment. Although added that students are able to assess their peers work, they are able to distinguish good work from bad. Topping (1998) asserted that peer assessment is as reliable as educator assessment, McLaughlin and Simpson, (2004) asserted that peer assessment with clear criteria can be a reliable method of assessment for groups.

Williams (1992) pointed that clear criteria for assessment makes the task more objective, also with explicit criteria students were more open to sharing responsibility for assessment. Pond and Ulhaq (1997) found that peer assessment Help students to be responsible for their work. Freeman (1995) conclude that peer assessment encourage students to look at the quality of the outputs rather than only at the inputs and efforts.

McLaughlin and Simpson (2004) reported through their study that students perceived using peer assessment positively, Students felt that they learned more through this strategy, also they enjoyed assessing the work of their peers, they spent a great deal of time formulating their assessments and there was a level of peer agreement about the assessments. Very few students were worried about the possibility of payback ratings by their peers; students in general preferred this type of assessment to "lecturer only" assessment.

Zevenbergen (2001) in his study that focus on peer assessment in which students reviewed posters created by their peers, argued that peer assessment offers potential as an assessment alternative within teacher education. There is a positive correlation between student marks and staff marks, particularly when students are provided appropriate training in marking, and revelled that through the construction of posters, students became more cognisant about assessment, poster construction and other aspects of mathematics teaching.

Karaca (2009) conclude that teacher trainees have positive opinion about peer assessment, also revealed that the teacher trainees thought of peer assessment as a useful assessment method that encouraged students to critically analyze their peer's work, allowed students to take part in the assessment process and fostered interaction among students in a course. Furthermore, the results indicated that teacher trainees believed that peer assessment could have some disadvantages. Such disadvantages, to them, included the fact that students might not be capable enough to evaluate each other and that their evaluation might be affected by their friendly or hostile relationship.

Vu and Alba (2007) reported that in their case study, peer assessment processes were useful for the students' learning. It was found that peer assessment had a positive effect on students' learning experiences with most students acknowledging learning from both the process and from their peers. And conclude several points should be taken in consideration when using peer assessment such providing adequate and appropriate preparation for the successful implementation of peer assessment.

Abram, Scarloss, Holthuis, Cohen, Lotan and Schultz (2001) support the belief that rubrics and self-assessment can promote learning. In their study, they tested whether the presence of clearly articulated evaluation criteria on group activities would alter the nature of the group's discussion and, subsequently, improve student learning. They found that groups using evaluation criteria spent more time evaluating their products, discussing the content of their unit and discussing their task than students not using evaluation criteria. Evaluative talk and task-focused talk, at the group level, were modestly, yet significantly correlated with individual scores on an essay test following the unit. Their findings suggest that the presence of clear and accessible criteria for

evaluation can improve the academic nature of group discussions and individual learning gains.

Karaca (2009); Vu and Alba (2007) list some points to be taken in consideration while using peer assessment:

- Students should be provided with brief information of what is expected of them; what criteria to follow; the purpose of the evaluation;
- Teachers need to make sure that students are following the criteria clearly and appropriately.
- Teachers should determine the degree of assistance they will give during the peer assessment Process.
- Students need to practice the process in stress-free environments.
- Teachers should cooperate with colleagues who have already used peer assessment.
- Teachers should not expect peer assessment to be perfect at first attempt.
- Teacher should encourage students' discussion after peer assessment.

Wen and Tsai (2006) revelled that students had positive reaction for using peer assessment, but they showed a lack of self-confidence to peer assess their classmates and showed that males had more positive view towards peer assessment than females and that students who had experienced peer assessment before had less negative views towards peer assessment and students agreed that peer assessment score should take a small percent of the final score.

Sadler and Good (2006) investigated the extent to which self and peer grading improves test scores. They investigated three types of grading strategies: teacher-only grading, self-grading plus teacher grading and peer-grading plus teaching grading. By training students to grade with the help of a scoring rubric, this study shows that high levels of agreement are possible between students and teacher when students grade their own or others papers and recommended that teachers should be aware that lower performing students tend to inflate their own grades; whereas, the grades of higher performing students may suffer when graded by others. Also teachers should monitor the accuracy of student grades and not simply assume that grades are awarded fairly by all students.
Self and peer assessment is effective to both teachers and students as follows:

- It saves the teacher‘s time since the whole class will be assessed at the same time and every student work will have enough time to be corrected since every student have to assess one work.
- Students can learn from assessing each other‘s work and every student can have the feedback immediately.
- Students can understand how other students think.
- They can understand the strength and weakness points on their classmate work.
- It helps students to assess their own work and think of the ways to enhance it.
- Finally self and peer assessment help students to understand the useful feedback from assessment (Sadler and Good, 2006).

Butler and Hodge (2001) in their study that aims to find effects of peer assessment in high school physical education found that peer assessment had practical applications and value for students. The results of their study emphasized the importance of both feedbacks in peer assessment and in developing trust among peer assessors.

Birjandi and Tamjid (2011) conducted a study that aimed to explore the role of using peer and self -assessment in promoting writing performance of language learners. To do this, (157) intermediate TEFL (Teaching English as Foreign Language) students were assigned to five different treatments in five groups: four experimental groups and one control group. The first experimental group did journal writing as a self- assessment technique, the second group self-assessed their own writings, the third group employed peer assessment and the fourth group had both self- and peer assessment. Moreover, there was teacher assessment in all experimental groups, except the fourth group (the self- and peer assessment group). In the control group, there was only teacher assessment. Also, at the beginning and end of the semester, all participants took a writing test. The results revealed that in the second and third groups, in which the students employed self- assessment and peer assessment, together with teacher assessment, they observed the maximum improvement in writing.

4. Alternative assessment tools

With the rapid technological development the need for students who have cognitive skills such as problem solving, critical thinking, analyzing data and presenting them

orally and written format have increased (Dochy, 2001). That demand alternative forms of assessment to assess both learning process and learning outcomes. The assessment standards for school mathematics (NCTM, 1995); recommend that assessment should contribute to students' learning. Black and William (1998b, p.19) pointed that assessment should be integrated in the teaching and learning process. "Assessment is to be seen as a moment of learning and students have to be active in their own assessment and to picture their own learning in the light of an understanding of what it means to get better". Therefore students should be involved with exercises that require them to apply mathematical information and reasoning to situations similar to those they will encounter in the real world and students be helped to become more self-directed in their learning plans and activities.

This requires assessment techniques that focus on assessing what students know as well as what they do not know and called for the use of multiple and complex assessment tools including written, oral and demonstrations formats. Therefore, alternative assessment tools, such as rubrics, concept maps, portfolios, student Journals, self-assessments and peer/group assessments are necessary to determine what students actually known and where they are in the learning process (Anderson, 1998; Novak, 2000; Birgin, 2011).

Johnsen (1996) added that the purposes of alternative assessment are to motivate students to do their best work, build the self-confidence and self-concept of students, show improvement in students' work over time and show the best work of students in a specific area. Alternative assessment require that students to have a clear understanding of what they are expected to do and learn. In partnership with their instructors, students monitor and adjust their own progress and play a role in communicating evidence of their own learning (Stiggins, 2005), also alternative assessments encourage students to think critically and draw their own conclusion to complex problems rather than asking them to select answers to short, discrete questions - often devoid of real world context or application. Alternative assessments require students to create extended responses, using multiple modes of representation (Travis, 1996).

Nasri et al (2010) on their study that aim to understand teachers perceptions on using alternative assessment, pointed that teachers perception should be taken in consecration

before integrating any alternative assessment. A sample of 50 secondary teachers in Brunei was involved and their perceptions were collected using questionnaire developed by researcher. The results showed that Brunei teachers have positive perceptions on alternative assessment, because alternative assessment can help them to cultivate their students' critical and creative thinking skills. However, the respondents' claim that, alternative assessment increase their work. It was concluded that alternative assessment is the best method to enhance students' potential. Besides, also provides information on achievement of particular levels of skills.

They also added that assessment should be used to facilitate learning and skills development and motivate students to perform better and prepare students for self-directed and lifelong learning. When it's used to diagnose areas of weaknesses and develop remedial instruction to facilitate mastery of content and skills, and suggested that assessment should be used to help student to learn ***"assessment as a means not an end"*** by using assessment to serve the following functions:

a) Diagnostic

b) Remedial/ enhancement

c) Motivation (Nasri et al. 2010).

Knight and Mantz, (2003) list some alternative assessment techniques:

*** Concept maps:** Students identify the main points in an argument, view, claim, concept or system. They will then group like points with like in a way that shows the relationship between them. This technique is an efficient way of portraying how students understand conceptual relationship.

*** Portfolio:** Allow students to establish their own claims to achievement, using what they see as the best evidence to hand.

*** Projects:** Authentic and complex tasks. Students may have to use several concepts and skills to complete the task.

*** Role-play:** Students take on part of certain characters in specific situation. This task can be a good way of identifying students' understanding of different perspectives.

*** Fieldwork, lab work:** A type of authentic assessment where teachers should decide to sample to avoid overwhelming volume to be checked.

***Posters:** An efficient way of seeing how students understand complex content and relationships of components. This task is best done in groups because students can learn by reflecting each other's posters.

*** Game and simulation:** Can be a good way of seeing whether the student understand the subject or no.

* **Short evaluation of a target paper:** That encourages critical and analytical evaluation thinking.

* **Presentations:** This activity encourages students to become better at oral communication. They can be Authentic and also invite peer assessment, which is a way of giving teachers supplementary evidence for grading.

* **Article review:** This sort of task encourages critical, analytical and evaluative thinking.

Altinisik, Demirbas and Bayrakci (2011) conducted a research that aim to determine the differences in primary school teachers' views on the use of alternative measurement, they revelled that teachers mostly use filling in the blanks, multiple choice tests, true or false, written examinations, project and performance evaluation activities, while they least frequently use structured grid and diagnostic branched tree activities. The teachers have also expressed that they do not frequently use the alternative measurement and evaluation techniques in Science and Technology courses due to the time limit. The teachers demand in-service training courses and increase in the weekly periods of Science and Technology course. Also they found that teachers with 26 and more years of experience as well as those with (0-5) years of service have more positive views on these techniques compared to the rest of the teachers. Related to the competency of the teachers' use of Alternative assessment techniques they found that the teachers don't have information about these technique and it was found that teachers frequently use written reports, project and interview method, concept maps, rarely use group and/or peer review, drama and performance evaluation and never use structured grid and diagnostic branched Tree techniques (Altinisik et al. 2011).

Grimison (1992) presented a paper at University of Western Sydney that studied attitudes of some secondary mathematics teachers to alternative methods of assessment in mathematics, results indicates that:

* Traditional written tests dominate other forms of assessment.

* Attitudes to using alternative methods of assessment in the class room were fairly negative,
* The most common forms of alternative assessment were, oral, practical, observation and students journals, many teachers indicated that many of these forms were used in their assessment, but only as informal assessment which didn't contribute to the final mark.

Raboijane (2005) on her study that aim to investigate whether or not teachers at junior secondary schools in Botswana were using formative assessment when teaching mathematics, results showed that few mathematics teachers , partly due to their ignorance in the value of this kind of assessment and partly because of the structural constraints. Since the education system in Botswana is examination driven, the success of the education system is judged by the performance of students in the examinations, which is taken as evidence that learning has occurred. Consequently, teachers' instructional and assessment practices are highly influenced by the need to make sure students pass the examinations at the end of their junior secondary education. Only one teacher said that he used self-assessment, interviews and observations to assess his students, it's also concluded that mathematics teachers in three schools rarely used formative assessment. Also participants pointed out a number of constraints that impede the use of alternative classroom assessment. They mentioned inadequate resources: time and large classes as the major limitation to the adoption of classroom-based assessment practices. The nature of the examination-driven education system is also another valid factor that dictates teachers' assessment practices. Teachers do not want to risk losing precious time for content coverage by trying out innovative assessments, as this would compromise the performance of their students in the public examinations. Their stand is supported.

Watt (2005) on her study investigated methods of assessment used by (60) mathematics teachers from (11) secondary schools in Metropolitan Sydney, as well as their attitudes to a range of alternative assessment methods, together with reasons why they would or would not implement these. The alternative assessment methods targeted in this study included those suggested in the New South Wales mathematics syllabi as well as the curriculum literature in mathematics education, of (1) oral tasks where students give short answers, seminar presentations and debates; (2) practical tasks with students using

instruments to apply or deduce mathematical principles; (3) teacher observation of students in structured or unstructured activities and evaluation of the quality of student task engagement; (4) student journals where students keep reflective accounts of their mathematics learning and processes of understanding, from which the quality of their task engagement and development may be explored by the assessor; (5) student self-assessment with students judging the quality of their own and their peers' mathematical understanding and progress; and (6) involving parents in the assessment process, asking them to observe, reflect on and evaluate their child's mathematical understanding and progress. Results showed that teachers were satisfied with traditional tests as valid measures of student ability, particularly for senior school years. Teachers generally did not favour implementing alternative assessment methods, although those with the least years' teaching experience reported more positive attitudes. A major concern raised by teachers about the use of alternative assessment methods related to their perceived subjectivity.

Herman, Klein and Wakai (1997) studied American students' perspectives on alternative assessment, the results show that students find alternative assessment items more interesting and challenging than multiple-choice items, students try harder on these items; and they recognize that open-ended items require them to think harder, explain their thinking and communicate their understanding of mathematical knowledge. At the same time, however, students do not necessarily like such challenges. In fact, students express a preference for multiple-choice items. They find multiple-choice items easier to understand and believe that they perform better on such items.

Kelvin (2011) identified three conceptions of alternative assessment that primary school teachers in Singapore hold, teachers with a conservative conception, teachers with a pragmatic conception and teachers with a progressive conception:

* Teachers with a conservative conception are preoccupied with preparing students for their examinations. Alternative assessment is viewed as a distraction or a luxury because it is perceived as having little utility or direct relevance to students' examination performance. There is little connection between alternative assessment and what is required to be taught.

*Teachers with a pragmatic conception understand alternative assessment as an improvement on existing assessments in contrast; teachers with a pragmatic conception

attempt to identify the limitations of existing assessment practices and understand that alternative assessment is able to address such limitations. They diagnose what students really need to learn in their subjects and design alternative ways of assessing students accordingly.

*Teachers with a progressive conception of assessment do not accept examinations and existing school assessment practices as a status quo for which alternative assessment should be aligned towards. Instead, they are able to identify for students learning outcomes that are important and yet not reflected in examinations and design alternative ways of assessing such outcomes accordingly.

4.1. Introducing rubrics

Assessment culture is recently moving a way from traditional assessment, which focuses on testing of knowledge, to a new assessment culture that focuses on assessing complex thinking, information processing and effective communication (Nitko and Brookhart, 2011). Teachers' started to focus on performance-based assessment instead of traditional assessment methods such as multiple-choice tests (Kahl, 2008). Thus, performance assessment moved from being a fashionable innovation in education to a recognized element in teaching, learning and assessment (Wiggins and McTighe, 2005).

Good body of literature describes rubrics as alternative assessment tools for performance assessment (Hafner and Hafner, 2003; Luft 1997; Popham 1997; Stuhlmann et al.1999 Wiggins, 1991). In addition, Montgomery (2001) claimed that rubrics could be considered as tools for authentic assessment, according to Shepard (2001) assessment for learning focuses on demanding tasks that involve creativity and critical thinking. In addition, authentic assessment should be integrated with teaching and should be continuous process. Moreover, learning goals and teacher's expectations should be clear to students at the beginning of instruction and students should involve in the process of assessment through either self or peer assessment.

4.2. Overview studies about rubrics

Andrade and Du (2005) on their study that aim to understand student perspectives on rubric-referenced assessment, fourteen undergraduate students discussed the ways in which they used rubrics to plan an approach to an assignment, check their work and guide or reflect on feedback from others. The students said that using rubrics helped

them focus their efforts, produce work of higher quality, earn a better grade and feel less anxious about an assignment. Their comments also revealed that most of the students tend not to read a rubric in its entirety and that some may perceive a rubric as a tool for satisfying a particular teacher's demand, rather than as a representation of the criteria and standards of a discipline.

Orsmond, Merry and Reiling (2002) conducted a study that aims to investigate student-constructed marking criteria in the presence of exemplars. The findings demonstrate that (a) exemplars help students gain better understanding of the marking criteria or the subject standards; (b) exemplars help produce higher quality outcomes; (c) exemplars help produce meaningful formative feedback; (d) students can make more objective judgments through peer assessment than through self-assessment.

Lim (2013) study was designed to explore the students' perceived uses of rubrics and their actual use of rubrics in their oral production assessment, using focus group discussion as a main method of data collection. Ten students from an exclusive - girl school in Metro Manila participated in the discussion. Results showed that students recognized the ability of rubrics to make them understand teacher's expectations. The standards in a rubric clarify to the students the targets that are to be achieved during the assessment, rubrics allowed students to reflect on their oral production performances by specifically defining their strengths and areas to improve on. It served as a form of feedback to the students, instructing them what they are to do the next time they have to deal with a similar oral production assessment and justify the grades being given to them by the teacher. Most mentioned that rubrics provided them the justification for the grades given by the teacher. These rubrics were also recognized to aid teachers in evaluating students' performances and assigning grades to their respective performances.

Jonsson and Svingby (2007) reviewed (75) studies to investigate evidence to sport the claims that using scoring rubrics in performance assessments increase consistency of scoring, facilitate valid judgment of complex competencies and promote learning, concludes that:

- The reliable scoring of performance assessments can be enhanced by the use of rubrics, especially if they are analytic, topic-specific and complemented with exemplars and training;

- Rubrics do not facilitate valid judgment of performance assessments per se. However, valid assessment could be facilitated by using a more comprehensive framework of validity when validating the rubric;

- Rubrics seem to have the potential of promoting learning and improve instruction; also rubrics make expectations and criteria explicit, which also facilitate feedback and self-assessment.

Reynolds-Keefer (2010) conducted a study that aimed to explore how rubrics impacted students learning, as well as whether using rubrics influenced the likelihood that they would use rubrics in the future as teachers. In this study, (45) undergraduate students enrolled in educational psychology were provided rubrics for each of the two writing assignments assigned during the semester. At the end of the semester, students were asked about their use of rubrics as well as the relationship between rubrics and performance. Student perceptions of rubric importance highlighted the importance of using rubrics as pre service teachers. Responses indicated that preserves teachers who used rubrics as students may be more likely to use rubrics in their own teaching.

Hafner and Hafner (2003) conducted a study that focused on the validity and reliability of the rubric as an assessment tool for student peer-group evaluation in an effort to further explore the use and effectiveness of the rubric. They provide statistical documentation of the validity and reliability of the rubric for student peer-group assessment; they conclude that the use of the rubric in combination with peer assessment provides an effective teaching and learning strategy, that the rubric is a useful assessment tool for peer-group and self- assessment by students.

Choudhury (2012) shared his experience of developing and applying rubrics to assess students' performance in a course taught using cases and development of conceptual framework. The results from his experience indicate that rubrics are not only an effective assessment tool but also provide a large amount of data that could be analyzed to provide appropriate feedback to students, moreover it would quantify the learning

and academic outcome. Also, effective use of rubrics facilitates instructors and administrators to know about the quality of the program and the effectiveness of the course and its pedagogy.

Mora and Ochoa (2010) added that rubrics make the expectation of the school or department clear and specific, rubrics also provide objectivity to subjective grades, facilitate grading and enable students to have a better understanding of their strengths and weaknesses. Rubrics provide teacher with information about student about previous courses that can be used as a feedback, about his weakness and strengths points.

Leonhardt (2005) talked about using rubrics as an assessment tool in music class; she said that with the consistent use of rubrics, her students have more opportunities for musical performances as they attain a deeper understanding of the subject area. Each performance can also increase students' higher-order thinking as they are encouraged to discuss the performance using correct musical language. Students also had the opportunity to understand what constitutes tone quality at the expert level, she noted that as a teacher, she can explain and demonstrate what good tone quality is and students will have a surface level understanding.

Martínez, Tellado and Raposo (2013) concluded that the rubric help the students to enhance their learning. Arrufat and Torres (2012) spot the light on students' opinion about using rubric in a secondary class in Granada. The result show that the students agreed that using rubric as an assessment tool have the potential to: (a) Increase their confidence in learning; (b) make it more objective; (c) enhance teachers work; (d) make it easy to know teachers expectation; (e) support self- learning.

Raposo and Gallego (2012) examined students satisfaction of using the rubric as an evaluation tool, the results showed that the students noted that the rubric allowed them to; (a) understand the quality demand; (b) evaluate themselves and their peers; (c)clarify the assessment criteria; (d)evaluate more objectively.

Evaluating using the rubric help student to be familiar with the evaluation process as rubrics provide students with clear expectations about the skills they are learning, she noted that as a teacher, she can use rubrics as a tool to communicate educational goals

precisely and concretely to teachers, students, parents and administrators. The use of rubric assessment in my classroom provides "snapshots" throughout the year of how students are progressing in the mastery of musical skills, while also providing a guide for areas that need to be re taught for student success. Also using the rubric incrassated student involvement in the educational process, for her, the main advantage of this type of assessment is that the students take an increased role in their musical learning. My classroom has been transformed into a partnership, with student and teacher moving towards an active role of assessment (Leonhardt, 2005).

Anglin, Anglin, Schumann and Kaliski (2008) Test the use of computer-assisted grading rubrics compared to other grading methods with respect to the efficiency and effectiveness of different grading processes for subjective assignments, the results suggest that the computer-assisted grading rubrics were almost 200% faster than traditional hand grading without rubrics, more than 300% faster than hand grading with rubrics and nearly 350% faster than typing the feedback into a learning content management system.

On Gallego and Dandis (2012) study that aim to examine students' attitudes towards using the rubrics, the results of this study indicate that most of the students found positive relationship between using the rubric and their learning. They found it difficult and consume a lot of time, and they gave some suggestion to enhance the rubric.

Elliot (1995) asserted that students' levels of performance can be improved by including the following components (a) selecting assessment tasks that are aligned clearly and are connected to the material being taught; (b) specifying clearly the scoring criteria for the assessment task to students prior to attempting the task; (c) providing students with explicit statements of standards and/or various models of acceptable performance before they attempt a task; (d) encouraging students to undertake self-assessments of their performances; and (e) interpreting students' performances by comparing them to those of other students, as well as to standards that are developmentally appropriate.

Dunbar, Brooks and Kubichka-Miller (2006) report that the use of rubrics allowed teachers to find out students' weaknesses in oral skills in public speaking courses and hence reconsider their teaching practices. The study's results indicate that the success in

teaching even the most basic oral communication skills is limited in the studied classrooms. Although the students did extremely well at some competencies, some of the most basic skills have not been attained. Overall, the fact that students were rated unsatisfactory in five out of eight competency areas that were described in the rubric is cause for panic. Thus, teachers should make changes in the way they teach the basic public speaking course by re-examining both the content of the course and the way in which it is delivered.

On a project study titled formative and peer-to-peer evaluation using a rubric tool, Cebrián (2009) have proved positive results of the use of an e-rubric and peer-to peer evaluation, the most important advantages that they have encountered in this project:

- E-rubrics allow for a more interactive and dynamic communication between professors and students.
- Teachers can know immediately both, the scope of particular skill by all students and the scope of all the skills of a particular student.
- Teachers know and can easily distinguish which skills are more/less problematically acquired by students.
- E-rubrics may be edited for a better understanding during the assessment process and this can be done immediately.
- Students can readily have access to the evaluation of their skills; know which skills they have acquired and which are still to be developed.
- They found that e-rubrics were evidenced to be more successful in small groups with a Project-Based- Learning methodology, than in large groups.
- Students reflect upon evaluation and its reach. They analyze assessment criteria and standards further than they would do in a more traditional model. Reflecting during the learning process influences positively on their results.
- Occasionally peer reviews are harder and more critical than teachers' assessment, particularly because of the wrong internalization and application of the criteria.

Murphy (2009) also suggests that rubrics can help educators know whether English language learners are making progress. To meet this purpose, educators should start by establishing a baseline of a student's ability in each of the four strands of language: listening, speaking, reading and writing. By establishing a baseline, teachers can adjust instruction in each strand to provide the needed support and track a student's progress.

Afterwards, teachers should design rubrics for each language strand based on performance expectations from the state's ESL proficiency standards. They should use dates to specify when behaviour is observed. This will document the student's proficiency level as well as inform the next steps for instruction in a specific strand.

Schaefer, Swanson, Bene and Newberry (2001) conducted a study in which the focus was to study the hypothesis that enhanced teacher knowledge of generic assessment rubrics results in improved student achievement. Pairs of teachers were selected from system nominations based on course (Algebra, Biology, English and Government). One member of each pair was randomly assigned to receive rubric training and the other did not. After a period of instruction, all teachers administered subject matter tests that contained both selected response and constructed-response items. Results favoured the achievement of students whose teachers had received rubric in.

Cebrián and Accino (2009) in their research from the e-Portfolio to federation technologies: The Ágora Virtual Experience used the e-rubric started making paper rubrics that were immediately converted to electronic format (e-Rubrics) see Figure 9.

Lara (2010) highlights the benefits of using the rubric on students learning, by using it as a learning method rather than an evaluation one. She concludes that rubric is a great tool to promote self-regulated learning, rubrics help students to be more reflective and independent in their work, through sharing expectation, students understand what they have to do and how.

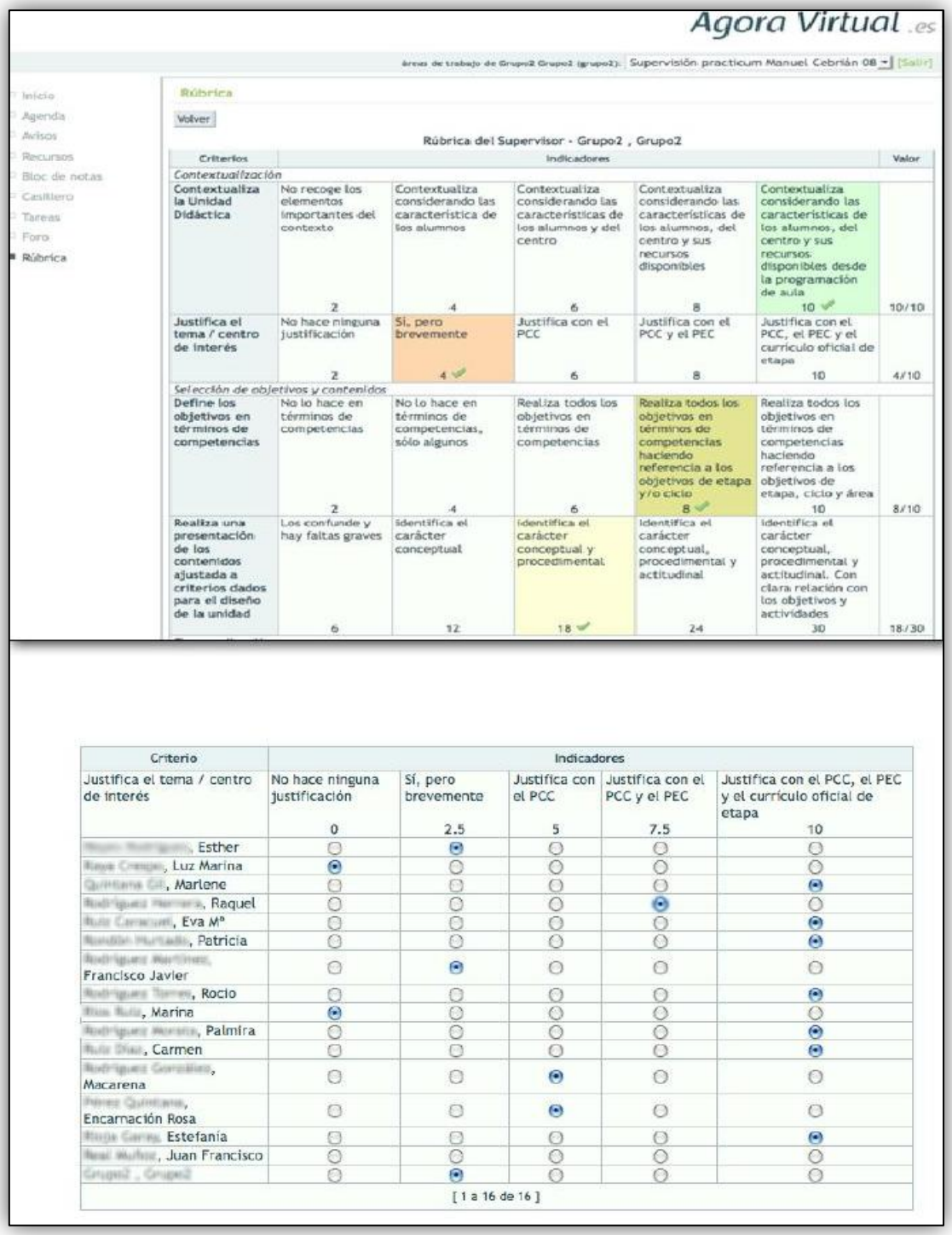


Figure 9. E-Rubric adapted from Cebrián and Accino (2009).

Santero, Flores and Gordillo (2010) developed a rubric for each of the practices that the students have to perform in the course. They provide the students with description of the required competencies and the grades for each section of the activity and when developing the rubric they tried to help the students detect their mistakes and improve

their performance in order to get the scores. Students' valuations about rubrics have been obtained to identify their influences on learning. They conclude that using the rubric was very useful to both teachers and students because it provides the students with the level of their learning and also with criteria needed to meet teacher's expectation. Additionally, it helps them to better understand the content and for the teachers it was useful in correcting every part of the practices.

Lee and Lee (2009) examined the effects of instructional rubrics on class engagement behaviors and the achievement of lesson objectives in the Korean language class by students with mild mental retardation and their typical peers. Found that instructional rubrics also enhanced class engagement behaviors of students with mild mental retardation drastically, instructional rubrics help students to be aware of the lesson objectives and guide them to monitor their performance during the class. In addition, found that using rubric affect students achievement positively. Moreover, they suggest that the utility of instructional rubrics not only as an inclusive class-wide assessment tool, but also as an instructional strategy that systematically assists students with disabilities to make meaningful progress in the general curriculum.

Maxwell (2010) on his study that focus on using rubrics to support graded assessment in a competency-based environment, revealed that teachers found rubrics useful for grading assessments and for conveying assessment expectations to students.

Reco (2011) conducted a study that aim to design and implement rubrics for assessing student digital portfolios, the results obtained confirmed that the rubrics allow student-centered learning, that help students to involve in the learning and become aware of the development of their skills. Rubrics are valuable not only as an assessment but as a tool for reflection and communication.

Rubrics through determining the goals, criteria, standards expected help to clarify what good performance is. So in order to achieve a performance target: first, there has to be an alignment between the task goal set by the student and the assignment goal set by the teacher. Second, examples of performance define an objective and valid standard against what student can compare their work. Finally, a discussion may clarify the criteria and standards. In addition, peer discussions can be helpful in exposing students

to alternative perspectives on problems and to alternative tactics and strategies (Wiliam, 2008).

In this study rubrics were chosen as alarming and assessment tool, as rubrics can help students to present their ideas, provide feedback to teachers, assessment should enhance student learning than to judge it, it should be assessment for learning, "assessment should not merely be done to students; rather, it should also be done for students" (NCTM, 2000, p. 22).

5. Rubric in more details

The term rubric has been used in English since the 1400s, the English dictionary defined rubric as a heading of different sections of a book (Cooper and Gragan, 2009). Educators today use rubrics to refer to a category of behavior that can be used to evaluate performance. Today's rubrics involve creating a standard and a descriptive statement that illustrates how the standard is to be achieved (Popham, 1997). Rubrics are simply tools where lists of standards used to score students' work (Bush and Lein-wand, 2000; Goodrich, 1997).

A rubric is a scoring tool that offers information to students about the skills they are expected to reach. It is a set of standards, criteria, evidences that inform them about what they have to do to acquire those skills (Cebrián, 2009).

Stevens and Levi (2005) defined rubric as a scoring tool that lays out the specific expectations for an assignment, rubrics divided an assignment in to its component parts and provide detailed description of what constitutes acceptable or un acceptable level of performance for each of these parts. Rubrics include four basic parts: (1) - Task description. (2)- Scale, (3) - Dimensions, (4) - Descriptions of the dimensions.

Reco (2011) defined rubric as a matrix to assess students work; rubrics provide students with criteria to help them evaluate their own work. Andrade (2008) argued that rubrics can be a powerful self-assessment tool if teachers disconnect them from grades and give students time and support to revise their work. A good rubric can orient learners to the

concept of quality as defined by experts in a field, inform self- and peer assessment and guide revision and improvement.

Although every rubric contain different level of details, they all nearly contain the same component, normally rubrics has three common components: the factor or trait of the assignment being evaluated; the criteria for evaluation; and, the relative weighting of the factor/trait in relation to the assignment total.

Allen and Tanner (2006) added that rubrics contain three to five evaluation criteria that used to judge student responses and each evaluation criteria must emphasize the skill being evaluated and every criterion will guide the teacher to help his students to master that skill.

A rubric is a matrix that contains two dimensional checklists, one dimension presents the evaluation criteria and the other describes performance levels. The difference between rubrics and checklists is that rubrics have extensive descriptions of the criteria of each level of the task and emphasize on teacher's goal from evaluating students work. While check lists provide limited information that indicates only whether the criterion exist or not and does not provide idea for potential (Flinders University website, 2010).

Andrade (2008) proposed three basic steps to design a rubric:

- **Setting Clear Expectations:** teacher expectations should be clearly stated and shared with the students, she added that its better create all or part of the rubrics in class with students, since students become better acquainted with the task when students are involved in thinking about what counts and how quality is defined.
- **Conducting Self-Assessment:** student's performance should be compared to the rubric.
- **Revising:** the feedback from self- assessment should be used to revise and enhance the work.

The University of Hawaii (2012) identifies four basic components of rubric. It includes: A task description. The outcome being assessed or instructions students received for an assignment.

- The characteristics to be rated (rows). The skills, knowledge and/or behavior to be demonstrated.
- Levels of mastery/scale (columns). Labels used to describe the levels of mastery should be tactful but clear. Commonly used labels include:
- Not meeting, approaching, meeting, exceeding
- Exemplary, proficient, marginal, unacceptable
- Advanced, intermediate high, intermediate, novice.
- 1, 2, 3, 4

Flinders University (2012) clarified three common elements for a rubric:

- **Dimensions of quality/criteria** - competencies that relate to a specific academic discipline or across disciplinary boundaries are defined.
- **Levels of mastery** - such as excellent, good, needs improvement and not yet achieved.
- **Commentaries/descriptions** – this element defines features that should be found in the work at a particular level of mastery.

The University of New South Weals (2012) added that rubrics have three common elements:

- A set of criteria that provides an interpretation of the stated objectives (performance, behaviour, quality).
- A range of different levels of performance between highest and lowest.
- Descriptors that specify the performance corresponding to each level.

5.1. Types of rubrics

In general any rubric has three features: evaluative criteria, quality definitions and scoring strategy. Evaluative criteria indicate whether performance level is acceptable or not, while quality definition describe the performance different levels (Allen and Tanner, 2006).

In the following paragraphs, the differences between holistic and analytical rubrics and between General and Task-specific will be explained.

5.1.1. Holistic versus analytical

According to Nitko (2001), a holistic rubric obligates the teacher to score the overall performance as a whole, without judging the constituents separately. In holistic rubrics general uncategorized, descriptions of overall quality of performance are provided (Gatha and Darcy, 2010; Popham, 1997). Table 2 represent a holistic rubric adopted from Mertler (2001, p. 2).

Analytical rubrics require the teacher to score every process or to separate parts of the performance and then to sum the scores of individual parts to obtain total score. In analytical rubrics specific, highly categorized and extensive descriptions of each level of quality of performance for each criterion are provided (Gatha and Darcy, 2010; Mertler, 2001; Nitko, 2001).

Table 2.
Template for Holistic Rubrics

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

The decision regarding which variation of the scoring rubric should be used in a given evaluation is dependent on many factors; First, the purpose of the evaluation; Second, the time and effort intended to be spent for evaluating certain performance; Third, the nature of the assignment itself and finally, the nature of observed performance standards (Mertler, 2001; Montgomery, 2001).

The purpose of evaluation influences teacher's choice of rubric type. If the purpose of assessment is summative, a holistic scoring approach will be more favourable than the analytical approach because it guarantees providing scores in more cost and time effective manner. In contrast, if the purpose of using a rubric is formative, then the

analytical scoring approach is more advantageous. Analytical rubrics provide students with the detailed expectations for an assignment, so it explains "how excellent work looks like" and provides focused feedback on performance (Andrade et al 2008; Mertler, 2001; Montgomery, 2001).

In cases of limited time for evaluation, holistic rubrics are more suitable because they are easier to be constructed and marked. Analytical rubrics required the teacher to examine student's work several times to decide on the appropriate level of performance. In addition to the difficulty in marking an assignment, the construction of the analytical rubric is quite time and effort consuming (Mertler, 2001).

Table 3
Template for Analytical Rubric Adopted From Mertler (2001, P. 3).

	Beginning 1	Developing 2	Accomplished 3	Exemplary 4	Score
Criteria **# 1**	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criteria **# 2**	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criteria **# 3**	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	
Criteria **# 4**	Description reflecting beginning level of performance	Description reflecting movement toward mastery level of performance	Description reflecting achievement of mastery level of performance	Description reflecting highest level of performance	

Fluckiger (2010) talked about single point rubric as an ethical tool to assist students with their responsibilities of goal setting and self-assessment of their own education. The single point rubric helps each student to indicate the following:

1) I know where I'm going;
2) I know where I am now;
3) I know how to get there;
4) I know how to go beyond.

The single point rubric (see Table 4) is a different from a typical, multiple point rubric. It describes only one level of performance, the proficient level. Therefore, the single point rubric has only one set of criteria, or "one point," and that is the list of criteria which shows proficient competence appropriate to the grade or learning context. Single point rubric identifies only the proficient level of performance. This leaves ample space in which students are able to write their own descriptions of goals and how to achieve them, indicate their current status and explain how they have surpassed goals.

Table 4

Single Point Rubric from Jarene Fluckiger (2010, P. 23) Persuasive Writing

Not Yet (Areas that need work)	Proficient (Performance Standards)	Evidence (How you've met the standard)	Advanced (Areas that go beyond the basics)
	IDEAS and CONTENT a) Creates a clear understanding of the writer's opinion. b) Well-focused on the prompt. c) Contains numerous, relevant Supporting examples, reasons. d) Contains arguments that are distinctive in approach.		
	ORGANIZATION a) Structural development includes a functional introduction, body and conclusion. b) Sequencing is thoughtful, logical and effective. c) Pacing is well-controlled. d) Transitions clearly show how ideas connect.		
	WORD CHOICE a) Uses language that is specific and precise. b) Uses language that seems natural and appropriate to the purpose and audience. c) Effectively uses vivid words and phrases. d) Avoids clichés and jargon.		
	VOICE a) Shows strong commitment to the topic. b) Engages the reader throughout. c)Uses tone appropriate and effective for the purpose and audience. d) Anticipated reader's questions throughout.		
	CONVENTIONS a) Paragraphing is sound. b) Grammar, usage, spelling and punctuation is correct. c) Conventions may be manipulated for stylistic effect.		

The first empty column is where students write what they still need to do to achieve proficiency and to set their own immediate goals of things they will revise. In the second empty column, students write evidence to show how they have met proficiency. In the third empty column, students provide evidence of how they have gone above and beyond proficiency. Thus, the process of using a single point rubric allows time for goal

setting and revision, provides a place for noting current status and sets an expectation of initiative and innovation (Fluckiger, 2010).

The nature of the task influences the choice of the type of rubric. Holistic rubrics are more suitable for tasks that have no ideal correct answer. In addition, they are more proper for tasks where the overall quality is the focus and where minor errors could be tolerated if the overall quality of performance is high (Mertler, 2001). In contrast, analytical rubrics are more appropriate for tasks that require focused response.

5.1.2. General versus task specific

General rubrics are designed for the evaluation of a broad category of task. For example, a teacher could develop a rubric to evaluate all writing assignments year (12) students. In contrast, task-specific rubrics are planned to evaluate student's performance on a single task. General rubrics prove to be more useful, because they need not be constantly adapted to a particular assignment. In addition, they allow students to use the feedback from last assignment to enhance their performance on next assignment. Therefore, they provide an enduring vision of quality work that can both guide student and teacher. Moreover, they help to avoid the potential for confusion, when two different rubrics are used to score similar assignment (Perlman, 2003).

Selecting a general rubric does not eliminate the possibility of a task-specific rubric. Some rubrics could contain both general and task-specific part (Moskal, 2000). Rubrics can be used for both summative and formative assessment based on how the rubric is constructed. When formative assessment is desired, the content of the rubric concentrates on constructive feedback that helps the student improve his solution and move to a higher level. When summative feedback is desired, the cell contents concentrate on describing the desired characteristics on that level (Auvinen, 2009).

5.2. Debate on using rubrics

Despite their numerous advantages, rubrics_ specifically writing rubrics_ have come under some criticism recently, some of it is reasonable, but much of it is not (Spandel, 2006). Wilson (2007) noted that rubrics encourage conformity and an overly formal style. Cooper and Gargan (2009) argued that rubrics then can become the overbearing

framework that shapes student work, forcing everyone to look at problems and solutions in the same way, thus discouraging new ideas and approaches. Creative students-those thinking "outside the box" and beyond the rubric-will be penalized. Spandel (2006) defend that this can only happen if we use a language in our rubric that affirm the value of such thing and added that rubrics are like a guide that provide students with direction to have the necessary skills, that doesn't put a ceiling on performance and asserted that many students may exceed expectations.

Khon (2006) also criticized and dismiss rubric as a merely a list of expectation, a tool that promotes standardization and encourage conformity, Wilson (2007) complains that rubrics and their list of general comments, are clumsy in theory and in practice. They are tools of standardization that tear at the basis of the rhetorical heart of writing. Spandel (2006) responds that it is unreasonable to imagine that we are somehow ruled by the rubrics we design. Rubrics cannot impede our understanding of writing. They document what we know at present, but they cannot prohibit exploration of new ideas. In fact, rubrics help us surmount randomness, flat-out bias and inconsistency. They do not, however, require teachers to desert individuality or stop responding on a personal level. Turley and Gallagher (2008) explicate that it is true that evaluative criteria are idiosyncratic to each piece of writing. But in high school and college classrooms, we also need to develop writing communities in which we acquire shared vocabulary for talking about and evaluating pieces of writing.

Khon (2006) argued that rubrics actually help to legitimate grades by offering a new way to derive them. They do nothing to address the terrible reality of students who have been led to focus on getting A's rather than on making sense of ideas. Spandel (2006) argued that if produced in adequate thought and used with discretion and understanding, they become among the best instructional tools available to instructors.

Spandel (2006) asserted that rubric like any instructional tool or method can be misused. She explains that rubrics are not all the same. Some are unclearly written and are more accusatory than helpful. Some emphasize a prescribed approach to writing or stress on mechanics at the expense of content. However, good rubrics always embrace what we most deeply value. Andrade (2005) agreed that rubrics that neglect important issues such as validity, reliability and equity are dysfunctional. Rubric should be aligned with

reasonable and respectable standards and with the curriculum being taught. In addition, rubrics should be used several times by different people to check for reliability. Moreover, equity issues should be taken in consideration to be sure that the score received by a student has nothing to do with gender, race, ethnicity or socioeconomic status (Andrade, 2005).

Cooper and Gargan (2009) asserted that assessment with rubrics is subjective especially when teachers try to convert the qualitative descriptions of a criterion into scores. Spandel (2006) clarified that no teacher believe that rubrics makes us totally objectives and added that subjectivity is not wrong or even harmful- unless we use it as an excuse not to make our scores or grades defensible.

Andrade (2005) agreed with Cooper and Gargan (2009) that rubrics require time and effort in their construction and application, in addition, students need much explanation and practice before using them. Beatty (2008) also agreed that the main disadvantages relate to the time and precision required to develop a genuinely useful rubric, once constructed they can be reused over and again but require continuous thoughtful review and revision.

Andrade (2000) asserted that rubrics make assessing student work quick and efficient and they help teachers to justify to parents and others the grades that they assign to students. Kohn (2006) criticized using the rubric as self-justification strategy for the grades they put to students. Spandel (2006) argued that we need to offer reasons for our reactions and to show that those reasons are based on sound criteria rubrics make us accountable for scores and grades that affect human lives.

Gilmore (2007) argued that we also don't want to condemn a practice simply because it also helps parents navigate the complexities of assessments that are often quite different from any they experienced themselves in school. Rubrics are likewise commended for their ability to make sure different teachers in different classrooms are scoring in the same way, but educators are right to mistrust such a demand for conformity, it's not bad in and of itself that two or more teachers might respond to the same paper in the same way, but again, such uniformity should be a possible by-product, not a goal.

Spandel (2006) pointed that the real problem with existing writing assessment does not lie with rubrics but with what we value. Rubrics are not pushing us to value low-level skills. Instead, it is our own discourage and our reluctance to embrace the complication of truly good quality writing. We do not frequently credit design or voice or thinking because these things can practically never be assessed in a quick manner. Thus, the recognition of such qualities requires time and shrewd perceptive reading. It demands a belief that such qualities are just as important as spelling. Once we fully believe in that, our rubrics will endorse our beliefs.

Gilmore (2007) also offered the following six guidelines that extend the conversation about the ways rubrics work or do not work. First, rubrics should be tools that focus teacher commentary and not substitute it. Andrade (2005) agreed that although rubrics could be used as educative tools, they do not replace good instruction. Students still need models, feedback and opportunity for dialogue. Second, rubrics should be used according to a certain pedagogy that has not yet been fully investigated. Many teachers have used rubrics as assessment tools, not as teaching tools. We have to explore the pedagogical value of rubrics incorporation into classrooms through, for example, discussion groups, metacognitive writing, or think-pair-share activities. Gilmore asserted that rubrics make excellent springboards for class discussions about writing. Along with model essays and good prompts, they provide students and teachers the ability to deconstruct writing and explore aspects of, say, voice or syntax through the same good practices we use to discuss literature itself.

Third, students should be involved in creating the rubrics. Fourth, rubrics should be varied and flexible in order to adjust to the needs of the students. Turley and Gallagher (2008) declare that any educational tool becomes less instructionally helpful and more potentially harmful to educational integrity if it is not developed within the classroom context. Hence, a rubric that is created in this manner does not substitute engaged response. Rather, it is a tool for rendering more of it. While the language of the rubric corresponds to a consensus of the values of a certain group of writers, it also launches conversation. It is a place to start and certainly not a place to end. Fifth, rubrics should encourage and reward the writing process as well as the final product. Finally, the positive effects of using rubrics should not be ignored and also they should not be used as justifications that validate the tool's existence.

Turley and Gallagher (2008) believe that the debate on the uses of rubrics has been structured in limited ways. It makes little sense to reject or accept a tool without careful attention to how, why, by whom and in what contexts it is utilized. They propose a set of questions that can aid us to assess the value of rubrics or any instructional tool. The questions are: (a) What is the tool used for? (b) In what context is it utilized? (c) Who makes decisions? (d) What ideological agenda guides those decisions? The authors believe that these questions provide an approach for making judgments about the uses of rubrics.

Kohn (2006) argued that neither we nor our assessment strategies can be simultaneously devoted to helping all students improve and to sorting them into winners and losers. That's why we have to do more than reconsider rubrics. We have to reassess the whole enterprise of assessment; the goal being to make sure it's consistent with the reason we decided to go into teaching in the first place. Spandel (2006) Called that we should not abandon rubrics, we should make them better by ensuring that they embrace what we really value. Let's also create them in ways that leave space for thinking and opportunities for reflection. Gilmore (2007) asserted that in education, we need an ongoing conversation about assessment tools not just in our professional community, but in our classrooms, with students; that key piece of dialogue is all too often overlooked by all of those who extol the rubric's usefulness or who prophesy the doom it may bring.

5.2.1. The benefits of using the rubric

Panadero and Jonsson (2013) conducted a study that aims to review the research on formative use of rubrics, in order to investigate if and how, rubrics have an impact on student learning. In total, 21 studies about rubrics were analyzed through content analysis. Sample, subject/task, design, procedure and findings, were compared among the different studies in relation to effects on student performance and self-regulation. Findings indicate that the use of rubrics may mediate improved performance through (a) - providing transparency to the assessment. (b) - reduce student anxiety. (c) - aid the feedback process. (d) - Improve student self-efficacy. (e) - Support student self-regulation, that may indirectly facilitate improved student performance. Consequently,

there are a number of different ways in which the use of rubrics may support student learning, rubrics may have the potential to influence students learning positively. Rubrics explicate assessment criteria and quality levels. Thus, students understand in details "what is going to be assessed?" and the required quality (Cooper and Gargan, 2009; Moskal, 2000). In addition, rubrics enhance the ability of student to evaluate their and their peers' performance (Andrade et.al, 2008).

Rubrics support teaching; they can help teachers think carefully and critically about what they are teaching and what students need to learn. A rubric will help teachers consider what is important for them to teach and how to determine the level at which students have learned, what has been taught (Goodrich, 1997; Cooper and Gargan, 2009). Also, evaluations based on rubric usage are "likely to be reasonably objective and consistent" (Callison, 2000, p. 35). Because it clarifies schemes for evaluation ahead of time; therefore, reduce subjectivity (Moskal, 2000).

Andrade, Buff, Terry, Erano and Paolino (2009) work aimed to improve students' writing skills and scores. In order to achieve their aim, the researchers collaborated with the sixth, seventh and eighth grade teachers of English and social studies and set three assessment goals. The first is to make assessment processes clear to students via rubrics. The second is to provide frequent, meaningful feedback to students about the quality of their work through teacher, peer and self-assessment. The third is to use the assessments to examine the strengths and weaknesses in students' work and to plan instruction. The study's results show that students' writing and their ability to self-assess had considerably improved. Teachers realized consistent progress in the products and processes of students' writing. Most of the students were constantly gaining a score of three or four on all criteria on the rubric. In grades six and eight, the scores for all students demonstrated improvement by seven and 15%, respectively. Subgroup scores also increased.

Rubrics help teachers to think critically and carefully about the purpose and aims off the assessment, they are carrying out. In addition, rubrics help teacher to decide on the criteria and the quality of assessment they are intending to complete. Moreover, rubrics give teachers detailed feedback about the level at which students have learned, what has been taught through providing teachers with a clear and quick summary of performance

levels across scoring scales (Cooper and Gargan, 2009; Goodrich, 1997; Hafner and Hafner, 2003).

Rubrics are "regulatory device[s] for scoring, it seems safe to say that scoring with a rubric is probably more reliable than scoring without one" (Jonsson and Svingby, 2007, p. 136). Good body of research indicates that analytical rubrics provide more reliable results than General rubrics (Johnson, Penny and Gordon, 2001; Jonsson and Svingby, 2007). In addition, task-specific rubrics provide more generalize and reliable scoring (DeRemer, 1998; Marzano, 2002). In addition to consistency of assessment, rubrics provide reasonably objective assessment as they clarify schemes for evaluation ahead of time (Moskal, 2000). Moreover, training improves agreement, thus it enhances reliability (Stuhlmann et al. 1999).

With regard to validity, research does not provide good evidence for rubrics as valid scoring tools. However, rubrics have consequential validity since research prove that rubric influence teaching and learning positively (Jonsson and Svingby, 2007).

Besides being an effective tool for authentic assessment (Montgomery, 2002), rubrics have the potential to enhance instruction and to promote learning (Jonsson and Svingby, 2007). Andrade et al. (2008) investigate the impact of reading a model written assignment, coming up with a list of criteria for the assignment and self-assessing according to a rubric, on elementary school students' scores for a written assignment. The treatment involved using a sample paper to scaffold the process of making a list of criteria for an effective story or essay, delivering a written rubric and using the rubric to self-assess first drafts. The comparison condition comprised generating a list of criteria for an effective story or essay and reviewing first drafts. Results show that having students use model papers to generate criteria for a writing assignment and using a rubric to self-assess first drafts is positively related to the quality of writing. The treatment has a statistically significant, positive correlation with third and fourth grade students' essay scores.

Rubrics facilitate constructive and self-regulated learning (Hafner and Hafner, 2003; Lara, 2010). They increase students' awareness of learning goals, clarify teacher's expectations and explain the criteria needed to meet a quality performance. In addition,

rubrics provide students with appropriate feedback about their strengths, weaknesses and their progress in achieving teacher's expectations and direct them toward self-evaluation. The result is often marked improvements in the quality of student work and in learning (Allen and Tanner, 2006; Andrade, 2005; Andrade et.al 2008; Cooper and Gargan, 2009; Goodrich 1997; Knight, 2006; Zimmerman and Schunk, 2001).

Rubrics provide opportunities for reflection for both teachers and students. Students reflect on their current learning, on their progress and the requirements for achieving teacher's expectation, on the other hand, during developing rubrics, teachers reflect on their values, their learning goals, the extent to which these goals are reflected in their instruction and their expectations for students' learning (Allen and Tanner, 2006; Cooper and Gargan, 2009).

Rubrics can help teachers think carefully and critically about what they are teaching, what students need to learn, what problems face students in their learning and how to determine the level at which students have learned what's been taught. This reflection increases the potential for enhancing instruction (Cooper and Gargan, 2009; Cebrián, 2009; Moss, Gosnell, Brookhart and Haber, 2002).

Peat (2006) also affirms in his study that the teacher who used rubrics to assess students' performance on literature review papers reported that her style of teaching has changed. In general, the teacher focused more on providing meaningful and constructive feedback to the students, not only through the use of the rubric but also in her written comments throughout their papers. She also has found that, in class, she provided more detailed verbal instructions on the expectations of performance as well as the reasons for using literature review assignments. She has also tried to relate the purpose of the research proposal to their overall understanding of research.

Rubrics help students to develop a sense of responsibility specifically if they use rubrics in self and peer assessment. In addition, rubrics increase the ability of students to judge a quality performance (Cebrián and Accino, 2009; Goodrich, 1997). Students' involvement in the process of designing a rubric develops their understanding, their ability to become self-directed and help them develop insight into how they and others learn (Allen and Tanner, 2006; Andrade et.al 2008).

Rubric can be a powerful communication tool when shared among teachers, students and parents. A rubric provides a mean for teachers and for their colleagues' to clarify their vision of excellence and convey that vision to students and parents (Cebrián and Accino, 2009).

Goodrich (1997) lists five reasons to use rubrics. Rubrics are used to make the expectations of the teacher clear. They help students become more thoughtful judges of the quality of their own and others' work. They reduce the amount of time teachers spend evaluating student work. They allow teachers to accommodate heterogeneous classes. Rubrics provide an easy way to explain student evaluation to parents.

Rubrics help to make expectations clear, Wolf and Stevens (2007) pointed that teachers have a wrong assumption about the expectations for student performance and behaviour and presume that all students share those same understandings. While a lot of students especially foreigners had a different understanding of the teachers' expectations.

Rubric is valuable to both teacher and the student as a quick and clear summary of performance levels across a scoring scale, the top level of the rubric communicates what exemplary work should look like and involves the student in constructive learning and self-evaluation (Hafner and Hafner, 2003). Rubrics facilitate student awareness of learning goals as well as the application of feedback, both important in the assessment and learning cycle (Zimmerman and Schunk, 2001).

Although rubrics help students to know what they need to achieve a certain grade, they have other benefits. Rubrics can make the expectations and standards for performance clear to students, parents, teachers and educators (Cooper and Gargan, 2009). Also, rubrics provide students with feedback about their strengths and areas in needs of improvement. Rubrics support development of understanding and development of students' capacity to judge their own work (Goodrich, 1997; Cooper and Gargan, 2009).

Rubrics make the assessment process more accurate and fair. Since the criteria is determined and shared with the students, Well-designed rubrics make the assessment process more valid and reliable; their real value lies in advancing the teaching and learning process. But having a rubric doesn't necessarily mean that the evaluation task

is simple or clear-cut. The best rubrics allow evaluators and teachers to draw on their professional knowledge and to use that professional knowledge in ways that the rating process doesn't fall victim to personality variations or limitations of human information processing (Wolf and Stevens 2007).

Rubrics provide opportunities for reflection, feedback and continued learning. They can help both teachers and students to review their own work or their peer's work, in this way students learn to become self-directed. Besides, they will have the opportunity to understand how they and others learn. In 2002, a team work conducted a study that aimed to explore the effects of using analytical rubrics on teacher's beliefs about teaching, learning and the portfolio process. The study revealed that using analytical rubrics as a lens for examining their professional portfolios facilitated a more reflective approach to teaching and can help both students and teachers to become expert problem solvers, decision makers and goal getter (Moss et al, 2002).

Rubric can be powerful communication tool when shared among teachers, students and parents, the rubric inform every one about what characteristics of students work are most highly valued, it provides a mean for the teacher and for his colleges to clarify their vision of excellence and convey that vision to their students and parents. It also provides rational for assigning grades to subjectively scored assessment (Perlman, 2003).

Rubrics support development of skills. A team work in Iowa State University conducted a research aimed to examine the use of rubrics in supporting the development of students' problem-solving skills. The results indicate that rubrics are helpful in assisting student understand course-specific learning outcomes. In addition, it is important to involve students in revising and finalizing the rubrics, with a discussion about the characteristics of the excellent work and to engage students in the learning experiences they hope to achieve. Moreover the study revealed that rubrics allow students to learn in new ways and can improve communication between teacher and students. And that rubric student had the opportunity to learn from one another and that rubrics can help students form and adapt lifetime standards for assessing performance. Rubrics represent an effective assessment and feedback tool, having students assess their own work before submission with these benchmarks, helps students to identify ways to improve the

quality of their efforts. Finally the study showed that rubrics were generally useful and favourable received by the students (Saunders, Glatz, Huba, Griffin, Mallapragad and Shanks, 2003).

5.2.2. Disadvantages of rubrics

Although rubrics are gaining good reputation in teaching and assessment, they still have some pitfalls. First, assessment with rubrics is subjective especially when teachers try to convert the qualitative descriptions of a criterion into scores (Cooper and Gargan, 2009). Second, rubrics require time and effort in their construction and application, in addition, students need much explanation and practice before using them (Andrade, 2005; Cooper and Gargan, 2009).

Third, even though rubrics are widely accepted as teaching methods, they could limit learning. A rubric with very task-specific evaluative criteria or a rubric with excessively general criteria has potential to restrict learning. In addition, poorly designed rubrics, or rubrics with dysfunctional details also limit learning. Cooper and Gargan (2009) argue that rubrics then "can become the overbearing framework that shapes student work, forcing everyone to look at problems and solutions in the same way, thus discouraging new ideas and approaches. Creative students-those thinking "outside the box" and beyond the rubric will be penalized. Andrade (2005) asserted that although rubrics could be used as educative tools, they do not replace good instruction. Students still need models, feedback and opportunity for dialogue.

Finally, rubrics that neglect important issues such as validity, reliability and equity are dysfunctional. Rubrics should be aligned with reasonable and respectable standards and with the curriculum being taught. In addtion, rubrics should be used several times by different people to check for reliability. moreover, equity issues should be taken in considration to be sure that the score received by a student has nothing to do with gender, race, ethinicity or socioeconimic status (Andrade, 2005).

On Lim (2013) study that aim to explore the students' perceived uses of rubrics and their actual use of rubrics in their oral production assessment, the students didn't use rubrics in planning for their oral production assessments especially in their debates. Moreover, most of the time, they do not read the rubrics before their performance

assessment. Also during the delivery of their speeches in their oral performance assessments, all students deliberately mentioned that rubrics do not play a part at all. They feel that rubrics can actually make one's speech become rigid and may confuse the speaker if she constantly recalls what were written in the rubric (Lim, 2013).

Moreover, students in this study unanimously expressed their belief that rubrics trigger anxiety. Knowing the expectations may help them aim for a good grade; nonetheless, it also puts pressure on them to meet all the expectations. Anxiety is brought about by rubrics because of that fear that they might not meet all expectations set by the rubric (Lim, 2013).

Students also believe that rubrics tend to be quite subjective grading tools. Students' perception of subjectivity in rubrics is attributed to their experience in grading their peers with the use of rubrics where they believe that they only used their "gut feeling" in determining the scores for their classmate's performance despite the descriptors indicated in the rubric. In addition, the lengthy and vague descriptors of the rubric discourage students to read it because it can just trigger anxiety and probably, further confusion.

Some of the students also raised the proclivity of the rubric to limit the ability of the student to perform beyond the set expectations. Rubrics tend to impose on the students what they should do and how they should do it. They feel that they are not anymore given the opportunity to develop their own ways of achieving the standard set during instruction (Lim, 2013).

5.3. How to develop a rubric

Rubrics are gaining popularity in education; therefore, presently, there are extensive resources available to teachers (Andrade, 1997; Moskal, 2000). However, teachers may need to design their own rubrics to reflect their own curriculum or teaching style. "What would a rubric look like that not only helped teachers judge the quality of student's performance test but also assisted those teachers in helping students acquire the skill represented by that test" (Popham, 1997. p. 4).

Before the start of a rubric designing process, teachers have to clarify the purpose of the rubric, its framework and the objectives for using it (Knight, 2006). In addition, teachers, as much as possible, should share their students in designing a rubric since the process of developing a rubric is strongly instructive (Andrade, 2000; Andrade et al. 2008).

According to Andrade (2000) and Mertler (2001), teachers need to follow the following steps to develop a rubric: First, teachers have to decide on the learning standards that an assignment should address in order to align assessment with instruction. Second, they should determine the observable elements (skills, characteristics or behaviours) that they want students to demonstrate in their performance. In addition, they have to find out the common mistakes that students should not demonstrate in their performance. Third, teachers have to describe each observable element extensively and they have to express levels of quality for each element. For a holistic rubric, teachers have to write the descriptions of excellent work and poor work incorporating each standard in the description. Then, teachers have to write the descriptions of other levels on the ranges from excellent to poor work for the combined standards. For an analytical rubric, the teachers have to write the descriptions of excellent work and poor work for each standard separately. Next, they have to write the descriptions of other levels on the ranges from excellent to poor work for each element separately. Finally, teacher should always be ready to reflect on the effectiveness of their designed rubric, should seek students and peers review and revise the rubric as needed.

In brief, developing a rubric involves the identification of learning objectives appropriate to the skill/knowledge expected from the student. Next, setting levels of quality for each standard and deciding on scoring methodology. Finally, revising and implementing the rubric (Choudhury, 2012).

Skillings and Ferrell (2000) report on a successful collaborative effort in the development and design of rubrics with second and third grade students. The involvement of the students started with the introduction of teacher-generated rubrics used for assessment and instruction, however with careful guidance, the students were encouraged to perceive rubrics critically and to generate components of their own. As the process continued, the students presumed more control in the rubric design and

development. The process of working out and implementing student-generated rubrics assisted students in developing critical thinking and metacognitive skills.

Mehrens, Popham and Ryan (1998) argued that teachers who are clear about the criteria that will be used to identify high achievement levels are better able to design instruction to help students attain those levels.

The design of the rubric or any assessment method is very important, we have to focus on the quality of the questions we ask or the specific activities we design to assess students (Flinders University website, 2010).

Brown (2001) identifies seven questions that teacher might ask when designing an assessment task:

- What are the outcomes to be assessed?
- What are the capabilities/skills (implicit or explicit) in the outcomes?
- Is the method of assessment chosen consonant with the outcomes and skills?
- Is the method relatively efficient in terms of student time and staff time?
- What alternatives are there? What are their advantages and disadvantages?
- Does the specific assessment task match the outcomes and skills?
- Are the marking schemes or criteria appropriate?
- Who should make judgments about student learning - the teacher, the student, the student's peers or others? (Flinders University website, 2010).

A good body of research (Allen and Tanner, 2006; Andrade, 2000; Moskal, 2000) reveals that when designing a rubric, teachers must have a clear idea of the desired student learning goals and how to meet each goal, every teacher have to ask himself :

- What do I want my student to learn to be able to do?
- How will I know that they learn and that they can do it?
-

Answering these questions can help the teacher in choosing the suitable teaching methods and can help him also in choosing assessment task to collect evidence about how the outcomes have been met. Then, the teacher should make set criteria that describes the desired out comes and viewing existing rubrics about the same task would be helpful. Next, the teacher have to describe the levels of every criterion and that

depends on the type the rubric (holistic or analytical), which is not easy because it is difficult to decide the levels of the standard performance, with the range of capabilities of learners at a particular developmental. But it will help to start with describing the super performance, taking in consideration to avoid using words that are not measurable such as good and creative which are very general words that will not guide a learner to emulate specific standards for a task (Allen and Tanner, 2006; Andrade, 2000; Moskal, 2000).

Andrade (2000) indicates that in designing a rubric teacher has to engage students in the following:

Step 1. Viewing models that demonstrate good and poor examples of students' work for a particular task.

Step 2. Listing the criteria, teacher should use the characteristics to generate a discussion about what is considered quality work.

Step 3. Articulating gradations of quality, teacher should direct his students to describe best and worst levels of quality on the continuum and then fill in the middle levels of quality.

Step 4. Practicing on models, teacher should let students use the rubric created in Steps 2 and 3 to assess the examples of good and poor work in Step 1.

Step 5. Using self-assessment and peer assessment, teacher should stop students; occasionally, as they are working on a task to have them assesses the work.

Step 6. Revising, teacher should encourage students to revise their work based on the feedback they receive in Step 5.

Step 7. Teacher should assess students' work by using the same rubric they have used to assess their own and their peers' work.

Lockett (2001) added that when designing rubric we should follow these tips:

*Rubrics need to contain measurable criteria of work that is being evaluated.

*Vague descriptors or descriptors using overly technical jargon should also be avoided.

*Descriptors of the work should help to guide the students in constructing the final product and if the descriptors are not well defined, the students will not know what is required of them.

*Another design tip is to add thin columns in between each vertical column. The thin columns allow the teacher to review the student's work as needed by putting plus signs

beside the column where the criteria have been met. This allows the rubric to be used as an on-going dialog between the teacher and student and allows the student to know when each criterion has been met and then make improvements as needed.
*Whether the rubrics are teacher created or as collaboration between students and teachers, knowing when is important. When dealing with monitoring factual information, test quizzes and checklists are better methods of evaluation. The best use of rubrics is when there is a wide range of variation between quality work and work that is not yet proficient. Examples of times to use rubrics are for writing assignments, use of scientific inquiry, problem solving, performance based learning and presentations (Lockett, 2001).

Andrade (2000) also agrees that educators can boost student learning when they go beyond the most basic application of rubrics. By including students in designing rubrics, by looking for and including thinking-criteria and by involving students in serious self and peer assessment, the use of rubrics will have a powerful effect on the students' learning.

Stevens and Levi (2005) list three good reasons for involving students in rubric constructions: (a) Prevents misunderstanding and misinterpretation before they affect students work; (b) involve students in the educational process; (c) cut down teachers work load by letting students to create parts of their assessment tools.

In case of using an existing rubric, we should ask ourselves these questions:

- Does the rubric relate to the outcomes being measured?
- Does the rubric cover important dimensions of student performance?
- Do the criteria reflect current conceptions of excellence in field?
- Are the categories or scales well defined?
- Can students and parents understand the rubric?
- Is the rubric developmentally appropriate?
- Is the rubric applicable to a variety of tasks?
- Is the rubric fair and free from bias?
- Is the rubric useful, feasible and manageable and practical? (Perlman, 2003).

CHAPTER THREE: METHODOLOGY

1.Introduction

In this chapter, the theoretical and methodological underpinning to the present study are outlined, specific details of the research design and procedures for data collection and analysis are explained, and justified.

This chapter presents the study approach, ethical issues, participants and school description, instrumentation (interviews, diary and rubric for teachers, and Student exam, students open ended questionnaire and rubric). Moreover, this chapter clarified the process of rubric application in the classroom, students' questionnaire application, and the data analysis

The chapter closes with the description of the strengths and limitations of the method and considerations of ethical issues relevant to the study.

2.Study approach

This is a case-study qualitative research. That is an inductive inquiry strategy of approaching a setting. The case study research aims to explore an issue in a bound context or setting, using one or more cases within this context (Creswell, 2006). Thus, the case study is suitable for investigating the central phenomenon of this study, since the main aim of the researcher is to understand teacher’s beliefs about assessment for learning in secondary schools context. Case study is an excellent choice for researchers who want to intensively and deeply examine an issue (Creswell, 2006).

Critics of the case study method believe that the study of a small number of cases can offer no grounds for establishing reliability or generality of findings. Others feel that the intense exposure to study of the case biases the findings. Some dismiss case study research as useful only as an exploratory tool (Soy, 1997).

A key strength of the case study method involves using multiple sources and techniques in the data gathering process. Data gathered is normally largely qualitative, but it may also be researcher determines in advance what evidence to gather and what analysis techniques to use with the data to answer quantitative. Tools to collect data can include surveys, interviews, documentation review, and observation (Soy, 1997).

Case studies are complex because they generally involve multiple sources of data, may include multiple cases within a study, and produce large amounts of data for analysis. Researchers from many disciplines use the case study method to build upon theory, to produce new theory, to dispute or challenge theory, to explain a situation, to provide a basis to apply solutions to situations, to explore or to describe an object or phenomenon. The advantages of the case study method are its applicability to real-life, contemporary, human situations and its public accessibility through written reports. Case study results relate directly to the common reader's everyday experience and facilitate an understanding of complex real-life situations (Soy, 1997).

It's clear from the research objectives informing the present study, that this research concerns with in depth understanding of teachers' beliefs about assessment for learning, and hence, that case study offers a suitable research design to accommodate these concerns.

In order to facilitate the capturing of the richness of teachers' beliefs, the methodology guiding this study was necessarily qualitative. The research design, along with the method engaged for the purpose of data collection and analysis.

One advantage of qualitative methods in exploratory research is that use of open-ended questions gives participants the opportunity to respond in their own words, rather than forcing them to choose from fixed responses, open-ended questions have the ability to evoke responses that are:

- Meaningful and culturally salient to the participant.
- Unanticipated by the researcher.
- Rich and explanatory in nature.

Another advantage of qualitative methods is that they allow the researcher the flexibility to probe initial participant responses, the researcher must listen carefully to what

participants say; engage with them according to their individual personalities and styles (Mack, Woodsong, MacQueen, Guest, and Namey, 2005).

3. Ethical issues

The qualitative nature of this study demands that the researcher be at high level of awareness of ethical issues; so, the ethical steps that were suggested by Creswell (2008) were considered to maintain high ethical standards: Firstly, the school principal, the teacher and the students, were informed by the aims of the study, the benefits that they will gain, the costs required from them such as time, effort and risk (which is minimal in this study). Secondly, participants were informed by their rights as volunteer which are; the right to quit at any time, to refuse answering any question, to ask any question, and to receive feedback about the results. Finally, steps to protect confidentiality were taken such as destroying the audiotapes after transcribing the data, assigning aliases to participant to protect anonymity; all the interviews were conducted in the absence of any person who has authority on the teacher.

4. Participants and school description

***Teachers**

The sampling method is the purposeful sampling, two mathematics teachers (who can speak Spanish and English languages) and who are also interested in using rubrics for assessment, were involved in this study.

Two secondary mathematics teachers drawn from a public school in Granada participated in this study. The school was chosen because of its proximity to the researcher. The two teachers had along teaching experience 11 and 19 years, both of them are holders of a mathematics certificate.

***Students and school description**

The secondary school (I.E.S) in Granada was opened in the academic year 1989/1990, in which the number of students was, approximately 1,400.

The students who participated in the research were 15 students from 3º ESO and 8 students from 4 º ESO (from 14 to 16 years of age).

Before mentioning the students, it's appropriate to give a brief description about the education system in Spain:

The current system of education in Spain is known as Ley Orgánica de Educación (LOE) which stands for Fundamental Law of Education. Education in Spain is compulsory and free from 6 to 16 years of age, supported by the Government on each Region.

Below Higher Education the system can be seen as consisting of four levels:

- Pre-school (educación infantil, segundo ciclo) - 3 to 6 years old.
- Primary School (educación primaria) six years of schooling - 6 to 12 years old.
- Compulsory Secondary Education (ESO) four years of schooling - 12 to 16 years old.
- Post-Compulsory Schooling (*bachillerato*) two years of schooling - 16 to 18 years old.

Children 3 to 6 years old in Spain have the option of attending the Pre-school stage (*infantil* or popularly known as preschooler), which is non-compulsory and free for all students. It is regarded as an integral part of the education system with infants' classes at almost every primary school. There are some separate nursery schools (*colegios infantiles*).

Spanish students aged 6 to 16 undergo primary (*colegio*) and secondary school education, which are compulsory. Successful students are awarded a secondary education certificate, which is necessary to enter the post-compulsory stage of Schooling (principally the *bachillerato*) for their university or vocational studies. Once students have finished their " *bachillerato*", they can take their university entrance exam popularly called "*selectividad*" which differs greatly from region to region. The compulsory stage of secondary education is normally referred to by its initials: ESO (*Educación Secundaria Obligatoria*).

Compulsory Secondary Education (*Educación Secundaria Obligatoria or ESO*) is structured as two cycles of two academic years each (total 4 years):

Table 5

Compulsory Secondary Education

		Cycle	Age	
Compulsory Education	Secondary	1°	[12-14] Yeats	1° ESO 2° ESO
		2°	[14-16] years	3° ESO 4° ESO

Upon finishing ESO the student has a number of options, including:

- Spanish baccalaureate (post-compulsory diploma)
- Vocational training.
- Work (it is only possible to get a job from 16 onwards)

The students who participate in the research were 2nd cycle (14 to 16 years of age) 3º ESO.

5. Instrumentation

Rubrics, interviews, diary, and students' questionnaire and exam were used to collect information, followed a detailed explanation for every instrument:

5.1. Interviews, diary and rubric for teachers

5.1.1. Interviews

The in-depth interview is a technique designed to elicit a clear picture of the participants' perspective on the research topic. During in-depth interviews, the person being interviewed is considered the expert and the interviewer is considered the student. The researcher's interviewing techniques are motivated by the desire to learn everything the participant can share about the research topic. Researcher engage with participants by posing questions in a neutral manner, listening attentively to participants' responses and asking follow-up questions and probes based on those responses. They do not lead participants according to any preconceived notions, nor do they encourage participants

to provide particular answers by expressing approval or disapproval of what they say (Mack et al. 2005).

Merriam (2009) added that interviewing is the best technique to use when conducting intensive case studies of a few selected individuals. Interviewing is necessary when the required information cannot be observed such as feelings, beliefs, perceptions and opinions.

5.1.1.1. Construction of the interviews

The interview was a semi structured that aim to collect data that can help the researcher to understand teachers' beliefs about assessment for learning. The questions of the interviews derived from the literature and from the objective of this study, the interview questions concentrate on:

- Teachers' beliefs about assessment.
- Forms of assessment teachers apply in the classroom.
- The reasons that prevent teachers to apply new forms of assessment.
- The use of rubric as an assessment for learning tool and, students and teachers opinion about its validity, its benefits, and the difficulties that face them when using it.
- To understand the effect of using the rubric on teachers' beliefs.

The interviews were applied in four sessions (see appendix 3); two were applied before using the rubric, and two after applying it.

The first interview consist of 8 questions, that spot the light on the teacher experience in assessment, and the teacher beliefs about assessment, and what is needed to enhance it.

The second Interview consist of 12 questions, concentrate on the purpose of assessment, benefits of assessment, assessment for learning, self and peer assessment, using rubrics as an assessment for learning tool.

The third interview consists of 10 questions that concentrate on teacher's beliefs about assessment for learning, feedback rubric.

The fourth interview consist of 5 questions that concentrate on the assessment strategies that teacher use to assess their student, the reasons that prevent teachers to apply new forms of assessment, the difficulties that face teachers with using new assessment method, the purpose of assessment.

The interviews were recorded using high quality digital tape-recorder after taking consent of the participants for recording their voices. Recording the interviews will help the researcher to pay close attention to the conversations. In addition, the recorded material contains responses in the wards of the participants, these wards would be used later in quotation to increase trustworthiness (Creswell, 2006).

The process followed in the elaboration of the interviews was as follows:

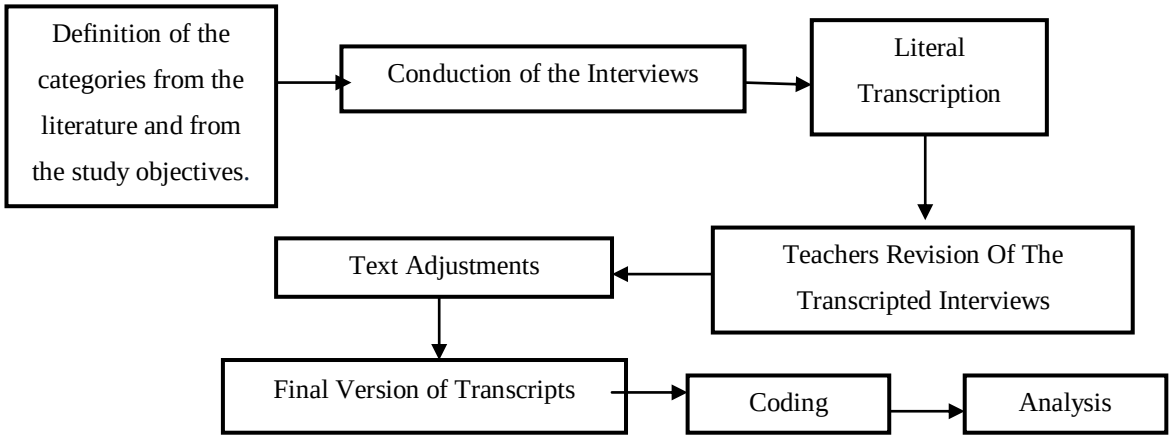


Figure 10 . The elaboration of the interviews

5.1.2. Diary

The teachers were asked to write a reflective diary to describe their experience with using the rubric (see appendix 4). These diaries permit us to understand see the experience of applying the rubric from the teachers eyes, also helps us to find aspects that belong to teachers belief about assessment for learning. For that using diary as a tool of collecting data in this research is important.

Diaries were used as research instruments to collect detailed information about behaviour, events and other aspects of individuals' daily live. Self-completion diaries have a number of advantages over other data collections methods. First, diaries can

provide a reliable alternative to the traditional interview method for events that are difficult to recall accurately or that are easily forgotten. Second, like other self-completion methods, diaries can help to overcome the problems associated with collecting sensitive information by personal interview. Finally, they can be used to supplement interview data to provide a rich source of information on respondents' behaviour and experiences on a daily basis (Corti, 1993).

5.1.3. The rubric

The rubric was chosen to meet all the objectives of teaching mathematics in I.E.S (see appendix 2).

The rubric has three evaluation criteria as follows:

- Mathematical knowledge: (Do you know it?) Knowledge of mathematical principles and concepts that result in a correct solution to a problem.
- Strategic knowledge: (How do you plan?) Identification and use of important elements of the problem that represent and integrate concepts which yield the solution (e.g., models, diagrams, symbols, algorithms).
- Explanation: (Can you explain it?) Written explanation of the rationales and steps of the solution process. A justification of each step is provided. Though important, the length of the response, grammar, and syntax are not the critical elements of this dimension**.**
- And every evaluation criteria is followed by a number of statements that describe the quality definition for every evaluation criterion.

Table 6
Rubric

Conocimiento matemático: (¿Cómo lo averiguo?)	**Conocimiento estratégico:** (¿Cómo lo planteo?)	**EXPLICACION:** (¿Lo puedo explicar?)	**Nota**
El conocimiento de principios y conceptos matemáticos que conllevan a un resultado correcto al resolver el problema.	Identificación y uso de elementos importantes sobre el problema que presenta e integra conceptos que conllevan a la resolución. (modelos, diagramas, símbolos, algoritmos)	Explicación escrita de los razonamientos y los pasos en el proceso de resolución. Se debe de proporcionar una justificación de cada paso. Es importante la extensión de la respuesta, pero la gramática y la sintaxis no son elementos fundamentales de esta dimensión.	

▪ Muestro una comprensión completa de los problemas, conceptos matemáticos y principios. ▪ El resultado que obtengo es correcto y lo califico como respuesta correcta. ▪ Uso términos matemáticos correctamente para demostrar que entiendo el modo en el que funcionan las matemáticas. ▪ Calculo sin cometer errores.	▪ Identifico todos los elementos importantes del problema y muestro una comprensión total de las relaciones entre ellos. ▪ Muestro todos los pasos utilizados para resolver el problema. ▪ Explico los cálculos realizados tanto mentalmente como usando la calculadora. ▪ Muestro diagramas completos, gráficos, ecuaciones, símbolos si los utilizo en mi planteamiento.	▪ Escribo qué he hecho y lo justifico. ▪ Si uso diagramas, gráficos, ecuaciones o símbolos soy capaz de explicarlo todo por escrito.	
(2.5 puntos)	(5 puntos)	(2.5puntos)	
▪ Mostrar una comprensión aproximadamente total de los problemas, conceptos matemáticos y principios. ▪ Empleo los términos matemáticos adecuadamente. ▪ Cometo errores menores durante el cálculo.	▪ Identifico la mayoría de los elementos más importantes del problema y muestro una comprensión general de las relaciones entre ellas. ▪ Muestro un planteamiento razonable. así como la mayoría de los pasos empleados para resolver el problema. ▪ Explico los cálculos realizados tanto mentalmente como mediante el uso de la calculadora. ▪ Muestro casi de forma completa los diagramas, símbolos, modelos o cálculos en caso de usarlos en mi planteamiento.	▪ Escribo la mayor parte de lo que he hecho. ▪ Presento algunos de los motivos por los que lo he hecho de ese modo. ▪ En caso de emplear diagramas, gráficos, ecuaciones, símbolos puedo explicar la mayor parte de ellos por escrito.	
(2 puntos)	(4 puntos)	(2puntos)	
▪ Muestro algo de comprensión de los problemas, conceptos matemáticos y principios. ▪ Sé cómo resolver parte de los problemas, pero cometo grandes errores al calcular y el resultado que obtengo es incorrecto. ▪ Presento un resultado incorrecto o solo una parte del resultado.	▪ Identifico algunos elementos importantes del problema pero tan solo muestro una comprensión limitada de las relaciones entre ellos. ▪ Muestro algunos de los pasos pero mi planteamiento es confuso. ▪ Explico parte de los cálculos realizados, tanto si los realizo mentalmente, o mediante el uso de la calculadora. ▪ Muestro algunas partes de los diagramas, gráficos, ecuaciones, símbolos en caso de utilizarlos en mi planteamiento.	▪ Escribo un poco sobre lo que he hecho o el motivo, pero no ambas cosas. ▪ En caso de emplear diagramas, gráficos, ecuaciones, símbolos, soy capaz de explicar por escrito algunos de ellos.	
(1.25 puntos)	(2.5 puntos)	(1.25 puntos)	
▪ Muestro una comprensión limitada de los problemas, conceptos matemáticos y principios. ▪ Intento resolver el problema pero no lo comprendo.	▪ No identifico los elementos importantes o resalto demasiado algunos elementos que no están relacionados. ▪ Presento un planteamiento que no es razonable. ▪ No presento apenas pasos que he usado para resolver el problema. ▪ Incluyo información innecesaria.	▪ Utilizo diagramas, gráficos, ecuaciones, símbolos que no se corresponden con mi respuesta. ▪ Presento una respuesta confusa.	
(0.75 punto)	(1.25 puntos)	(0.75 punto)	
▪ No estoy seguro de haber comprendido el problema.	▪ No presento ningún planteamiento.	▪ No explico nada por escrito.	
(0 puntos)	(0 puntos)	(0 puntos)	

For example: for the student to show that he can:

- Set a perfect plan that led him to the solution he has to meet the following quality definitions.
- Identify all-important elements of the problem and show complete understanding of the relationships among elements.
- Show all the steps I use to solve the problem.
- Explain any work I do in my head or with a calculator.
- Completely show pictures, diagrams, models or computation if I use them in my plan.

The scoring strategy of the rubric was modified by the teachers as follows:

Table 7
The Rubric Scoring Strategy

Mathematical knowledge	Strategic knowledge	Explanation	Final score
2.5	5	2.5	10
2	4	2	8
1.25	2.5	1.25	5
0.75	1.25	0.75	2.75
0	0	0	0

5.2. Students Instruments

5.2.1. Students exam

In the end of the teaching unit, the students had an exam and they were asked to correct it in peers using the rubric, and teachers were asked to reflect their opinion about the results (appendix 6).

The students exam was used to help the teacher to see the how her students solve problem following the rubric, and to help her see the difficulties and the advantages of using the rubric. Search for evaluating aspects of interest to the teacher according to the competences to be acquired.

5.2.2. Students open-ended questionnaire

Students’ open-ended questionnaire (appendix 5) was used to explore their perceptions about rubrics as a method of learning and assessing.
The questionnaire was designed to help both the teacher and the researcher to understand students' opinion about using this rubric; this will give them a feedback that will help them to enhance their practices.

The questions spot the light on students' opinion about:

- The advantages and disadvantages of the rubric.
- The difficulties they found while using the rubric, and the ways to enhance them.
- How to enhance the rubric?
- The effect of using the rubric in their classmates.

This questionnaire was used at the end of the experience of using the rubric as an assessment for learning tool.

6. Procedure

This study was designed to investigate teachers’ beliefs about using the rubric as an assessment for learning tool in a secondary mathematics class, Mainly, to understand teachers’ beliefs about assessment, to describe the assessment strategies they apply in the classroom, to analyze the reasons that prevents teachers to apply new forms of assessment. to use rubric as an assessment for learning tool and spot the light on students and teachers opinion about its benefits, and the difficulties they face when using it, to help the teacher reflect on the current practices that she use to assess her students, in order to enhance it. And to understand the changes that happened to the teachers' beliefs related to the use of rubric

For that the literature was reviewed in order to have better understanding of the research topic, and to have a clear idea of what others have written about this topic.

The study methodology was chosen to address the purpose of this study, the qualitative research method was used, and the sampling method is purposeful sampling, where two

math teachers, who can speak Spanish and English languages and who are also interested in using rubrics for assessment, were involved in this study.

Two math teachers, who can speak Spanish and English languages and who are also interested in using rubrics for assessment, were involved in this study.

The qualitative data were collected in Spanish language and then translated to English language. One-on-one interview, diaries, rubrics, students' exams and questionnaire were used as a source of the data. Every teacher kept a reflective diary which was also used to describe the teaching mechanism that that every teacher follows.

The interviews were made by the researcher and were audio taped. The teachers were interviewed four times; two interviews before using the rubrics and two after using the rubrics. Appendix 3 showed the questions, the answers, and the time of every interview. The interview questions were formulated based on reviewing past literature.

Immediately following each interview the recording was transcript, the participants were provided with the opportunity to make amendments to the transcript, or to withdraw any information that they were uncomfortable with, upon receiving the transcript back from the participants, the entire document was once again reviewed, and the names of the participants and the school were removed.

The rubric was adapted from Illinois' state board of education. A letter was sent to the department of assessment at Illinois' state board of education, as it meet all the competences that was set by the teacher and that was aligned with the competences that was done by the evaluation system.

After the teaching unit, the students were given an exam, and the teacher was asked to reflect on students results at that exam.

The following table shows the dates of applying the study instruments:

Table 8

The Dates of Applying the Study Instruments

	Applying date and code	
Instrument	Teacher A	Teacher B
Interview session 1	Week (1) Code: (IS1TA)	Week (1) Code: (IS1TB)
Interview session 2	Week (2) Code: (IS2TA)	Week (2) Code: (IS2TB)
Interview session 3	Week (8) Code: (IS3TA)	Week (11) Code: (IS3TB)
Interview session 4	Week(10) Code: (IS4TA)	Week (12) Code: (IS4TB)
Students' exam	Week (7) Code: (SEGA)	Week (9) Code: (SEGB)
Students' questionnaire	Week (9) Code: (SQGA)	Week (10) Code: (SQGB)
Diary	Week (1) until week(10) Code: (DTA)	Week (1) until week(12) Code: (DTB)
Rubric	Week (1) until week (10) Code:(RTA)	Week (1) until week(12) Code:(RTB)

6.1. The process of rubric design and application in the classroom

A discussion was made with the teacher to analyse the main competences that the students should domain at the unit that they are going to study at the time of applying the rubric which was the "function unit", and the criteria that will be followed to define and assess every competence.

A literature search was made to find a rubric that meet all the competences that we are interested in, the rubric was adapted from Illinois' state board of education. A letter was sent to the department of assessment at Illinois' state board of education to ask for permission to use this rubric (see appendix 1); the rubric was modified and reviewed by the mathematics teacher who was involved in the study, another math teacher in the same school, and two professors at the University of Granada.

The rubric was translated to Spanish language, modified, and reviewed by the mathematics teacher who was involved in the study, and another mathematics teacher in the same school and two professors at the University of Granada.

The Figure 11 shows the steps that were followed in integrating the rubric at a mathematics class:

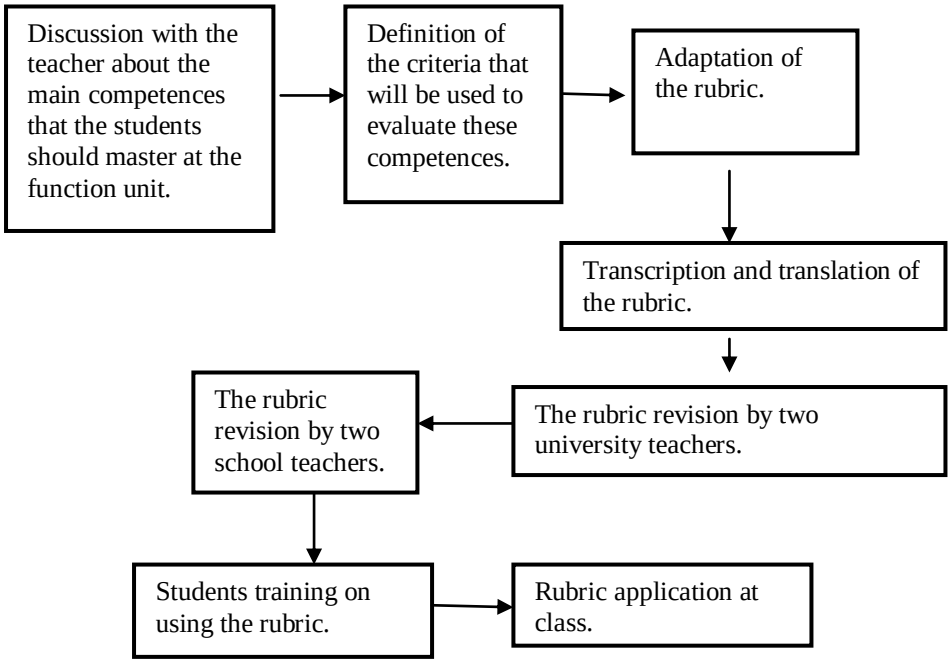


Figure11 . Introducing rubric at class.

Grade 3º compulsory secondary education (*Educación Secundaria Obligatoria*: ESO) and 4º ESO students who had never used rubrics in classroom, were trained to use the rubric for one week, four sections. Every section is 45 minutes before actually using it in assessment. The training included defining rubrics, explaining their main objectives and the detailed mechanism for using them. The students used this rubric in peer and self- assessment. After applying the rubric and seeing the result of this experience the teacher made another modification on the rubric in order for the students to understand it.

6.2. Students' questionnaire application

On the other hand, the students were asked to respond to open-ended questions (see appendix 5) to explore their perceptions about rubrics as a method of learning and

assessing. Every teacher was asked to review her students' opinions. This will help the teacher and the researcher to see the impact of using rubric from the students' point of view. The questionnaire consists of four questions that would let the students express their opinion about using the rubric. The items of the questionnaire concentrate on the advantages and disadvantages of the rubric, the difficulties that students face while using the rubric, the ways to enhance it and finally the effect of using the rubric on their classmates.

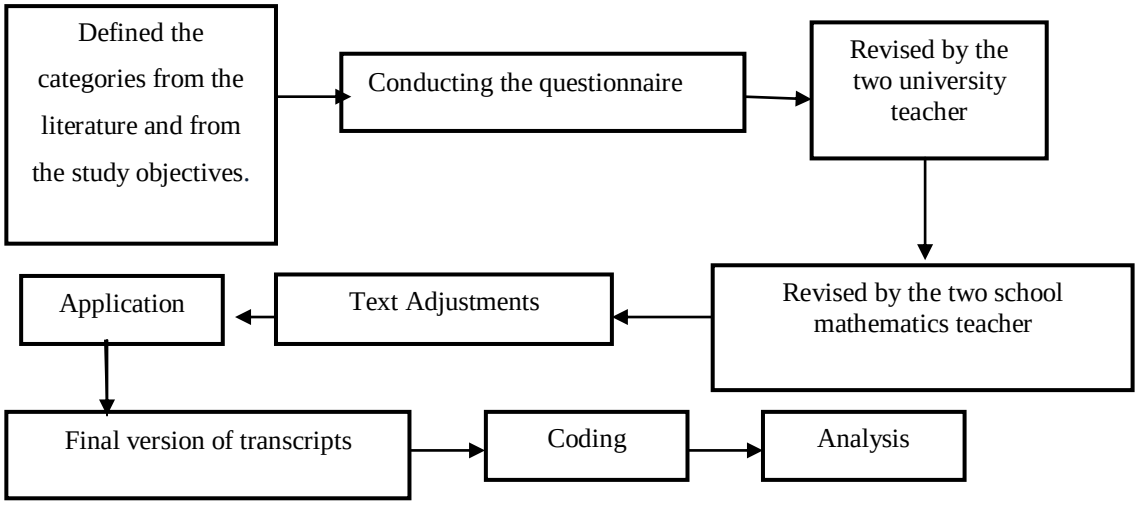


Figure 12. Students' questionnaire application

7. Data analysis

The analysis of the qualitative data was guided by the framework suggested by Miles, Huberman and Saldaña (1994) which involves data reduction, data display, and drawing conclusions and verification. Data reduction refers to the processes of selecting, simplifying, abstracting and transforming data into themes by coding, the coded data were then organised and assembled into representations including mind maps and case summaries. This process is known as data display. The final stage in the data analysis was drawing conclusions and verification from the data. The findings discussed in this research were obtained by performing single-case analysis for each of the two teachers (Creswell, 2006; Miles et al., 1994).

After receiving the verified transcripts back from the participants, the attention was turned towards interpreting or seeking meanings of the text, in the hermeneutic seeking

of meaning, each text was read several times with annotations being made and key phrases that seem particularly essential for the research were highlighted using the software Nvivo, transcript fragments with the same codes were grouped and the process of coding initiated the interpretative analysis of the interview data in terms of the theoretical framework.

The data analysis progressed in two phases by the researcher (Miles et al., 1994). In the first phase the vertical or *within case analysis* the individual teacher was taken as the unit of analysis. This careful transcribing and coding of the data resulted in an individual, structured case report for each teacher, which was fed back to the participant for communicative validation, encompassing all the results of the analysis as well as illustrative interview fragments.

The fixed structure in the individual reports was the starting point for the second phase in the analysis, the horizontal or *cross-case analysis* where we looked for systematic differences similarities across the two cases (e.g. supporters and opponents).

In the cyclical process of reading, interpreting and checking, we focused on interpreting and understanding patterns of teachers' beliefs about assessment for learning and the methods they used to assess their students, in order to refine or verify preliminary conclusions.

7.1. Transcripts management

Immediately following each interview the recording was sent to transcription, the transcriber was instructed to use question marks to record any portion of the record which was audibly unclear, or the meaning uncertain, and then the entire document was reviewed to in conjunction with the audio file to resolve any of these issues, in seeking corroboration of the transcripts accuracy the participants were explicitly provided with the opportunity to make amendment to the transcripts, or to withdraw any information that they were uncomfortable with, upon receiving the transcript back from the participants the entire document was once again reviewed, any requested amendments were made, the names of teachers, students, schools removed, and pseudonyms applied before analysis was formally commenced (see appendix 3).

7.2. Teachers and students data: Triangulation

More than one method was used to collect the data (triangulation): Rubric, interviews, diary and students' questionnaire and exam. This combination of several data collection strategies or methods is called triangulation. Triangulation involves corroborating evidence from different sources to shed light on a particular theme or issue. Triangulation in qualitative research is important to validate issues such as checking the truthfulness of the information collected (Denzin, 1970).

Denzin (1970) extended the idea of triangulation beyond its conventional association with research methods and designs. He distinguished four forms of triangulation:

1. Data triangulation, which entails gathering data through several sampling strategies, so that slices of data at different times and social situations, as well as on a variety of people, are gathered.
2. Investigator triangulation, which refers to the use of more than one researcher in the field to gather and interpret data.
3. Theoretical triangulation, which refers to the use of more than one theoretical position in interpreting data.
4. Methodological triangulation, which refers to the use of more than one method for gathering data.

Triangulation is sometimes used to refer to all instances in which two or more research methods are employed. Thus, it might be used to refer to multimethod research in which a quantitative and a qualitative research method are combined to provide a more complete set of findings than could be arrived at through the administration of one of the methods alone.

In this research more than one type of triangulation was used: (a) Data triangulation more than one method was used to collect the data: Rubric, interviews (The interview consists of four sessions, two sessions to be applied before using the rubric and two after using the rubric), diary, student exam, students open-ended questionnaire. (b) Triangulation with participants (two mathematics teachers, 3º ESO students and 4º ESO students).

7.3. Data coding

In a qualitative case study, qualitative data analysis is needed, because as the researcher progress through the collection of information, he/she will have many data, and if the researcher do not have a suitable technique for organizing and analyzing, it would be very difficult to see interrelated aspects in the study. Therefore, the coding in the data analysis process is a crucial step in the investigation.

The encoding process was guided by the framework suggested by Miles et al (1994) that involves:

1. Obtained records information through various methods such as interviews, teachers' diaries, and students' questionnaire.
2. Capture, transcribe and organize the information through different media: Interviews (audio recording), dairy (paper), exams (paper), and questionnaires (paper), documents (copy and scan)
3. Encode the gathered information in a general codes and sub - codes that reflect the ideas, based on the literature review and the objectives of the study.
4. Integrate the information related to the same codes with each other.

The following two tables show the coding system that is followed in the current research:

Table 9a

The Coding of the Data

Code data					
Theme	Sub code (SC)	SCA	Definition	Code	Example
Teachers' beliefs about assessment	Beliefs about Assessment for learning		Include statements that show the beliefs the teacher hold about assessment for learning.	TBAFL	*The assessment feedback should benefit both students and teachers. It Help them to know each other more, and students' results will improve consequently (IS3TA,P.27:[04:16-04:24]*
		Include statements that reflect teachers' beliefs about benefits of assessment for learning		TBBFA	

	Beliefs about benefits from assessment.	For student	Include statements that reflect teachers' beliefs about the benefits that their students got from assessment.	FS	*The students do not get any benefit from evaluation, its only allows their parents to punish or reward them (IS4TA, p. 33: [12:07-12:50]).*
		For teacher	Include statements that reflect teachers' beliefs about the benefits they got from assessment.	FT	*When we evaluate the students, in a certain way, we evaluate our labor as educators. (IS3TA, p. 27: [03:58-04:11]).*
	Beliefs about students learning		Include some statement that show the way teachers' beliefs their students learning	BSL	*Our students are not motivated to enhance their learning" (IS4TA, p. 33: [14:34-18:20]).*
	Beliefs about the forms of assessment	Include statements that reflect teachers' beliefs about the forms of evaluation.		BFA	*"The form of assessment should be changed like other things in education not because they are bad but because our student's results are not as we want"(IS4TA, p. 32: [04:45-06:04]).*
		Direct observation	Statements that show teachers' beliefs about direct observation	BFADO	*Through direct observation the learning process is evaluated in a better way, as it evaluates better students' improvement and evolution (progress).(IS1TA,p.13: [06:05-06:27])*
		Direct questions	Statements that show teachers' beliefs about direct questions	BFADQ	*"Direct questions are the key to see if your students understand what you want, when you explain and then ask a question. If all the students remain silent that means that they have not understood" (IS2TA, p. 19: [13:28-14:32]).*
			Statements that show		*"Exams should be eliminated; they do not seem to be a good evaluation tool, but it is very difficult not to do exams, since the exams are the only norm the students*

		Exam	teachers' beliefs about exam	BFEX	*know, the ideal thing would be not to be obliged to do exams in order evaluate my students" (IS1TA, p. 15: [10:21-10:48]).*
		Inviting parents to participate with the assessment	Statements that show teachers' beliefs about Inviting parents to participate with the assessment	*BFIPTPA*	*"it's as an aid for the parents to see how the work goes, its collaborative work between teachers, parents, but according to the teacher that can be done"(IS3TB,P.49: [26:12-26:49])*
		Rubric	Statements that show teachers' beliefs about rubric	BFRUB	*It is true that this method "rubric" makes the students more aware of what they are doing, the students in this method correct their work, it is like a self-assessment, through self-evaluate they know the error that they can make, which is good. (Appendix3,p.30: [01:00-01:53])*
		Self and peer assessment	Statements that show teachers' beliefs about Self and peer assessment	BFSPA	*"Peer assessment encourages the students to work collaboratively in a group".*
	Beliefs about the purpose of	Include statements that reflect teachers' beliefs about the purpose of assessment		BPUR	
		Accountability	Include statement that shows that teacher beliefs that assessment purpose is to defend their current practices they use.	ACT	*"We can't go out of the department methods of evaluation because then if any student protests we can defend our self "(IS4TA, p. 31: [04:32-05:20]).*
		Diagnosis	Include some declarations that reflect teachers' beliefs that assessment could be used to see the problems that are facing students.	DIG	*"through self-assessment students find their own failures" IS2TA, p.20:[25:36-27:03]*
		Measurement	Include some declarations that reflect teachers' beliefs that assessment purpose is	MSR	*"Until now the evaluation is used to quantify the degree, to which the students have exceeded the objectives" IS3TA, p.*

	assessment		to measure the level of students learning.		*26: [02:10-02:40]).*
		Motivation	Include some declarations that reflect teachers' beliefs that assessment purpose is to motivate students in order to enhance their learning.	MOT	*"The most important thing is that the students stay motivated, and this could happen if the assessment strategy could be changed" (IS4TA, p. 33: [14:34-18:20]).*
		Support learning	Include some declaration that reflect teachers' beliefs that assessment purpose is to support learning	SUP	*"In a certain way, although it is not an objective in and of itself, the evaluation attempts that the students work in order to assimilate concepts "(IS3TA, p. 26: [02:10-02:40]).*
	Beliefs about the relationship between learning and teaching and assessment		Include some declaration that reflect teachers' beliefs about the relationship between learning and teaching and assessment	BRLTA	*"It is true that the assessment is not always present in the process of teaching and learning, the assessment present only in the exams" (IS2TA, p. 21: [31:15-34:18]).*

Table 9b

The Coding of the Data

Theme	Sub code	Definition	Code	Example
Forms of assessment that teacher use to evaluate her students	Desirable forms of assessment	Includes teacher declarations about what they believe are ideal ways of assessing their students	DF	"*In this way the learning process and the student's improvement and evolution can be evaluated better*". (*IS1TA*, p.19 [06:40-07:04]).
	Forms of assessment used.	Includes teacher declarations about the current forms they use to evaluate their students	FU	*"The traditional form of assessment does not offer much for the learning process" (IS2TA, p.*

Theme	Sub code	Definition	Code	Example
				26: [03:23-03:54]).
	Reported use of alternative assessment	Demonstrate the alternative assessment that is used by the teachers	RUAS	*"normally I use direct observation in the classroom, problem solving strategies, group work, present a topic orally, how do they express orally to the public, then content exams" (IS3TB. p.43:[00:53-01:21]).*
	Suggestion for improving student assessment.	Include some recommendation that could enhance the evaluation practices at their school.	SUG	*"teachers should be provided with a lot of information and training in the new evaluation techniques, as teachers do not know how to evaluate well; they need a lot of information and training" (IS1TA, p.14: [09:23-10:04])*
	Teachers' satisfactions with traditional methods.	Consider statements that report the level of satisfaction about using traditional assessment methods	ASAT	*"We are obliged to evaluate their students with the numerical grades by exams, some time we are not satisfied but we are obliged". (IS2TA, p20: [28:37-28:41]).*
	Consume time and effort	Explanations and / or clarification on the use of time and effort in evaluating	CTE	*"I am not used to apply self and peer assessment with my students, it's not my way of work, and then it will cost me more time and work (IS2TA, p20: [28:37-28:41]).*
	Number of student in class	Include statements about the students' number in class as a difficulty.	DNS	*" We have to limit ourselves to what we can accomplish, because we have many students, I think this is the main problem" (IS1TA, p. 13: [02:14-04:26]).*
				The main reason why we do not use new forms of assessment is that the entire departments have to do the same, homogeneous; all

Theme	Sub code	Definition	Code	Example
	Difficulties from the department of Math	Include teachers' comments about the mathematics department.	DDM	*teachers in the department should agree if any teacher want to use a new form. That is the main problems (IS4TA, p. 31: [03:46-04:29]).*
	Difficulties from the evaluation system	Include teachers' statements that are related to the evaluation system.	DES	*"In Spain with the law they have, if students have low level he/she can pass to another class, because although they may have six suspended marks, they may pass the course. Because the system is so bad, as a result the teacher focus only on putting the final grade and classifying students to pass or fail the subject"(IS4TA,p.33 :[11:15-11.58])*
	Difficulties from the students	Reflect teachers' point of view of the difficulty that come from the students.	DFS	*"Although there are many things and tools to motivate students, students don't work. I have been watching this for the past 19 years" (IS1TA, p. 12: [00.17-01.14]).*
	Difficulties teacher preparation	Include teachers' statements that reflect the difficulties that they have related to the lack of information about assessment.	DTP	*It is a general rule that says, if they do not force us to do things, we will not do it. In addition, we do not have information about other strategies, other forms of assessment (IS4TA, p. 30: [01:55-02:29]).*
	Difficulties from the method itself	Include teachers' comments about the difficulties that come from the	DFM	*Rubric require a lot of work from the teacher and her students, also it was difficult to assign a numerical number for each part. (IS3TB, p. 45:*

Theme	Sub code	Definition	Code	Example
		method itself.		*[07:33-07:44]).*
	Fair strategy	Include statement that show changes in teachers' beliefs about Fair strategy	FSAB	*Providing the students with the rubric, every day and on the exam, make the assessment fair, the students who had zero means that he didn't do anything, and at least who has interest in learning know what he had to do, and that he has to work more to improve his level. IS4TA,P.33:[13:02-14:28]*
	Feeback	Include statement that show changes in teachers' beliefs about feedback	FDAB	**The feedback should benefit both the students and the teachers. In this way, they know each other better and the results would improve. IS3TA, P.27:[04:16-04:24]*
	Self and peer assessment	Include statement that show changes in teachers' beliefs about Self and peer assessment	SPAB	*When the students correct a question from someone else helps them reflect over their own answers and the score that they will assign, and if they have answered every step in a right way (IS2TA, p. 20: [25:36-27:03]).*
	Students understand what teacher want	Include statement that show changes in teachers' beliefs about Students understand what teacher want	SUAB	*Because in this way the students participate in the evaluation, it makes them improve their effort, because at least they become aware of what they know or do not know*
	The benefits that teachers gain from the assessment	Include statement that show changes in teachers' beliefs about the benefits that teachers gain from the assessment	BTAB	*Using the rubric allow me to check if my students understand or no every day.*
	The benefits that students gain from the	Include statement that show changes in students beliefs about the benefits that teachers gain from the assessment	BSTB	*"The explanation part of the rubric is very interesting because it requires giving a written and*

Theme	Sub code	Definition	Code	Example
	assessment			*oral explanation; it forces them to think why they are doing that in mathematics, not just doing it mechanically" (IS3TB, p.43:[02:10-02:34]).*
	The main objective of assessment	Include statement that show changes in teachers' beliefs about the main objective of assessment	OAB	*The evaluation should be used to enhance students learning and to reflect our work as teachers; it is true that through evaluating students work, we evaluate our work as teachers.*
	The question that you ask yourself before determining a main assessment strategy	Include statement that show changes in teachers' beliefs about the question that you ask yourself before determining a main assessment strategy	QAB	*We should ask ourselves what we should or want to obtain.* (*IS3TB, P.26:[01:22-02:06])*
	The relationship between teaching and learning and assessment	Include statement that show changes in teachers' beliefs about The relationship between teaching and learning and assessment	RLTAAB	*After using the rubric, I can say that the evaluation can be used to enhance learning.* (*IS3TB, P.26: [01:22-02:06]*
	Using traditional assessment tool	Include statement that show changes in teachers' beliefs about Using traditional assessment tool	UTAAB	*It is necessary to use different resources with the goal of improving the academic achievements of the students(IS3TA, p. 26: [02:10-02:40])*

8. Assumptions underlying the method

In this study, it was assumed that teacher is qualified to provide answers to the study tools. It was also assumed that the way of data collection (interviews, rubric) will be enough to provide answers to the focus of study. Another assumption was is that schools' samples will represent the secondary schools in Spain. Finally, it was assumed that there is no similar previous research which has studied the central problem of this study.

9. Strengths and limitations of the method

Myers (2000) said, "A major strength of the qualitative approach is the depth to which explorations are conducted and descriptions are written, usually resulting in sufficient details for the reader to grasp the idiosyncrasies of the situation" (p. 3). Another important additional fact is the small budget required (Ramirez, 2007).

Some of the limitations of this case study are time and effort needed from both the researcher and the teacher. Besides, the researcher language is different from the teacher's language which may affect the results. Another limitation is that the beliefs that have been studied for one teacher cannot be generalized for bigger population. Also, the way of collecting data, especially the interviews, has some drawbacks such as that data collected is filtered through the interviewer perspective. We also have to take into account that interview data may be deceptive if the interviewer is not expert, he or she could unconsciously lead the interviewees to give certain answers (Creswell, 2008). In general, qualitative research is criticized for its limited ability to be generalized due to small sample, its difficulty to be replicated (Myers, 2000), and results are more easily influenced by the researcher's personal biases and idiosyncrasies (Creswell, 2008).

CHAPTER FOUR: RESULTS AND DISCUSSION

1.Introduction

In this chapter the attention is turned to the vertical or *within case analysis* using the Nvivo software. The major themes, with attendant sub-themes were articulated. The individual teacher was taken as the unit of analysis. This careful transcribing and coding of the data resulted in an individual, structured case report for each teacher *" teacher A and teacher B"*, which was feedback to the participant for communicative validation, encompassing all the results of the analysis as well as illustrative interview and diary fragments.

The fixed structure in the individual reports was the starting point for the horizontal or *cross-case analysis* where we looked for systematic differences similarities across the two cases (e.g., supporters and opponents). The findings are explored with reference to relevant literature and attention paid to aspects that were expected, and those were not, indications are provided of where the current findings support those of the earlier studies in the literature, and where they diverge.

The finding and the discussion is presented in four sections. The first section presents the methods that a secondary mathematics teacher uses to assess their students, and the second section presents the reasons that prevent teachers from using new forms of assessment, section three presents teachers' beliefs about assessment, and the fourth section present the changes that happened to the teachers' beliefs related to the use of rubric.

2. Results of *within case analysis* individual teacher

2.1. Case 1: *Teacher A*

2.1.1. Teachers' beliefs about assessment

According to teacher "A" at high school, it is better to use strict and rigid forms of assessment, because they have a specific time and agenda to follow, also they have to

maintain a certain level, they must follow the compulsory syllabus, but in the ESO, they can use different forms of assessment.

Using traditional and more rigid evaluation process at high school is better as there is an agenda and a syllabus to follow. But In the ESO we can use different forms of evaluation, other ways of evaluation based on the student's daily work, and on their behavior and attitude, as this stage is not critical as the high school (IS1TA, p.13: [04:32-05:02]).

The teacher complained that the results of students in mathematics are not good, many students suspended, and she beliefs that using different forms of assessment would reduce this problem.

She also expressed her concern about the students' results, she said, "I believe that something must be done with the assessment process, because things are not going as we want. The students' results are not good, and their levels of mathematics in Spain are falling down, not only in mathematics but in all the subjects" (IS4TA, p. 33: [14:34-18:20]).

She recommended changing a lot of thing in education, especially in the evaluation methods. The teacher is not satisfied with her students' results she commented: "The form of assessment should be changed like other things in education not because they are bad but because our student's results are not as we want" (IS4TA, p. 32: [04:45-06:04]).

According to the teacher, the form of evaluation should contemplate and foment students' daily work, she said that "What experience has taught me is that the form of evaluation should contemplate and foment daily work on the part of the students. In mathematics this seems, to be fundamental, since evaluating the constancy of the work helps the students to learn and understand the material better" (IS3TA, p. 25: [00:57-01:14]).

Also the form in which the students are evaluated should include a series of criteria, in the center where she teach they follow the following criteria,

- Work done by the student at home;
- Work done by the student in class;

- Work done by the student in groups;
- Tests, quizzes or exams on each unit;
- The student's attitude for the subject.

She added that in mathematics the most suitable method they use to evaluate the students is the exam; on other subjects such as language, the teacher can use more than one evaluation method.

Also she pointed that It is very difficult to choose a sound evaluation strategy; this greatly depends on the group of students, if the students were active and motivated then it will not cost the teacher a lot of work, but if the students were not motivated then it's better not to use traditional methods.

On the other hand, the teacher criticized evaluating students' attitudes with a high percent, as it make a lot of students pass if they did not have the required mathematical knowledge. Also criticized the traditional forms of assessment she said, "The traditional form of assessment does not offer much for the learning process" (IS3TA, p. 26: [03:23-03:54]).

2.1.2. Beliefs about students learning

The teacher believes that students' before used to study more, they were more motivated, but nowadays although there are a lot of thing and tools to motivate students, the students are not working seriously.

This year in the second semester, I have a small group of students; I have tried to evaluate them without tests, I decided to evaluate and revise and correct their daily work. However, five of the 13 children had to take the final exam, as they did not work as required, and the failed in the course (IS1TA, p. 13: [02:14-04:26]).

She added that students do not work although there are many forms of assessment. In the past students worked and learned more, because they like to learn and to do more projects, but things have changed now it is very difficult to find a student who have all his work up to date, and who want to complete many projects.

According to the teacher, the students always choose not to take exams, because they do not want to study. They are very lazy and want the minimum law of effort.

The law requires that students must have a minimum level to have a minimum knowledge, to pass the course (IS4TA, p. 32: [10:29-11:05]).

She pointed that when the excellent students find that he/she can get the same result with minimum effort, they will not do more effort to get the same. The students should be given motivation in order to work. "If they change the law and the student who didn't study have to repeat the class, 90% of the students would improve. Moreover, it is always true that there will be some school failure but not like the school, failure exists nowadays (IS3TA, p. 27: [14:34-18:20]).

According to the teacher, the student who failed two subjects should not pass the course, in order to motivate him to study. Because if we let all the students pass at the primary stage we gather the school failure from the primary with the failure in the secondary, and the good and excellent students will be affected negatively.

> "Our students are not motivated to enhance their learning" (IS4TA, p. 33: [14:34-18:20]).

She added that one of the main problems facing students in mathematics is that they do not understand things well, and this could be solved by studying the level of every student alone, "Many times for example, some students who are not brilliant don't even know what to do in order to pass" (IS4TA, p. 33: [13:02-14:28]).

It is always true that there are few students, who may catch and understand the concept or the idea from in the first time; therefore teachers should put an exercise and say: What comes next? Try a little to involve the students, try to make them participate in what they are explaining, is the only way to know if they have understood or not.

Some students show that they understand what I have explained and in the exam, I find that they did not understand anything (IS2TA, p. 19: [13:28-14:32]).

When the teacher was asked about using new forms of assessment, she answered that she does not prefer using new forms of assessment because, "When I use another way of assessment some of the students will manipulate and cheat" (IS3TA, p. 29: [11:01-12:19]).

Students cheat in the exams that count for the grade. Imagine if you know that in this exam, you are going to correct for yourself -we care for the note- sure you are going to try to change the answer. This is the only problem (IS2TA, p. 21: [28:41-29:37]).

After using the rubric with self and peer assessment, she found that the students could use self and peer assessment correctly. The only thing teachers need to do when using self and peer assessment is to take away the pen to avoid cheating, or let them correct with red pen only.

On the other hand when using self and peer assessment the teacher have to review what the students have done, because probably if they get used to the teacher always use this way of evaluation, they will correct less, and sometimes they will not correct well and put things that doesn't not belong.

The teacher was afraid that her students would not correct well, she found after using the rubric that the students are not only fair, but they are also very strict. There were no differences between the teacher and the students marking. Moreover, the teacher asserted that her students enjoyed using peer assessment, "students learn better when there are more entertainment" (IS2TA, p. 18: [08:18-09:44]).

Nevertheless, they faced many difficulties using the rubric as they are not used to read and to use the mathematical language.

2.1.3. Beliefs about assessment for learning

Teacher "A" asserted that teachers should help the students to get benefits from assessment by informing them accurately what they will be graded or assessed, and how, but it is not something they normally do.

The assessment feedback should benefit both students and teachers. It helps them to know each other more, and the students' results will improve consequently.

The rubric helps the students to enhance their work. Many students do not know what they had to do to enhance their work, using the rubric helped them to know what they should do and how. It is true that this method "rubric" makes them more aware of what they are doing; it is like a self-assessment, through it they can know the error they may, which is good.

She believes that students and teachers are prepared to use self and peer assessment with rubrics, what is needed is to inform our students with more details of all the criteria that will be followed to evaluate them, and what the things that will be rated positively and negatively. In addition, teachers should ask themselves before determine to use a certain assessment strategy: what we should or want to obtain?

She added that the key strategy to make sure that the students understand or not is "direct question", when the teacher explains and asks a question, If the students remained silent that mean that they did not understand.

In addition, she makes sure that her students meet her expectations by repeating examples.

> "Repeating examples and exercises helps the teacher to know that her students meet her expectations, as it's very difficult thing to know" (IS2TA, p. 19: [14:39-16:18]).

She also makes sure that her evaluation is fair from the exams results, "I know that my assessment strategy is fair only from the results of the tests; If the results of the exam aren't good, then the strategy that I follow is not good" (IS2TA, p. 19: [16:18-16:24]).

According to the teacher assessment for learning refers to one's own way of evaluating students, by gives them tools to improve their responses on the tests or the time to solve a problem, assessment for learning is to learn, what they normally do is to assess learning. She added that using assessment for learning is very difficult, because they do not have time.

She provides the following example of how she uses assessment for learning,

> "Whenever we perform any exam, we usually write it on the board and solve it, and then the students correct their mistakes, for the next time they take an exam or other trail; they know what steps they have to follow, how to respond in order to get more scores. Thus, even if it is for the score ... they are predisposed to learn how to do or how to solve this problem well" (IS2TA, p. 18: [06:40-07:16]).

2.1.4. Beliefs about the relationship between learning and teaching and assessment

When the teacher was asked about the relationship between teaching and learning and assessment, she said that it's very difficult question, She beliefs that there is a relation between teaching and learning, but there is no relation between teaching and learning and assessment, according to the teacher in mathematics, teaching and learning is continuous, assessment is something discreet. Teachers cannot do a continuous assessment of students' work because they do not have time.

Also added that the relationship between learning and teaching is very clear; the teacher explains and the students learn, there is very clear interrelationship between teaching and learning, but assessment is something apart. We should try to include the assessment to become a part of the teaching-learning process.

Many times the teacher learns from what students say (IS2TA, p. 21: [31:15-34:18]).

She clarified that when a teacher explains in class the students acquire some knowledge, and above all how to get a reasoning capacity that students cannot get alone, or through reading a book. That describe the relationship between teaching and learning, but assessment does not have any relation with the teaching and learning process.

It is true that the assessment is not always present in the process of teaching and learning, the assessment present only in the exams (IS2TA, p. 21: [31:15-34:18]).

The relationship between teaching and learning is daily, continuous, but assessment is eventually, it's more sporadic, it is not every day, and less when there are 30 students in class it's very difficult.

The teacher added that if the teaching-learning process is daily and in every minute, the assessment process is not (IS2TA, p. 21: [31:15-34:18]).

The teacher complained that when there are more than 30 students on the class it's very difficult to evaluate them all, evaluation happen only on the exam, or when they solve a problem on the board.

> "Assessment is not always present in the whole process of teaching and learning "(IS2TA, p. 21: [31:15-34:18]).

Evaluation from teacher to student, happen only when there is a test, or a question in class to solve on the board, but evaluation from students to teacher happens every day, students evaluates their teachers every day.

"We should try to include the assessment to become a part of the teaching-learning process" (IS2TA, p. 21: [31:15-34:18]), because for the majority of our students the teaching-learning process is incomplete. That mean, the teacher teaches and explain until he/she thinks that the students understand and comprehend the concepts. Then the teacher test the students level of understanding by asking questions or by sending one student to the board, which is not enough for all the students, because every student have a certain problem that the teacher didn't see.

We are accustomed to value only what the students know or what they have learned, we should learn to assess the learning process development from the beginning until the end, that's what we should value more (IS1TA, p. 15: [10:50-11:37]).

2.1.5. Beliefs about benefits from evaluation

2.1.5.1. For the students

The teacher asserted that the students are not benefiting from evaluation. Until now, their only benefit is that with the evaluations they are relieved from the pressure of exams. She also pointed that the tradition method of assessment does not support learning.

The students do not get any benefit from evaluation, its only allows their parents to punish or reward them (IS4TA, p. 33: [12:07-12:50]).

She also added that the information that the evaluation give is not very important for the students. It is motivated for the good students, in order to continue as they are, and for the bad students for nothing. She pointed that the evaluation feedback should benefit both students and teachers. It helps them to know each other more, and students' results will improve consequently.

In a certain way, although it is not a clear objective, the evaluation attempts that the students work in order to assimilate concepts (IS3TA, p. 26: [02:10-02:40]).

She beliefs that evaluating student work and their attitudes with high percentage is the only benefit students get from evaluations, as it helps them pass the course even if they fail the exam, which is not right thing, as all the students should have a good attitude.

After using the rubric the teacher asserted that evaluation could enhance students learning, as the students are participants in the evaluation methods, and as they know what they have to do and how.

"With this rubric you gave me, evaluation serves the students to improve and to learn (IS4TA, p.33: [12:07-12:50]). She added that using the rubric with peer assessment makes the students aware and feel more involved in the learning process.

When the students correct a question from someone else helps them reflect over their own answers, the score that they will assign, and if they have answered every step in a right way (IS2TA, p. 20: [25:36-27:03]).

The student with self and peer assessment takes into account their own failings, and how to improve it; in order to have the grade they want, for that they make more effort to understand the mathematical concepts, also since the grading tends to be public; they tend to work harder in order to have a high grade.

Self-assessment allows students to learn from their failures (IS2TA, p. 20: [25:36-27:03]).

2.1.5.2. For the teacher

The teacher asserted that teachers draw more benefits from the assessment than the students; according to her, the students do not have any benefit assessment, as they are limited to respond the questions of the exams.

The evaluation provide teachers with information about the students and about their learning process, in this way they can solve problems that face the students, they can see some times that there are students who couldn’t achieve the minimum goals, for that teachers have to change their plans to help those students .

According to the teacher, the information from the evaluation should help both teachers and students to know each other more, and this will enhance students learning.

In addition, she added that it is true that when teachers evaluate their students, they evaluate their work as a teacher, if the students did well on the exam that is mean that they understand, and the teacher work is good, and if the students' results were bad that means that the teacher didn't do a good work.

According to the teacher the benefits she has from evaluation are:

- Help the teacher to know if the students get the level that he has to get.
- Help the teacher to know if the student learned what he had to learn.
- Help the teacher to put a numerical grade on students work.
- Help the teacher to make a decision if the student can pass or fail the course according to the law.
- Help the teacher to measure the level of the achieved goals from the goals that have been set in the course plan.
- Help the teacher to quantify the degree to which the students have exceeded the objectives, also to detect possible learning problems.
- Periodic chapter allow teacher to see the problems that our students are facing in their learning process.
- Evaluating students' daily work is useful and necessary.
- The assessment that occurs before and during a unit or chapter of study helps the teacher to assess the learning process in the ideal way.
- Direct observation shows us whether students understand or not.
- Direct questions allow teachers to see if their students understand what they want, when the teacher explain and then ask a question. If all the students remain silent that mean that they have not understand.
- Peer assessment gives us more time.

2.1.6. Teachers' beliefs about the purpose and the forms of assessment

From the teacher diary and interviews, many beliefs were gathered under the following categories:

Table 10

The Main Categories of Teachers' beliefs

Beliefs about direct observation.
Beliefs about periodic chapter test.
Beliefs about exam.
Beliefs about direct questions.
Beliefs about self and peer assessment.
Beliefs about rubric.

2.1.6.1. Direct observation

Teacher "A" expressed her desire to evaluate her student with direct observation for the following reasons:

- Through direct observation, the learning process is evaluated in a better way, as it evaluates better students' improvement and evolution (progress).
- Using direct observation will improve her assessment process.
- One of the main problems facing students of mathematics is that students misunderstand issues; teachers can overcome this problem by studying the level of each student in particularly, directly by direct observation.
- Student's bad results can be improved by direct observation.
- Direct observation helps the teacher to concentrate more on every student.
- Direct observation shows whether students understand or not.
- Direct observation is a good way to evaluate student's improvement.

The teacher noted that it is impossible to use direct observation when there are more than 30 students in the class.

2.1.6.2. Periodic chapter test

The teacher said that it is important to use periodic chapter test and the assessment that used before and during a unit.

> "Periodic chapter test help us to see the problems that our students are facing in their learning process, and also we have to evaluate their daily work, both are useful and necessary" (IS1TA, p. 12: [08:03-08:19]).

In addition, she noted "The assessment that occurs before and during a unit or chapter are also useful and necessary, because it assesses the learning process in the most ideal

way. We have to evaluate and follow the students work daily "(IS1TA, p. 12: [08:23-08:35]).

2.1.6.3. Exams

When the teacher was asked about what should be eliminated in order to enhance the evaluation practices in mathematics. She answered, "Exams should be eliminated; they do not seem to be a good evaluation tool, but it is very difficult not to do exams, since the exams are the only norm the students know, the ideal thing would be not to oblige us to do exams in order to evaluate our students" (IS1TA, p. 15: [10:21-10:48]).

She added that exams are not an effective way to evaluate the students, but they are obliged to evaluate by exams. However, when there are a large number of students the ideal way is to assess students by exams.

On the other hand she clarified that through exams results she can see if her students understand what she want or not, she never know for sure that the students understand exactly what she want .

2.1.6.4. Direct questions

According to the teacher a good way for the teacher to see if their students understand or not is by using direct questions.

> "Direct questions are the key to see if your students understand what you want, when you explain and then ask a question, If all the students remain silent, that means that they haven't understood" (IS2TA, p. 19: [13:28-14:32]).

2.1.6.5. Self and peer assessment

The teacher admitted that she never used peer and assessment before, as she belief that it is better for the teacher to correct her students' exam alone at home.

> "The truth that I have never used peer and self- assessment with my students, because I find it easier to correct the exams alone" (IS2TA, p. 20: [24:28-25:30]).

After using the rubric, the teacher changed her opinion she said,

- Peer assessment gives the teachers more time.

- With self-assessment students can score their exam immediately, they do not have to wait days until they get there scores, as the teacher need many days to give the student their exam corrected.
- Self-assessment allows students to learn from their failures.
- The students include many things when they assess themselves or when they have to assess their classmates. They also tend to be very critical when correcting.
- They take in consideration their own failings and how to improve it.
- They work a little harder to understand the mathematical concepts.
- Since the grading tends to be public, they tend to work harder in order to have a good grade.
- Peer assessment encourages students to work collaboratively.
- The students become conscious of their own failings when they see the failings of their classmates, and how to correct them in order to get a better grade. In this way, they are encouraged to work a little harder to understand the mathematical concepts.
- Since the grading tends to be public, they tend to work harder not to have a low grade.
- "I noticed that when we were correcting the exercises that day, the student corrected their peer's exercises seriously, Contrary to my fears, that they will put high grades for their partners, they were very critical when assessing the responses of their peers" (DTA).

On the other hand, it is necessary when using peer and self-assessment that the teacher review what the students have done, because probably if the students get used to the teacher always doing the correction this way, they will not correct well and they will put things that do not belong. It is the only disadvantage.

- It is necessary to be followed up by a supervision of the teacher.
- It takes a lot of time that we need to complete the programs.
- It is possible that some students use tricks in their answers. I believe that this has been one of the disadvantages, for that self-assessment and assessment in pairs has been used very little.
- Competition and conflict among students could occur, or an argument if a student is not in agreement with the assessment of his classmate.

2.1.6.6. Rubric

2.1.6.6.1. Advantages

* Enhance students learning

According the teacher using the rubric-enhanced students learning for the following reasons:

- Using the rubric enhanced students' work, as the students were involved in the evaluation process.
- Using the rubric require a lot of work from the students, they had to study very well in order to answer any question and to explain it, consequence many of them have understood the concepts that were given in the subject.
- The students evaluated themselves and they evaluated each other in pairs, and that enhance their learning.
- They work harder to learn how to explain what they know.
- They have to study the content from the beginning and they have to understand it, otherwise they will not be able to explain what they are doing with ease.
- One of the advantages of the rubric that the students have to study the content very well in order to solve any problem according the rubric (DTA).
- With the rubric, the evaluation could enhance students learning: "After using the rubric I have to say the assessment can be used to learn and it is necessary to use different resources to improve the educational outcomes for the students" (IS3TA, p.26: [02:10-02:40]).
- Although the students had difficulties in using the mathematical language to explain everything they do, it was difficult for them to explain everything in order to get the full mark, but they understand the subject better.
- The majority of the students realized that they had to study the content very well. Before using the rubric, the students were used to study only before the exam (IS3TA, p. 28: [07:22-08:41]).

*Students participate in the evaluation process

Using the rubric make the students an active part in the learning process, she clarified:

- With the use of the rubric, the students are participants in the teaching-learning process, since they explain more and that is beneficial.
- I think the rubric is great method, because the students participate in the evaluation process. It obliged them enhance their work, at least the student become aware of what they know and what they do not know.
- With the rubric the student know what they need to do to enhance their work and to have a full mark, many students do not know what they had to do to pass the exam. Now having this rubric with them every day also in the exam, help them to become more aware of what they have to do, and the student who gets zero, he knows that he did not do anything.
- It appears that what they like is to correct the exercises of their partner (DTA).

* The students know the teacher expectations

- Using the rubric help the students to know what the teacher exactly want, as the rubric contains all the criteria that the teacher will follow to evaluate her students.
- The students know what is expected from them, and then they work hard to achieve the required level.
- It is true that this rubric makes the students more aware of what they are doing, the students in this method correct their work, and they know the error that they can make, which is good.

* Enhance teacher work

According to the teacher, the rubric not only enhanced the students work but also the teacher work:

- Using the rubric allowed the teacher to check the understanding level of the all the students every day.
- The greatest benefit that I gain from using the rubric was that I felt, with some concern, that I cannot relax as a teacher, and that it is necessary to motivate my students to explain better and work harder to employ all the necessary mathematical terms.

- After using the rubric, I realized that the assessment can be used to learn and it is necessary to use different resources to improve educational outcomes for students.

2.1.6.6.2. Disadvantages

According to the teacher, all the disadvantages and difficulties that they found on using the rubric derived from not being used to it before.

> "The main difficulty is to get used to the method and the time it consumes. One thing is combined with the other, because if they were used since the early primary to use this method, they would use it more easily and they do not take a lot of time in answering any questions" (IS4TA, p. 32: [06:29-10:21]).

*Students are not used to this method

The teacher pointed that the students were not used to this form of assessment, for that she needed many days for the students to get used to it. Because when they need to answer any question they have to follow all the required steps following the rubric, and they have to explain everything they write, and to use all the necessary graphics, which they are not used to that.

The main problem that faces the student was that they have to write and explain a lot, as they are not accustomed doing it, they are progressing slowly (DTA).

In addition, she added, "As they are not accustomed to give a detailed explanation, I have to give them more examples of how accurately they should answer any exercise" (DTA).

In addition, she asserted that since the students are not used to doing so it is difficult for them to explain what they are doing.

"I belief that all of the disadvantages a derived from never having used this method before, and it seems essential to me that it should be applied during a complete course in order to achieve its benefits (IS3TA, p. 28: [06:42-07:15]).

*Using the rubric depends on the students

- The teacher noted that using the rubric depend a lot of the group of students the teacher have.
- Using the rubric greatly depends on the group of students you are working with (IS3TA, p. 26: [01:22-02:06]).
- If the students are motivated and willing to use new method, then good results will be achieved, and if the students are not motivated, then using new methods is wasting of time.
- It is very difficult to choose a sound evaluation strategy; this greatly depends on the group of students you are working with as well. The group of students that used the rubric were very good students and they paid a lot of attention. I am certain that if I had employed the rubric in another group I would not have obtained the same results (IS3TA, p. 29: [01:22-02:06]).

*Difficult to understand

The teacher also commented that this rubric was difficult for the students to use, and she recommended writing it with a language that the students could understand.

This rubric is difficult the students did not understand it, if we enhanced it by making it shorter and rewrite it in a language that they can understand without many words; it will be easier for them (IS4TA, p. 32: [06:29-10:21]).

She added that the students are not used to use mathematical language, for that it was difficult for them.

* Require a lot of work

The teacher noted that this rubric requires a lot of time and work from both the teacher and her students: "Teachers have to prepare a form, a special rubric for each subject, so it takes more work" (IS4TA, p. 30: [01:00-01:53]).

Also using the rubric requires a lot of work from the students, they had to study the content from the beginning and they have to understand it, otherwise they will not be able to explain what they are doing with ease.

* Decreased students' grades

According to the teacher the rubric decreased the students grade, as it required a high quality answer, and as the students were not accustomed using the mathematical language properly they couldn't have full marks.

> "The students who use good strategies to resolve problems, but do not explain well what they did; get a lower grade with this form of evaluation" (IS3TA, p. 27: [06:42-07:15]).

Many bright students are accustomed to solve the problem without explaining a lot, for that they had lower grades using this rubric.

*Consume a lot of time

According to the teacher the rubric, consume a lot of time from the teacher and the student:

- It takes a long time to correct any exercise, since the students have to explain, with a lot of detail, the steps they follow.
- The group of students that used the rubric last year was very good, they paid a lot of attention, but it was something new for them they didn't use it before, it consumed a lot of time from them as it require a lot of writing. I could not put a lot of question in the exam, as they do not have the time to solve the questions with the required details.
- Some bright students when they solve any problem they don't write a lot, they write the half of what they need to write with the rubric, because the teacher know their students, if the student can solve the problem then he know the formula, and that means that the students understand it. We understand a lot of thing that the students do not write, if they have to write everything it will consume a lot of time.

* Long

According to the teacher, this rubric is very long for the students, as the students are not used to read.

The rubric is very long and the students are not used to read. Its, too long for them to handle (IS3TA, p.23: [35:17-37:35]).

She added that it is better to make this rubric shorter as it is very long, and the students are not accustomed to read.

*The purpose of assessment

From the teacher diary and interviews, many beliefs were gathered under the following categories:

Table 11

Beliefs About the Purpose of Assessment

- Assessment as measurement
- Assessment support learning
- Assessment as motivation
- Assessment for Accountability
- Assessment as diagnosis

* Assessment as measurement

According to the teacher, the main purpose of the evaluation is to measure the level of the achieved goals from the goals that have been set in the course plan. In general, teachers use to assess students to put the grade. The evaluation is to determine whether the student has reached the level that he had to reach or no. To assess whether the student learned what he to learn, or if the student reached the minimum levels required by law.

The law requires that the student should have a minimum level in order to have a minimum knowledge, or a minimum evolution in the learning process in order to pass the course, mainly we use evaluation for that (IS4TA, p. 32: [10:29-11:05]).

The teacher criticized the law of the minimum effort she argued that with the law they have; the student can pass the course if he/she has six subjects suspended, because our system is very bad, if any student has six suspended subjects he can pass to the following course. In this way evaluation means for the teachers to give the students their final grades, to see if he/she can or can’t pass the subject, also to see if he has the level required from the law in order to pass or fail the course" (IS4TA, p. 32: [10:29-11:05]).

She noted, "Until now the evaluation is used to quantify the degree, to which the students have exceeded the objectives" (IS3TA, p. 26: [02:10-02:40]).

The assessment for teacher is a mean to give a grade for the students, as they had to put a numerical number for every student, the teacher give the students many exams, and the average of the entire exam is the students' grade.

In addition, she noted that when teachers evaluate students work, in a certain way, they evaluate their labor as educators, if the students had low grade that means that students did not understand from the teacher. Moreover, if all the students had a good grade that means that the teacher did a good work.

* Assessment support learning

The teacher clarified that assessment is also used to detect possible learning problems, if all the students didn't solve a question that means that the students are facing problems with this subject so teacher have to change her teaching method in order to overcome this difficulty. Also the evaluation is a way to make the students work more in order to understand the subjects, as the students are not used to study every day, they only study for the exam.

In a certain way, although it is not an objective in and of itself, the evaluation attempts that the students work in order to assimilate concepts (IS3TA, p. 26: [02:10-02:40]).

On the other hand, she noted that the exam feedback should benefit both students and teachers. It helps them to know each other more, in this way the students' results will improve consequently.

Before using the rubric the teacher asserted the assessment is only used as a part of the administrative work to put a numerical grade for the students, after using the rubric she said that sharing the students with teacher expectation, and involve them in the assessment method through rubric, evaluation in this way can be used for learning.

An example of how to use assessment for learning: whenever we perform any exam, we usually write it on the board and solve it, and then they correct their mistakes. For the next time they take an exam or other trail; they should know what steps they have to follow, how they should respond in order to get more scores. Thus they, even if it is for the score. They are predisposed to learn how to do or how to solve this problem well (IS2TA, p. 18: [06:40-07:16])

She differentiated between assessment for learning and assessment of learning: "Assessment for learning refers to one's own way of evaluating students, by giving them tools to improve their responses on the tests or the time to solve a problem. Assessment for learning" is to learn, what we normally do is assess learning" (IS2TA, p. 18: [05:58-06:29]).

Also she added that the cant use assessment for learning, as it's continues and they had to do it every day, and they don't have enough time as they had more than 30 students in the class also they have syllabus to follow.

She said that last year she asked her students to copy on their notebook all the formulas for calculating areas, volumes of polyhedron, figures, geometric reasoning, without having to memorize the formulas since they are going to forget it. Because they could not maintain their book for a long time after they finish the class, she asked them to use these formulas without having to memorize it, and the teacher evaluate only the students' notebook. According to the teacher it is not necessary to memorize it, the important thing is to improve student's ability of reasoning.

* Assessment as motivation

According to the teacher, the evaluation is a kind of motivation for the good students to continue advancing on their learning, and for the bad students' it does not provide them with anything.

She added that our students are not motivated to enhance the learning process, "the most important thing is that the students stay motivated, this could happen if the assessment strategy could be changed" (IS4TA, p. 33: [14:34-18:20]).

She also noted that teachers also are not motivated; there should be teacher productivity. That productivity is not if you have a certain number of students passes the course or get more money. Teachers need a real productivity, an external exam for example, if your students have a higher level, if your students can demonstrate that their teacher have better level than the others teachers, in this way the teacher receives productivity, but that's impossible in this time and age"(IS4TA, p. 35: [18:24-25:06]).

* Assessment for accountability

The teacher pointed that it’s better to follow the department methods for evaluating, as these days they have a lot of complement from parents, in this way the teacher can easily defined himself, he can say this is all established by the department it’s all written at the beginning of the year.

We have to use the department methods of evaluation, because if any student protests we can defend our self (IS4TA, p. 31: [04:32-05:20]).

On the other hand, she said that the students do not have any benefit from evaluation, it is a way or a method the students are punished or reward from their parents according to it.

* Assessment as diagnosis

The teacher asserted that the evaluation helps teachers to see the problems that their students are facing in their learning process. Students' evaluation provides teachers with information about the students and about their learning process, in this way, they can solve any problem that faces the students, the evaluation can help the teacher to see that there are some students had difficulties to achieve the minimum goals, and that make the teacher change his way of teaching.

The evaluation can also help the teacher to see if the students understand or not, for example,

> "Direct questions are the key to see if your students understand what you want. When you explain and ask a question, if the students remain silent, that means that they have not understood" (IS2TA, p. 19: [13:28-14:32]).

She added that she never know for sure that my students understand what she really want, but from the examples they discuss in class and the activities they make, she think they understand, also the direct observation of students make her see if they have understood or have not understood.

When she was asked how she makes sure that her students meet her expectations, she answered, "Repeating examples and exercises helps the teacher to know that her

students meet her expectations, as it's very difficult to know" (IS2TA, p. 19: [14:39-16:18]).

When she was asked how she makes sure that her evaluation was fair, she answered: "I know that my assessment strategy was fair only from the results of the tests. If the results of the tests are not very good, then the strategy that we follow is not good "(IS2TA, p. 19: [16:24-16:36]).

2.1.7. Changes in teacher beliefs related to the use of rubric

The following table shows teacher's beliefs before and after using the rubric, some changes could be noticed:

Table 12

Changes in Teacher's Beliefs Related to the Use of Rubric

Subject	Before using the rubric	After using the rubric
*The questions that you ask yourself before determining a main assessment strategy?	*Well, I always wonder if students will be able to understand the questions, whether the questions are difficult, and if they need more time, things like that.	*we should ask ourselves what we should or want to obtain.
*The main objective of assessment.	*Until now, the evaluation is used to quantify the degree the students have exceeded the minimum objectives according the law, also to detect possible learning problems. *Although it is not a basic objective, evaluation attempts that the students work in order to assimilate concepts. *More than anything is to give students final grade, we evaluate to see if the student have the level required by the low in order to see if they can pass or fail. *In general, we evaluate to put a grade for the students. The objective from evaluation is to determine whether the student has reached the level that he had to reach or not. To assess whether	*After using the matrix of evaluation "Rubric" I have to reply that yes, of course, you can use the evaluation in order to learn, and it is necessary to use different resources with the goal of improving the academic achievements of the students. *The evaluation should be used to enhance students learning and to reflect our work as teachers; it is true that through evaluating students work, we evaluate our work as teachers. *The form of evaluation should contemplate and foment students' daily work. In mathematics, this is fundamental, since evaluating the constancy of the work helps the students to learn and understand the subject better.

	the student learned what he have to learn, or if the student reached the minimum levels required by law.	
*The benefits that students gain from the evaluation.	* The students do not have any benefit from the evaluation. However, evaluating students work with high percentage is good for students, in addition to assessing his attitude, because even if they did not have a good mark they have the opportunity to pass. *For nothing, it only makes their parents punish or reward them. *Until now, their only benefit is that with the evaluations they are relieved of the pressure after having weeks of exams and little more.	*The students obtain clear benefits from evaluation, by being participants in the evaluation process they know what is expected from them, and they can focus on their learning. *With this method "Rubric", evaluation serves the students to improve and to learn. *With the use of the rubric, the students are participants in the teaching-learning process, since they explain more in this process and that is beneficial. *The benefit is they had to learn the subject very well, in order to explain everything they do, and as consequence, many of them understood the concepts of subject. *It is true that this method "rubric" makes the students more aware of what they are doing., the students in this method correct their work, they know the error that they can make, which is good, but of course it takes a lot of work. Because you have to prepare a form, a special rubric for each subject, so it takes more work. *Well, I think the rubric is great. because the students participate in the evaluation , it makes them improve their effort, because at least they become aware of what they know or do not know, having the rubric help them to know what they have to do to get 10. Some students, who are not brilliant, do not even know what to do in order to pass. Rubric provide them with a

		written guide, that can be used in the exam, then the student who takes a zero knows that he didn't do anything.
*The benefits that teachers gain from the evaluation.	*With the majority of the students, the teaching-learning process is incomplete. Let me explain, we teach and explain until we think the students understand and comprehend the concepts. We test this level of understanding by questions or by sending certain students to the chalkboard. *well we try to get benefit, the evaluation provide us with information about the students and about the learning process, in this way we can solve problems that face our students, we can see some times that there are some students who couldn't achieve the minimum goals, that made us ware that we have to change our plans. *We (teacher) draw more benefits from the assessment that they (students), they do not, they are limited to responding.	*Using the rubric allow me to check if my students understand or no every day. *The greatest benefit has been to prove, with some concern, that I cannot relax as a teacher and that it is necessary to motivate the students to explain better and work harder to employ all the necessary mathematical terms.
*Self and peer assessment.	*The truth that I prefer corrects my student exam alone, alone at home. *The students will not put a fair grade.	*Next year I will propose using peer and self-assessment with our students, because when the students involved in the evaluation process, they can see their weakness points. Contrary to my expectation the students correct fairly, sometimes they were stricter than me, that is good because it makes them aware of their learning and feels more involved in the education process, and these things are good for them.
*How do you know that the students understand what you want?	*I never know that my students meet my expectations, there is nothing formal, just through repeating exercises....I understand that the students meet my expectations, so what I do to know if my student captured what I wanted is through their daily writing, and when they solve a problem on the board,	*Well I think the rubric is great, because in this way the students participate in the evaluation, it makes them improve their effort, because at least they become aware of what they know or do not know, having the rubric help them to know what they have to do to get a full mark. Some students, who are not brilliant, do not even know what to do in order to pass. To have it written

	*I never know for sure, but through discussion of some examples in class and from the activities we make, I think they understand what I want to explain in class, also the direct observation of the students makes you see if they have understood or have not understood. * The key strategy to know if the students understand what you want is direct questions, when you explained and then ask a question in class, if they all remain silent that mean that they have not understood.	through (rubric), and also lets them use it during exams, who takes a zero he knows that he hasn't any thing
*How did you make sure that your assessment strategy was fair?	The results of the tests help the teacher to make sure that his assessment strategy was fair ... if the results of the tests are not very good, then the strategy that he follows is not good.	Providing the students with the rubric, every day and on the exam, make the assessment fair, the students who had zero means that he didn't do anything, and at least who has interest in learning know what he had to do, and that he has to work more to improve his level.
*Feedback	* The feedback helps the students to know what steps they had to follow in order to see how they should respond and how to get more scores. Whenever they take any test, we usually write it on the board and solve it on the board, and correct. Thus they, even if it is for the note ... they are predisposed to learn how to do or how to solve this problem well.	*The feedback should benefit both the students and the teachers. In this way, they know each other better and the results would improve.
*The relationship between teaching and learning and assessment	* The relationship between Learning and teaching is very clear. The teacher explains and the student learn, the relation between teaching and learning is clear. *It is true that the assessment is not always present in the process, the evaluation present only in the exams. *The relationship between learning and teaching is daily, continuous, but evaluation is	*It is true that we should evaluate through the learning process, not only in exams. *I think it's better to involve this way of evaluation "rubric" in the teaching learning process *After using the rubric, I can say that the evaluation can be used to enhance learning. *The evaluation should be used to enhance students learning and to reflect our work as teachers; it is true that

	eventually, evaluation is more sporadic, it is not every day, and less when there are 30 students in class, you cannot make an assessment, an assessment of what students are learning, studying. *Maybe it could happen if they want to evaluate a teacher but one teacher cannot evaluate 30 students. *Assessment is not always present in the whole process of teaching and learning. *If the teaching-learning process is daily and in every minute. The assessment process is not.	through evaluating students work, we evaluate our work as teachers.
Traditional assessment	*In high school I prefer to follow more severe, and rigid ways of assessment, because there is a certain time and an agenda to fulfill, and we can't reduce the level, we must take the compulsory syllabus in high school, but in the ESO we can use different forms of assessment, evaluation criteria and more forms of assessment	*it is necessary to use different resources with the goal of improving the academic achievements of the students *The form in which the students are evaluated should include a series of criteria. *The benefits have been that they have had to learn the subject very well, in order to explain everything, and in consequence, many of them have understood the concepts that are given in the subject. With the use of the rubric, the students are participants in the teaching-learning process, since they explain more in this process and that is beneficial.

*When the teacher was asked about the question that she should ask herself before determining a main assessment strategy, she answered before using the rubric that she would ask herself if the students will understand the question she will put, and if the time will be enough to solve all the questions in the exam, a significant change can be

noticed after using the rubric she said, that teachers should ask themselves what we should or want to obtain.

*Also a clear change was found on teacher belief about the main objective of assessment; before using the rubric the teacher was thinking of students' evaluation as a measurement tool. She asserted that, the evaluation is used to quantify the degree to which the students have exceeded the minimum objectives according to the law, also to give him a grade without thinking or concentrating if this student understands the subject or no.

The teacher Said, "We evaluate to see if the students have the level required by the low in order to see if they can pass or fail (IS4TA, p. 33: [11:15-11:58]).

After using the rubric, the teacher said that assessment should be used to enhance students learning and to reflect our work as teachers; she added that it is true that through evaluating students work, we evaluate our work as teachers, which is a reflexive process.

After using the matrix of evaluation "Rubric" I have to say that of course we can use the evaluation to enhance students learning (IS4TA, p.26:[02:10-02:40]).

She asserted that it is necessary to use different resources with the goal of improving the academic achievements of the students. In addition, she pointed that the form of evaluation should contemplate and foment students' daily work. In mathematics its fundamental, since evaluating the work every day helps the students to learn and understand the subject better.

Before using the rubric, the teacher was convinced that the students do not have any benefit from evaluation, the only benefit according to the teacher is that they get a numerical grade that make them punished or reward from their parents. Moreover, they can have a holiday after the exams; she also added that evaluating the student's attitudes with 30% give the more opportunities to pass the course despite failing the exam.

After using the rubric a clear change was noticed, she said the students obtain a clear benefit from evaluation, using the rubric make the students participate in the evaluation process and that help them to know what is expected from them, and focus to enhance their learning.

The teacher said, "With this method you gave me, evaluation serves the students to improve and to learn" (IS3TA, p.26: [02:10-02:40]).

According to the teacher rubric makes the students more aware of what they are doing, also sharing the students with the evaluation helps them know the error that they make, as they participate in the evaluation makes them improve their effort, at least they become aware of what they know or do not know. Having the rubric help them to know what they have to do to get 10. Some students, who are not brilliant, do not know what to do in order to pass. For that the rubric provide them with a written criteria to help the pass, and also to let them use it during exams, the student who takes zero knows that he didn't do anything.

She added that she believe that the benefits that the students obtained from using the rubric was that they had to learn the subject very well, in order to explain every step they do, and in consequence many of them have understand the concepts of the subject.

With the use of the rubric, the students are participants in the teaching-learning process, since they explain more in this process and that is beneficial (IS3TA, p. 28: [08:46-09:05]).

*About the benefit the teacher obtain from evaluation she clarified (before using the rubric) that the teachers have more benefits from evaluation than students, the evaluation provide teachers with information about the students and about the learning process, in this way they can solve problems that face their students, it helps teachers to see that there are some students can't achieve the minimum goals, and this made us aware that we have to change their plans.

After using the rubric the teacher noted that the greatest benefit from using the rubric that made her aware that she cannot relax as a teacher, she has to keep her students motivated, and to teach them to explain better and work harder to employ all the necessary mathematical terms.

*About using self and peer assessment the teacher asserted that she prefers correcting the exams of her students alone at home. After using the rubric she said that using self and peer assessment make the students participate in the evaluation process and this make them aware of their weakness and strength points. She added that she didn't think

that the students corrected the exam fairly. She added that sometimes they were stricter than the teacher; according to her this is good because it makes them feel more involved in the education process, and it's good for the students.

Before using the rubric the teacher asserted that direct questions is the key to know that her students understand what she wants through observing their work when they solve something on the board. After using the rubric she said that the students understand clearly what I need as they had everything written at the rubric, and the student who had zero knows exactly that he did not do anything.

> "Some students, who are not brilliant, do not even know what to do in order to pass. With rubric, the students have all the criteria written to help them pass, also they can use it during exams, who takes a zero knows that he didn't do anything" (IS4TA, p. 33: [13:02-14:28]).

Before using the rubric the teacher asserted that the way to know if the evaluation strategy was fair through the exam results.

> "If the results of the tests are not very good, then the strategy that we are following is not good" (IS2TA, p. 19: [16:24-16:36]).

After using the rubric she said that the students had to have clear criteria to let them know what the teacher want at that way we can say that the evaluation process was fair, with the rubric the student know exactly what he/she has to do to pass the exam.

*About the feedback the teacher before using the rubric said that the feedback helps the student to know what steps they should follow in order to learn for the next exam, whenever they perform any test, they usually solve it on the board. After using the rubric she said the feedback should benefit both the students and the teachers. As they know each other better, then the results improve consequently.

*About the relationship between teaching and learning and assessment before using the rubric, she asserted that the relationship between learning and teaching is very clear. The relationship here is clear: the teacher explains, the children learn. It is true that the assessment is not always present in the process, the evaluation present only in the exams. In addition, the relationship between learning and teaching is daily,

continuously, but the assessment is eventually, evaluation is a more sporadic. Assessment is not always present in the whole process of teaching and learning. Moreover, if the teaching-learning process is daily and every minute, the assessment is not.

After using the rubric, a significant change can be noticed, she said, "It is true that we should evaluate through the learning process not after it, not only in exams. She asserted that after using the rubric she is convinced that the evaluation can be used to enhance learning. Moreover, she noted that it is better to involve this way of evaluation "rubric" in the teaching learning process. Finally she added the evaluation should be used to enhance students learning and to reflect their work as teachers; "It's true that through evaluating students work, we evaluate our work as teachers" (IS3TA, p. 27: [03:58-04:11]).

*The teacher before using the rubric asserted that using more rigid assessment tools with high school is better for the students.

> "In high school I prefer to follow more severe and rigid way of assessment, because there is a time and an agenda to fulfill, and we can't reduce the level, we must follow the compulsory syllabus in high school. But in the ESO because we can use different forms of assessment, evaluation criteria and more forms of assessment" (IS1TA, p. 13: [05:28-05:56]).

After using the rubric, the teacher said, "it is necessary to use different resources with the goal of improving the academic achievements of the students" (IS3TA, p. 26: [02:10-02:40]). She also noted that teacher should look for the methods that motivate their students to make more effort to enhance their learning.

2.1.8. The forms of assessment that teachers use to assess students

When the teacher was asked about the forms of assessment that she use to assess her students she answered: In our center and specifically in the department of mathematics, we assess:

Work done by the student at home;
Work done by the student in class;

Work done by the student in groups;
Tests, quizzes or exams on each unit;
The student's attitude for the subject;

According to the teacher in the school where she work evaluate 70% of the students work by written exams, and the other 30% (15% for students attitude toward the subject and towards the members of the educational community, and the 15% left for daily work at home and in class) by unclear methods. In addition, she commented that by evaluating students work and attitude with 30%, the students have more opportunity to pass even if they fail the exam.

The teacher added that assessing student attitudes is something new for them, assessing students' attitude, daily work, and the ability of students was not done before, students were only evaluated by exams. She used to assess students' knowledge of a particular unit. Recently she assesses student attitude and behavior regards mathematics. "Before, years ago, the student's knowledge was evaluated and marked, almost exclusively by written exams" (IS1TA, p12: [00.17-01.14]).

She pointed that now days there are many methods to assess students work such as,

- Written Tests
- Correct Students note books.
- Group and peers work in class.
- Multimedia;
- Direct questions at class;
- Direct observation;

However, she clarified that the strategy that she use to evaluate her students is 90% on what the students' show that they know through written exams and work in class. Nevertheless, the 10% for students' attitude in class, it is evaluated without a clear strategy.

In addition, she admitted that they evaluate their students with written exams, students note book, and their activities in classroom during the whole year, they do not change, she added that maybe teachers in other subjects as languages, use other forms of

assessment, but generally, in mathematics she do not know anyone that uses other forms of assessment.

She noted that direct questions are the key to see if your students understand what you want, when you explain and then ask a question. If they all the students remain silent that mean that they have not understand.

She added that she always assess student after each unit, she never did it during the unit. In addition, she is used to give her students many exams and students score is the average of all the scores. She said, "I always try to put the exam in one or two paragraphs, not just one type of questions. Moreover, I like when I put a question to put the grade in two parts, the first part for the planning and the other part for the application, because if the student plan well but did not solve well they should have a penalty. However, if the student can solve the problem but cannot plan well, this should be taken in consideration. For that reason I prefer put 2 types of questions one for the planning and the other for the solving" (IS2TA, p.17: [03:51-05:33]).

According to the teacher one of the methods that she used this year with a group of students in the second quarter, that she tried not to evaluate them by test, because she had only 13 students and because students always don't prefer doing exams. Therefore, she assessed them by reviewing everything they have done at class and at home. Moreover, it was successful. What happens is that even so, there are five students of the 13 have not even been able to keep up with this pace, because they did not study.

When the teacher was asked if she use more than one method to evaluate her students she answered, in high school she prefer following a harder and more rigid and more traditional evaluation process. Because there is an agenda, a schedule to meet, and a syllabus to follow, and they cannot decrease the level we must take in our account the compulsory syllabus in high school. Nevertheless, in the ESO she added that they can use different forms of evaluation, evaluation criteria, and other ways of evaluating that are based on the students work, on the students' daily work, and on their behavior and attitude.

Regarding the assessment method that she used to enhance students learning she noted that, one of the strategies that she used to help her student to learn was to ask her students to copy the necessary theories from their books. Since the students have to

return their book at the end of the year, her goal was to let them use these formulas to solve activities that contain finding the area and the volume of some geometric shape, and she assessed them accordingly, she noted that the students did not forget what they learned.

The teacher pointed that she didn't used rubric or self and peer assessment before, sometimes she assess students' skills on using calculators, and she admitted that: "We evaluate what we think the students have learned. We don't have any strategy that the students can participate in the evaluation process" (IS4TA, p.30: [00:09-00:56]).

2.1.8.1. Teacher's satisfactions with traditional methods

The teacher was not satisfied with the traditional methods of assessment, as students' results are not good; and there are a lot of school failure and repetitions.

She pointed that mathematics teachers agreed that something should be done to enhance this school failure, because the things are not going as they want, the results are very bad, and the students levels in mathematics is very bad. She suggested that they should change the traditional methods with some methods in order to motivate and enhances the students' results, she noted that the evaluation forms should be changed as many other things in education, not because the existed forms are bad but because our students level in not the desirable.

For the most students the teaching-learning process is not complete. She explained: The teachers teach or explain until we think that students understand or comprehend the concepts. We check this degree of understanding by asking certain student to solve a problem on the board. She noted that using the rubric allowed her to verify all students' level of understanding daily.

Teacher "A" also added that the traditional methods of assessment do not participate in enhancing students learning.

> "The traditional form of assessment does not offer much for the learning process" (IS3TA, p29: [03:23-03:54]).

> "We evaluate what we think they have learned. We do not have any strategy that the students can participate in the evaluation process" (IS4TA, p30: [00:09- 00:56]).

Through the teacher experience along 20 years, she noticed that, in the past it was normally to find in a class 10 students that are very good, and 2 or 3 are very bad and the rest are normal. However, according to the teacher, the situation has changed, now you can find one or two students that are very good, and 10 students that are very bad and the rest are normal.

She commented that it is a result of the bad evaluation system as the student could pass the course even though he/she does not have the accepted mathematical level.

> "This is because the students found that whatever they do they will pass the course, they are not motivated to enhance their work, the students are not motivated to study, this should be changed" (IS4TA, p34: [14:34-18:20]).

2.1.8.2. Desirable assessment methods

The teacher said that next year she would propose using peer and self-assessment with her students, according to her when the students involved in the evaluation process, they can see their weakness point. Also the students can correct honestly, sometimes they are stricter than the teacher, which is good because it makes them aware and feels more involved in the education process, and these things are good for the students' character.

In addition, next year she would like to use the rubric, she said, "I hope I will be able to use it "rubric" all the year" (IS4TA, p30: [01:55-02:29]).

She pointed that she would enjoy more evaluating the students by direct observation, not by tests, without papers, just watching their work and its evolution, but of course this is impossible complained the teacher, because of the large number of students they have in class, they have sometimes more than 30 students, which is impossible to do anything like that.

According to the teacher she would try to evaluate her students by directly observe their work, because, "In this way the learning process and the student's improvement and evolution can be evaluated better" (IS1TA, p.14: [06:40-07:04]).

2.1.8.3. Suggestion for improving student assessment

- The teacher suggested the following in order to enhance assessment current practices:
- Teachers have to be more like psychologists and less like judges of the children.
- Teachers have to change their way of thinking, "we have to change the chip, because we are used to evaluate only what students know or what they have learned. We should learn, to evaluate the development and the learning process, from the beginning until end, that's what we should value more, at least in the ESO I think we should do so, that should be changed" (IS1TA, p.15 : [10:50-11:37]).
- Teacher should be provided with a lot of information and training in evaluation techniques, as teachers do not know how to evaluate well; they need a lot of information and training, both things.
- Exam should be eliminated, "the exams do not seem to be a good evaluation tool" (IS1TA, p.15 : [10:21-10:48])
- Students should be evaluated by direct observation.
- The high number of students in classes should be changed.
- Teacher should participate in professional development seminars and conferences. Because it is one of the most interesting things, that can improve the results of the students.
- Keep the students motivated, "When the student knows that they can pass the course with minimum effort they will never put more effort to have the same result" (IS4TA, p.34: [14:34-18:20]).
- Teachers should work to enhance their assessment strategies, "One way would be to recycle ourselves, because we are stagnant in the same way for more than twenty years ago, and things have changed" (IS1TA, p.15 : [18:24-25:06]).
- The low of the minimum effort should be changed.
- The student who fails two subjects should not pass the course.

- Teachers' should be prepared to use technology in order to be able to use new forms of assessment.
- Teachers should be motivated through an external exams or events that the student can see that their teacher is better prepared than the others are.
- Change the department policy about assessment, to give the teacher the freedom to evaluate his/her students with the method that he/she finds suitable.

2.1.9.The difficulties that prevent the teacher from applying new assessment methods

From the teacher diary and interviews, the teacher mentioned many difficulties that prevent or make it difficult to use new forms of assessment; the following table presents the difficulties that the teacher encountered:

Table 13
Difficulties that Prevent Teachers from Applying New Forms of Assessment

Difficulties related to the participants.
Difficulties with the rubric and their application.
Difficulties from the organization.

2.1.9.1. Difficulties related to the participants

2.1.9.1.1. Difficulties caused by student

One of the difficulties that face the teacher that the students are not motivated: "Although there are many things and tools to motivate students, students don't work. (IS1TA, p. 12: [00:17-01:14]).

She added that whatever decision the teacher will take, depends greatly on the group of students that are going to be evaluated. Moreover, as the students are not motivated so using new methods will not give any result.

She admitted that she does not use new assessment methods because the students do not work, she gave that example: this year I had a group in the second ESO, She tried to evaluate them without tests, because she have only 13 students. She decided to evaluate them by reviewing in class everything they have done at home. According to the teacher, five students of the 13 that have not even been able to keep up with this pace, because they have not worked enough, they have had to take the final exam and of course, they failed.

According to the teacher, it is very difficult to apply different forms of evaluation because:

- Teachers have to struggle against the bad behavior of some students in classroom.
- Students can cheat when they correct their own exam, one of the problems that prevent teachers from using self and peer assessment is that students will cheat.
- Our students are not motivated, because the student do not do any effort to study, they know that they will pass the course, for that the students will not study, will not do the things that they have to do.
- The Students do not work, do not make any effort,
- The students are very lazy, they want the law of the minimum effort, when the bright students saw that they could get the same result with a minimum effort they will never make more effort.

2.1.9.1.1.1. Students are not used to this method

According to the teacher the main difficulty that she faced while applying the rubric is that the student are not used to this form and to the time that it require. She added if they knew this method in earlier stages it would be easier for them to use, they will use it automatically.

As the rubric requires writing and explaining every step, the students follow to solve any problem, it was very difficult for them, as they were accustomed to solve the problem without giving any explanation.

The main problem the teacher faced when applying the rubric that she needed many days for the students to get used to it. Because when they need to answer any question they have to follow all the required steps following the rubric, and they have to explain everything they write, and to use all the necessary graphics, they are not used to that.

She added "I belief that all of the disadvantages derived from never having used this method before and it seems essential to me that it should be applied during a complete course in order to achieve its benefits" (IS3TA, p. 28: [06:42-07:15]).

2.1.9.1.1.2. Using the rubric depends on the students

The teacher noted that it is very difficult to choose a sound evaluation strategy; this greatly depends on the group of students the teacher have. The group of students that used the rubric was very good group of students and they paid a lot of attention. "I am certain that if I had used the rubric in another group I would not have obtained the same results (IS3TA, p. 26: [01:22-02:06]).

Using the rubric greatly depends on the group of students. The students who use good strategies to resolve problems, but do not explain well what they did; get a lower grade with this form of evaluation.

2.1.9.1.2. Teacher preparation

The teacher added that one of the reasons that she does not apply new forms of assessment is that she do not know other forms of assessment, she added that along her experience as a teacher she did not have any training to improve her practices.

"It is a general rule that says, if they don't force us to do things, we will not do it. In addition, we do not have information about other strategies, other forms of assessment "(IS4TA, p. 30: [01:55-02:29]).

She added that, it is true that they did not have any training about how to give a class or how to evaluate the students. She said, "for example, when I studied to teach, my major was mathematics, but they did not teach me how to give a class or how to evaluate" (IS1TA, p. 15: [09:23-10:04]).

In addition, she noted that mathematics teachers need specific training on the new evaluation techniques, also training about using technology in teaching, learning, and evaluating. "I attended many seminars and conferences because I need to collect some points for the transfer and stuff issues; none of them was about evaluation" (IS1TA, p. 13: [01:38-01:50]).

According to the teacher, mathematics teacher do not use new forms of assessment because:

- They do not have the newest techniques that young teachers know. It is important to provide teachers with more information and training in evaluation techniques.
- They do not use new forms of assessment because they are very traditional.
- She don't use new forms of assessment because she forget that she had to use new forms of assessment, as she is accustomed to evaluate my students with exams.
- Teachers do not try to use new forms of assessment.
- Teachers that have many years teaching find it difficult to learn and assimilate new methods of assessment.
- New student's teachers are better prepared to use new forms of assessment than I do.
- As they (teachers) are comfortable and accepted as they are, then point. They will not even try to enhance, they are not motivated,
- It is true that we have many forms of assessment but also it is true that teachers are not prepared to use new forms of assessment.

She added that she have realized after using the rubric that mathematics teacher do not know how to evaluate well, and need a lot of information and training. According to the teacher,

> Teachers need to be retrained, but the problem is that teacher training will consume time from the free time of the teacher. Especially, that they are living in a crisis and it will be difficult to pay for that issue. It's very difficult to ask a teacher to come to learn new things on the time that he dedicate it for his family, as no one will evaluate this, for that we are like the student we went to the minimum effort (IS4TA, p. 35: [18:24-25:06]).

2.1.9.2. Difficulties with rubrics and their application

2.1.9.2.1. The rubric itself

According to this teacher, the rubric is very long and the students are not used to read.

- It is little too long for them to handle.
- It is better to make this rubric shorter as it is very long and the students are not accustomed to read.

2.1.9.2.2. Difficult to understand this rubric

The teacher asserted that the students find the rubric difficult to understand, she dedicates many classes until the students were able to understand it, the language of this rubric should be changed to help the students to understand it. "If we try to enhance this rubric by write it again in a simple language without a lot of words, it will be easier for them"(IS4TA, p. 32: [06:29-10:21]).

In addition, she added that her students had difficulties in using the mathematical language to explain everything they do; it was difficult for them to explain everything in order to get the full mark.

2.1.9.2.3. Time and effort consumed

According to the teacher, this rubric consumes a lot of time and work because:

- Teachers have to prepare a form, a special rubric for each subject, so it takes more work.
- The students required to explain every step they do, for that the teacher cannot progress on the curriculum.
- The teacher and her students are not used to this form of assessment.
- The students have to study a lot in order to be able to use this rubric.
- It takes a long time to correct any exercise, since they have to explain, with a lot of detail, the steps to follow.
- The rubric consumed a lot of time from the students, as it requires a lot of writing.
- The teacher could not put a lot of question in the exam, as the students do not have the time to solve the questions with the required details.

She added that some bright students when they solve any problem they do not write a lot, they write half what they need to write with the rubric, because usually teachers know their students, if the student can solve the problem then he know the formula, and that means that the student understand it. We understand a lot of thing that the students do not write, if they have to write everything it will consume a lot of time.

As the teacher was not used to let her students evaluate each other's work, using peer and self-assessment cost her lot of time and effort. The teacher noted "I am not used to

apply self and peer assessment with my students, it’s not my way of work, for that it will cost me more time and work (IS2TA, p20: [28:37-28:41]).

According to the teacher self and peer assessment require that teacher should review what students have done, because probably if the students get used that teacher always use this way, they will correct less. Alternatively, may be sometimes they will not correct well, and put things that do not belong. For that, consume a lot of time from the teacher.

Regarding assessment for learning the teacher clarified that they cannot use assessment for learning, they cannot use continuous assessment, as it will consume a lot of time from the teacher that he had to dedicate to finish the curriculum.

> "It is very difficult to assess for learning, we don’t have time" (IS2TA, p. 22: [34:38-35:00]).

Using the rubric consumed a lot of time and effort from the teacher. Because it is a new for the teacher and the students, for that it takes them a lot of time and effort to get used to it. On the other hand as the rubric require many details in solving any problem; the teacher could not put a lot of question on the exam in order for the students to be able to finish on time.

In addition, she added that she had to dedicate a lot of time explaining how to use this rubric; the students take a lot of time until they understand it, and were able to use it without any help from the teacher.

The main problem that we found while using the rubric, that we needed many days to get used to it, in order to solve any problem with all the steps that the rubric required, the student were not a costumed to explain every think they are writing, and the graphs they are drawing (IS4TA, p.32: [06:29-10:21]).

She pointed that rubric is a good method but it make the learning process advance slowly as teachers cant dedicate a lot of time using rubric. She noted, "It’s true that the rubric is a good method, but it takes a lot of time" (IS4TA, p. 32: [06:29-10:21]).

She added that the main problem is to get used to the method and the time that it consumes, the students need to accustom using it. She noted that the main difficulty they faced in using the rubric is to get accustomed to it and the time it consumed.

2.1.9.3. Organizational difficulties

2.1.9.3.1. Difficulties caused by the department of mathematics

The main reason that prevents the teachers from using new forms of assessment is that teachers do not have the right to determine the assessment method that they can use to assess their students. They cannot not choose the form of evaluation, the form of evaluation in the centers is determined by the department of mathematics, based on the current norms. What is on the hands of the teachers is to decide the best way to motivate their students to produce their best work.

The main reason why we do not use new forms of assessment is that the entire departments have to do the same, homogeneous; all teachers in the department should agree if any teacher want to use a new form. That is the main problems (IS4TA, p. 31: [03:46-04:29]).

The main reason that prevents teachers from using new methods of assessment is that the entire department has to do the same programming or schedule. In homogeneous way, all the teachers of the department should agree. That is the main problem. She clarified that every teacher can have strategies to teach what they want, but when they want to evaluate they are limited to follow the schedule or program norms, She added that It's important to follow the departments methods, because if any student protests teachers can defend their self. She added that mathematics teachers have to follow the department plan, they cannot think further.

In addition, she pointed that, as they are obliged to follow a certain schedule and agenda, they need to use more rigid and traditional forms of assessment.

2.1.9.3.2. Difficulties caused by the evaluation system

A cording to the teacher a big problem in the Spanish education system and very severe, that the law stated if a student who ordinarily didn't pass a subject of any course, he had to pass a special exam at the end the course in June. She noted that it's unbelievable,

because through 8 months the student couldn't pass the subject; it's illogical to ask the teacher after two days to evaluate this student another time, so all the teachers agreed to do the special examinations in September.

She also criticized the system that obliges the teacher to assign 30% of the final grade of the students on his attitudes. She said, another problem from my point of view that contribute to the school failure; is allocating high percent of the student final grade to his attitude in school. Every student should behave in appropriate way (it's something normal). Evaluating students attitude with a high percent allow many students to pass the course without having the required level in mathematics.

She also complained that in Spain with the law they have, if students have a low level he/she can pass to another class, although they may have six suspended marks, they might pass the course. Because the system is so bad, as a result the teacher focus only on putting the final grade and classifying students to pass or fail the subject, So they evaluate to see if the student have the required level by the low in order to see if he/she can pass or fail .

This leads to another problem as all the students can pass the course, and there is no class repetition in the primary stage, the young school failure is gathered with the older school failure, this will affect the students that have a middle and high level.

On the other hand she highlighted another problem which is the law of the minimum effort, which states that the student need to have a certain level to pass the course, she noted that the students with a little effort can pass the course, so they don't have motivation to do any additional effort.

She added that, in the past, it was normal to find a class with ten very good students and two or three are very bad, and the rest are normal. Now it has changed, now you can find one or two that are very good students, ten or twelve are very bad, and the rest are normal, I believe that it is because when the student sees that whatever he do, he will pass the course, he will not do anything to improve his work. Students nowadays are not motivated to study, that should be changed.

I imagine that one day the responsible of education in Spain will realize that is a mistake. In addition, all the teachers agree with that, I think all the teachers agree with that (IS4TA, p. 34: [14:34-18:20]).

2.1.9.3.3. Number of students in class

The teacher expressed her desire to use direct observation. However, the large numbers of students prevent her from using it.

> "I would enjoy more evaluating the students by direct observation, not by tests, just watching their work and its evolution. But of course this is impossible because of the large number of students we have in class, we have sometimes 30 students, and that is barbaric and it is impossible to do anything like that" (IS1TA, p. 14: [06:40-07:04]).

She noted that a lot of student especially in mathematics do not understand everything, and according to the teacher this could be solved by directly observe every student, but it is difficult with this large number of class.

One of the main problem that the students face in mathematics that they don't understand very well, and this can be solved if we could study the level of every student directly, but as there are a lot of students in class it's very difficult to do so (IS1TA, p. 14: [07:15-08:00]).

She also asserted that if the high number of students in classes could be changed that would greatly improve the evaluation process.

Also clarified that when they are more than 30 students in the class the ideal way to evaluate them is the exam, or a question to be solved on the board. "We have to limit ourselves to what we can accomplish because we have many students; I think this is the main problem" (IS1TA, p. 13: [02:14-04:26]).

2.1.10. The process of rubric application in the classroom *"Teacher A"*

The teacher applied the rubric with her students in the absence of the researcher. Teachers' diary was the main source of information for the researcher about the process of rubric application. However, the researcher used to meet the teacher for further clarification.

The teacher explained to her students that this new method of assessment would be used for research purposes. However, assessment by the rubric will affect their final grade because all exercises and exams of this unit will be assessed by the rubric. In addition, the teacher explained to her students that peer assessment would be used with the rubric.

Rubrics are new method of assessment to the participants, since Grade 3º ESO students had never used rubrics in any classroom. Therefore, the teacher provided her students with proper training before actually using rubrics. The training included defining rubrics, explaining their main objectives and the detailed mechanism for using them.

The first time of using peer assessment by the rubric was on April 5. The teacher asked students to solve a problem, and then she asked each student to exchange his/ her answer sheet with the colleague next to them. The teacher asked each student to mark his/ her colleague's answer sheet. Next, the teacher asked a student to solve the problem on blackboard and then the teacher marked the student's answer.

The teacher gave the student's answer a mark of 5.75 out of 10. The students consider this mark a low score. The teacher realised that the weakness point for the student was in the explanation. She commented

Students are not accustomed to explain the strategies they used to solve the problem (DTA).

Next, the teacher compared her marking with students' marking. The results were also low; no score exceeded six.

After using the rubric to mark their colleague's answer, the students become panic. Their main fear was that this assessment method would affect their final grade negatively. However, the teacher calmed them through clarifying that actually the effect of assessing this unit on their final grade is going to be minimal.

A student raised some doubts about this method. He said,

Correcting with this method demands more details for each answer. Thus, by this way, it is very difficult to solve more than two or three exercises (DTA).

The teacher agreed and explained that the final exam for this unit will be shorter than usual.

Another student added "This form of assessment required studying the topic content day by day "(DTA).

The teacher agreed with her and clarified that this could be considered one of the advantages of this method.

When the teacher announced that there will be no theoretical questions (memorizing questions) in the following exams. One student commented "there is no need to put such questions since we have to put the theory in every question according to the rubric (DTA).

The teacher commented that this could be considered another advantage of using the rubric in assessment, because students have always to revisit the theoretical topic material in order to answer according to the rubric.

On the following days, the students assessed various exercises using the rubric. The teacher commented: "As we are getting deep in the content, solving all problems with all the required details becomes harder "(DTA).

Some students criticized the time of applying this new method of assessment. Their main point was that they are in the third and final semester. According to them, it would have been better if this form of assessment is applied in the primary level and the 1°and 2° ESO.

Students were sure that applying of this method earlier can save training time, ensure that they master this type of assessment and reduce the negative effect on their final grade. The teacher agreed with her students.

We had a discussion and the students reach to same conclusion as the teacher, that it's desirable to start using this form of assessment at the beginning of their study in the secondary and primary, in order not to lose much time in explaining how to score rather than knowing how to answer every question (DTA).

On May 20 and 23, the teacher explained three types of functions. Next, she distributed worksheets that contain three questions that cover the three types of functions. The teacher asked the students to solve the questions and to assess them using the rubric in peers. The main problem that faced the student was that they have to explain a lot, which they are not used to do. Therefore, they progressed very slowly. In addition, some students faced difficulties in classifying the answers according to the rubric and in deciding on the mark for each branch. The teacher commented that with practice, this problem would be solved.

Some students wondered if they have to answer with all the details, and the teacher insisted that students should answer with the highest quality and clarity as possible. However, because the students were not accustomed to give more detailed and explanations, the teacher had to give them more examples of how accurately to answer every exercise.

The teacher realized that regardless of the difficulties students had in explaining their answers properly, they enjoyed using peer assessment. The teacher commented: "The students enjoyed correcting for each other (DTA).

In addition, the teacher realized that the students need to consult their books while solving each exercise. Thus, they have to study more than before. She considered this an advantage for using the rubric in solving math problems. She wrote in her diary

Although we have done many exercises using the rubric, the students need to go back to their books when they solve any problem. The student with this method study every day, not like before they only study before the exam (DTA).

On May 25, the students had the unit exam. Some students were worried that the teacher may not provide them with the rubric, and that they have to memorise it. However, the teacher calms them down telling them that the exam sheet will include a copy of the rubric.

The students faced no problems in applying the rubric because they are used to it, and they assess the exam in peers. The students were worried about using peer assessment alone, however, the teacher explained that she is going to assess the exam by herself and compare their assessment with her. The teacher wrote the key answers on the board, and

asked students to mark according to it. She had some doubts about providing the students with the key answers; she wrote:

It would have been better if I let the students agree on the key answers alone without my direct supervision (DTA).

The teacher noted that many students had a good grade on Column 2 that evaluates the strategic knowledge, because she usually evaluates them according to strategic knowledge. However, they had lower scores for Column (1) and Column (3) because she did not use to ask them to provide many details as required by these columns.

During marking the exam, students faced a technical problem. The teacher designed the exam in a way that the questions have unequal scores however, question 1 equals two points, question 2 equals three points, and question 3 equals five points, while the rubric is designed to assess each question with a fixed score that equals 10. Students faced difficulty in the conversion of scores for each question. Therefore, the students marked each question out of 10 and the teacher did the necessary conversions. The teacher commented, "I should have been aware of this problem" (DTA).

During the process of peer assessment, the teacher realized cases of conflict and dispute between students on the marks. However, the teacher realized a positive side for their argument; the students understood that they have to give clearer, more concise and precise answers.

The teacher noticed that the students assessed their peers critically. She commented,"contrary to my fears that the students will over mark their partners, they were very critical when assessing the responses of their peers" (DTA).

Comparing teacher is marking with students' marking, the teacher found that 10 students had slightly higher marks than the grading, five students had lower marks and three students had equal marks. The teacher commented: "Comparing the results, I can see that they are very close to the scores that I have set. This means that they were very serious in peer assessment" (DTA).

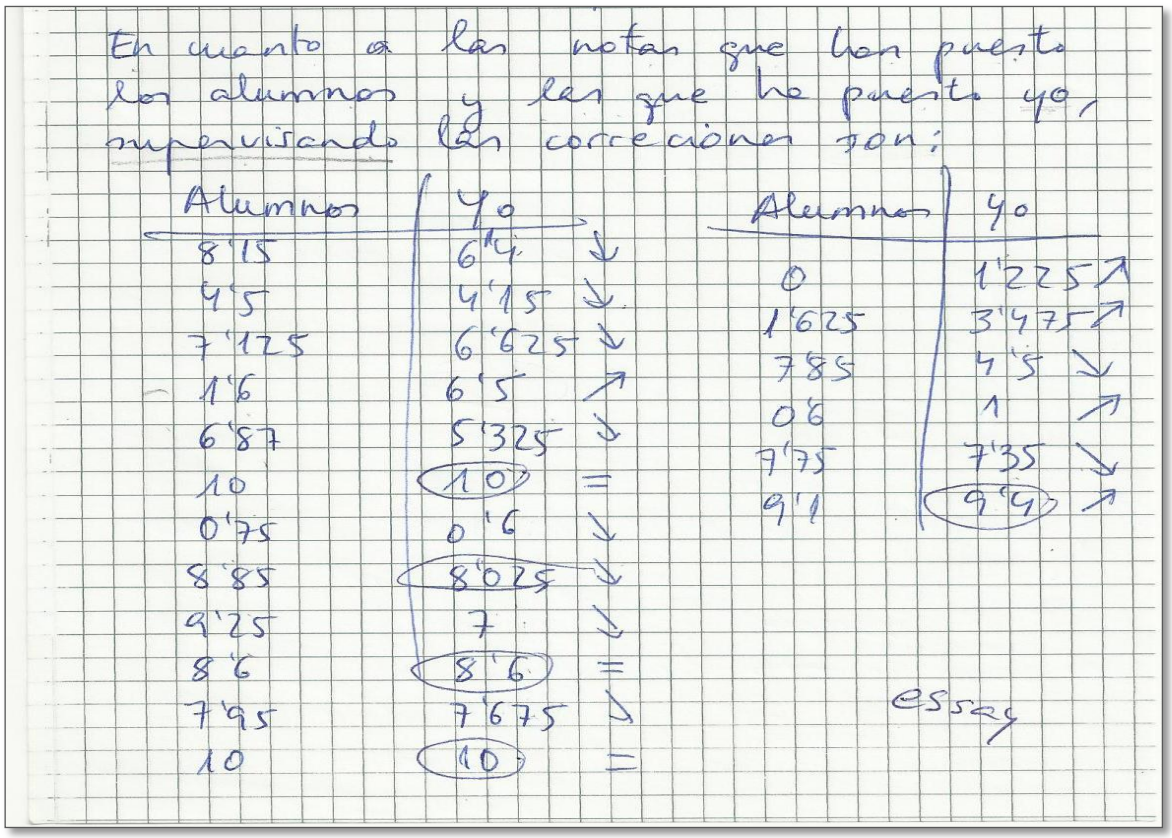


Figure 13 .A part of teacher's diary.

The teacher wrote on her diary:" There are clear cases where it is shows that certain students had done well on a particular exercise using the traditional method to evaluate, without understanding what they are doing, therefore they can't explain or explain it in wrong way or even worse in a way that doesn't have any sense" (DTA).

Reflecting on using rubric instead of the traditional methods of assessment, the teacher asserted that assessment using the rubric is useful. She argued that assessing by the rubric has an advantage over traditional assessment methods since it helped her to measure genuine understanding. According to her, some students might have correct answers according to traditional assessment methods however, they cannot explain these answers, explain them incorrectly or their explanation does not have any sense. See Figures 14,15,16,17.

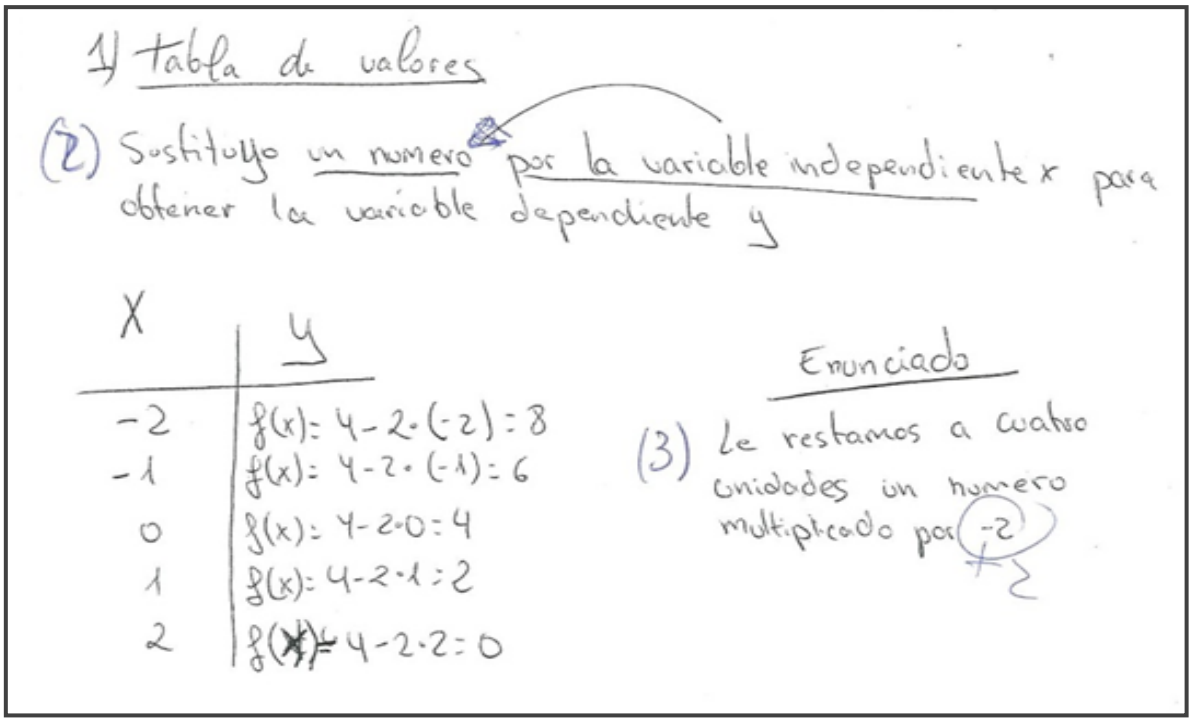


Figure 14. A part of student's exam

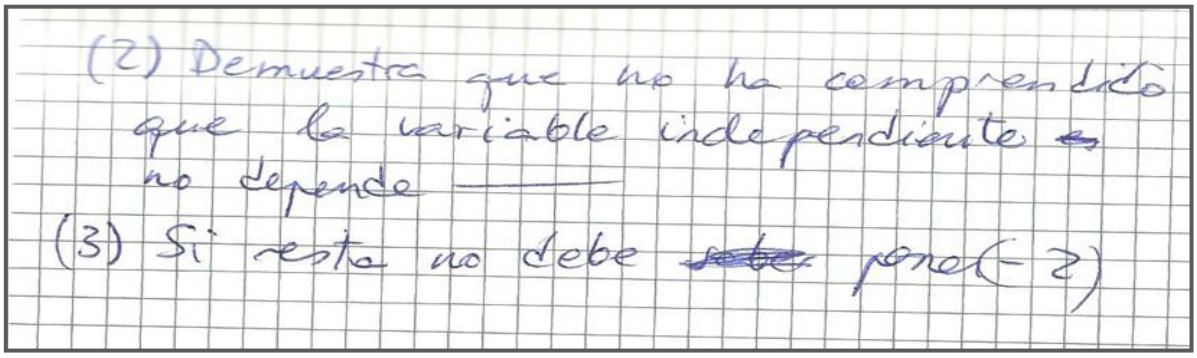
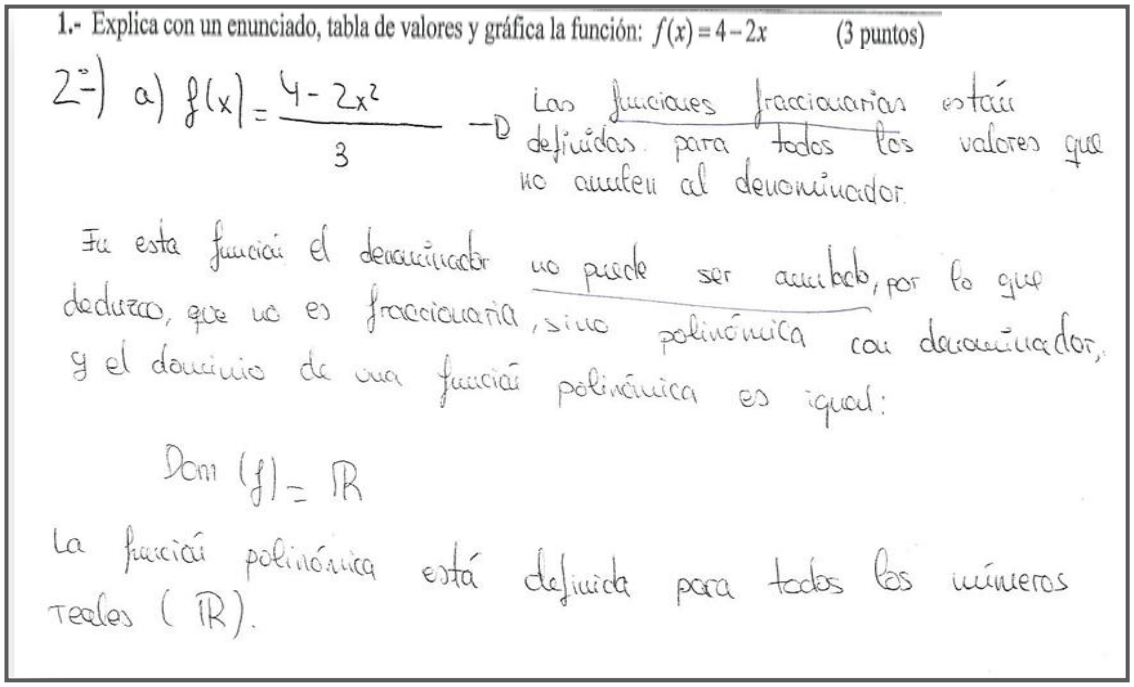


Figure 15. A part of teachers diary

The teacher pointed that the student's explanation showed that he didn't understand that the correct is to substitute *X* which is dependent on *Y* which is independent and not the contrary.

On the same answer the student wrote: "*Le restamos a cuatro unidades un numero multiplicado por* -2" that means we subtract from four units a number multiplied by (-2), and the teacher pointed that the correct answer should be we subtract from four units a number multiplied by$(+2)$.


1.- Explica con un enunciado, tabla de valores y gráfica la función: $f(x) = 4 - 2x$ (3 puntos)

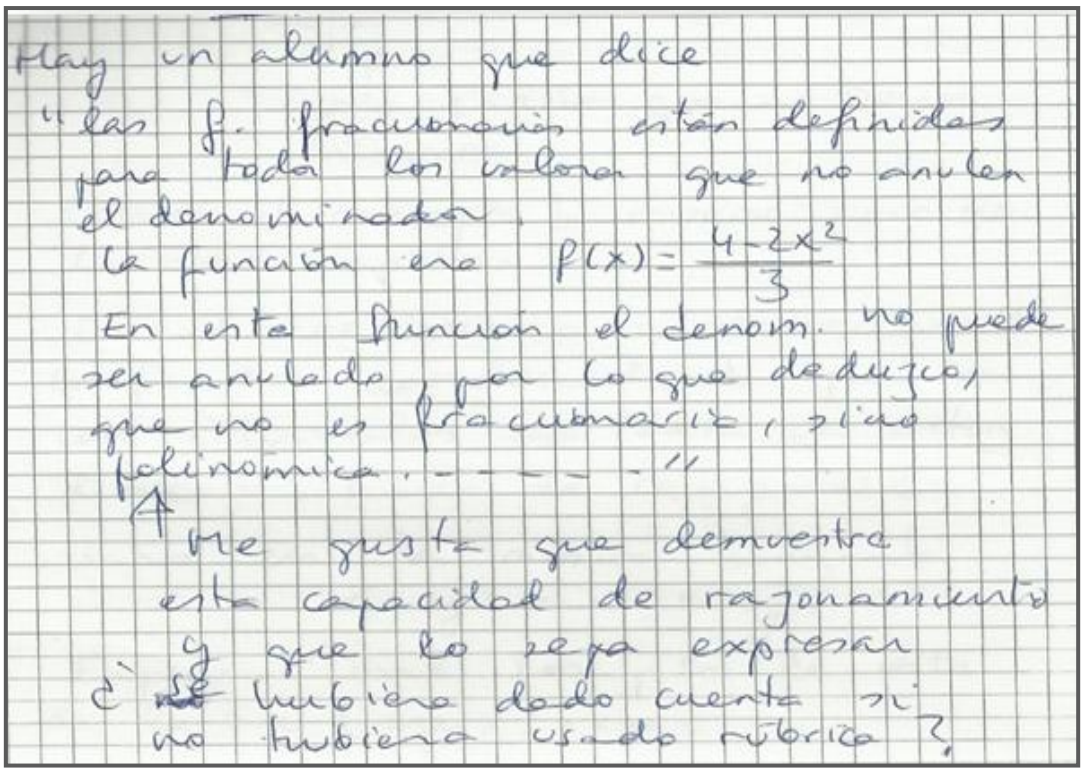
2°) a) $f(x) = \frac{4 - 2x^2}{3}$ → Las funciones fraccionarias están definidas para todos los valores que no anulen al denominador.

En esta función el denominador no puede ser anulado, por lo que deduzco, que no es fraccionaria, sino polinómica con denominador, y el dominio de una función polinómica es igual:

Dom $(f) = \mathbb{R}$

La función polinómica está definida para todos los números reales ($\mathbb{R}$).

Figure 16. A part of student's exam


Hay un alumno que dice "las f. fraccionarias están definidas para todos los valores que no anulen el denominador". La función era $f(x) = \frac{4-2x^2}{3}$ En esta función el denom. no puede ser anulado, por lo que deduzco, que no es fraccionaria, sino polinómica. ----- ✓

Me gusta que demuestre esta capacidad de razonamiento y que lo sepa expresar ¿Se hubiera dado cuenta si no hubiera usado rúbrica?

Figure 17. A part of teacher's diary.

The teacher pointed that one student wrote the fractional functions are defined for all the values that doesn't nullify the dominator, the function was $f(x) = (4 - 2x)/3$ the

dominator can’t be nullified, so I conclude that it’s not fractional but its Polynomial function.

The teacher wrote" I am very impressed that the student showed a reasoning ability, and knew how to express it very well; she said "I would never notice that if I haven’t used the rubric".

On the other hand the teacher confirmed that using the rubric have coasted her more time and effort than usual, because she is not used to it. However, she believes that with more practice she will be able to master this way of assessment.

The teacher commented that although assessment by rubrics was a new way of assessment for the students, because they were not used to explain everything they do (although they know); they will overcome this problem by training for long time.

The teacher noticed some differences on students results of the functions unit exam of the two groups (3B, 3C) that she teach, she found that group 3B who were assessed by rubric had lower grade than 3C who were assessed by the traditional method, although the group of 3B are more active and motivated.

According to the teacher, the reason for that result that, the rubric requires writing many details in a mathematical language, for that assessing the mathematical knowledge and their reasoning skill, made the students who were evaluated by rubric "penalized" by assessing these two aspects (column 1c and 3c). As group 3C where only evaluated for the application part which is similar to column 2 in the rubric. This explains why 3C had better grades than 3B. "If the group 3c was evaluated in the same form no one of them will success" (DTA).

In order for the teacher to see the effect of using the rubric she compared the results of the students who used the rubric 3B with the results of the group 3C who were assessed traditionally, according to the second column of the "strategic knowledge (column 2c)", she found that 3B had better results.

2.1.10.1. Students' responses on using the rubric in problem solving: The positives and the negatives.

Table14

The Advantages of Using the Rubric in Problem Solving from Students' Perspective.

Advantage	Frequency of students	Percentage of students
Using the rubric enhances students' learning	10	68%
Using the rubric facilitates teaching and learning	1	6%
Using the rubric elevates students' marks	3	20%
No reaction	1	6%

68% of the students found positive relationship between using the rubric in Math problem solving and their learning. According to them, the rubric clarified to students teacher's expectations regarding problem solving. The students wrote that solving the problem with previous knowledge of the assessment standards forced them to improve the way in which they used to study the learning content of a topic. In addition, the students admit that the rubric force them to study the topic content more thoroughly than before.

According to some students, they used to provide numerical answers to math questions. However, using the rubric forced them to explain what they had learnt in words. Therefore, these students found that they have to understand every step in problem solving to be able to explain it to the teacher. Thus, according to the students, the rubric enhanced the quality of their answers through forcing them to study more in order to reach genuine understanding.

Some students argued that using the rubric facilitate understanding the topic content. According to them, before using the rubric, they and the teacher have to solve several problems in order to understand the topic content. However, with the rubric it is enough to solve one or few problems to understand.

One third of the students claimed that assessment by using the rubric enhanced their marks.

You will never have zero you will always have some scores.

According to them, regardless of the quality of their answers, the assessment by the rubric provided them with some scores.

As a summary, the students reported that using the rubric in problem solving enhanced their learning for many reasons. First, it clarified the teacher's expectations and learning standards. Second, the rubric forced them to put more effort during study and to seek quinine understanding. Finally, the rubric improved the quality of the learning product. In addition, a student claimed that using the rubric in Math problem solving facilitated teaching and learning process. Moreover, 33% of the students favoured using the rubric in assessment since it helped them to get higher marks (See Table 13 and Figure 17)

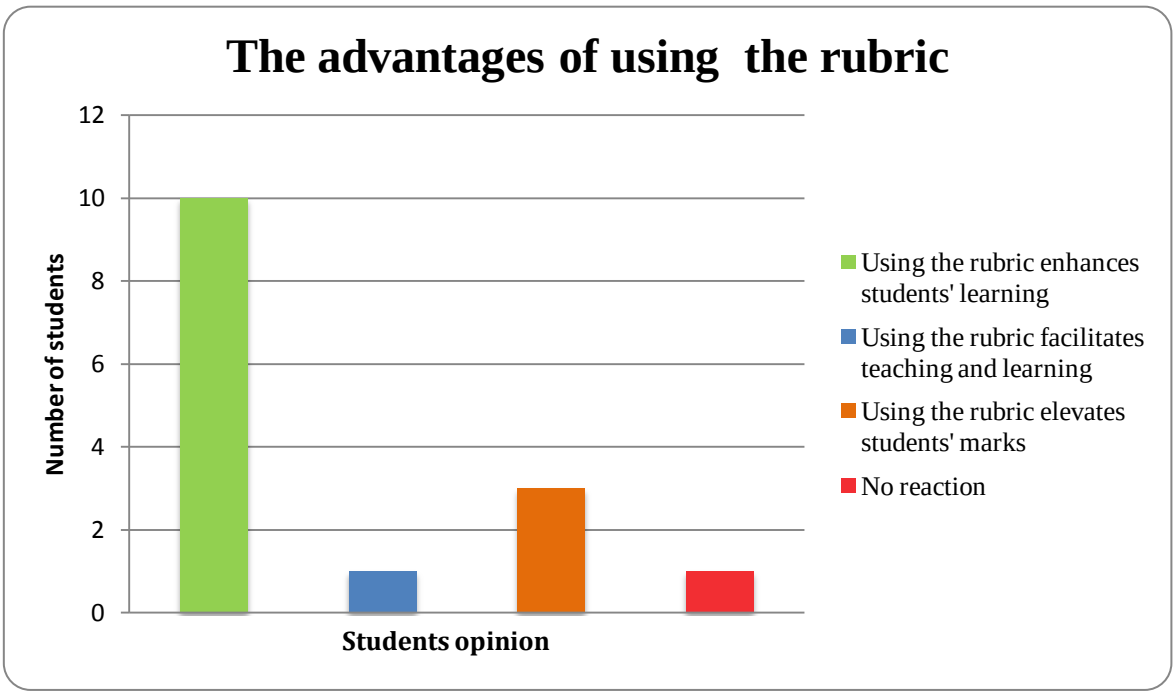


Figure 18. The advantages of using the rubric in problem solving from students' perspective.

2.1.10.2. The disadvantages of using the rubric in problem solving from students' perspective

Some students found that using the rubric was not easy for them, According to the students the rubric was very long and complicated, the y didn't understand it, as it was the first time they used it in class, they asked for more practice and training. According to them two hours of training is not enough to understand what a rubric is and how to use it in problem solving and in scoring.

Table 15
The Disadvantages of Using the Rubric in Problem Solving from Students' Perspective

Disadvantage	Frequency of students	Percentage of students
Using the rubric was difficult	8	53%
Using the rubric consumes time and effort	4	27%
The time of applying the rubric was not suitable	1	7%
Using the rubric require high quality of answer to have a full mark	1	7%
No reaction	1	7%

Some claimed that the rubric requires a high quality of answer, for that reason the students found difficulties in studying the content, one student pointed that using the rubrics was very difficult as it requires memorizing the content in order solve any problem with all the required details. According to the students, before using the rubric they did not have to provide much explanation and there was no need to memorise math concepts; it was just enough to understand the concept.

In addition some student complained that the rubric consume a lot of time and effort, they clarified that they couldn't solve many exercises using this method, as the rubric requires explaining every step the student follow in solving the problem.

Although some students claimed that it is easy to get higher scores in exams assessed by the rubric, other students considered it is very difficult to get full mark because there is much explanation in short time. One student mentioned, "It is difficult, we have to know everything very well in order to get maximum grade".

Some students criticised the time of applying the rubric, they noted that using the rubric at the end of the year was not suitable as the rubric was introduced to the students for the first time during the third semester. Students expressed their dissatisfaction with this sudden introduction and argued that it would be more beneficial to them if the rubric was introduced in the first semester. Some students advise that students should be exposed to rubric at primary years of their study. According to students, the time did not allow training, practicing and good understanding of the rubric.

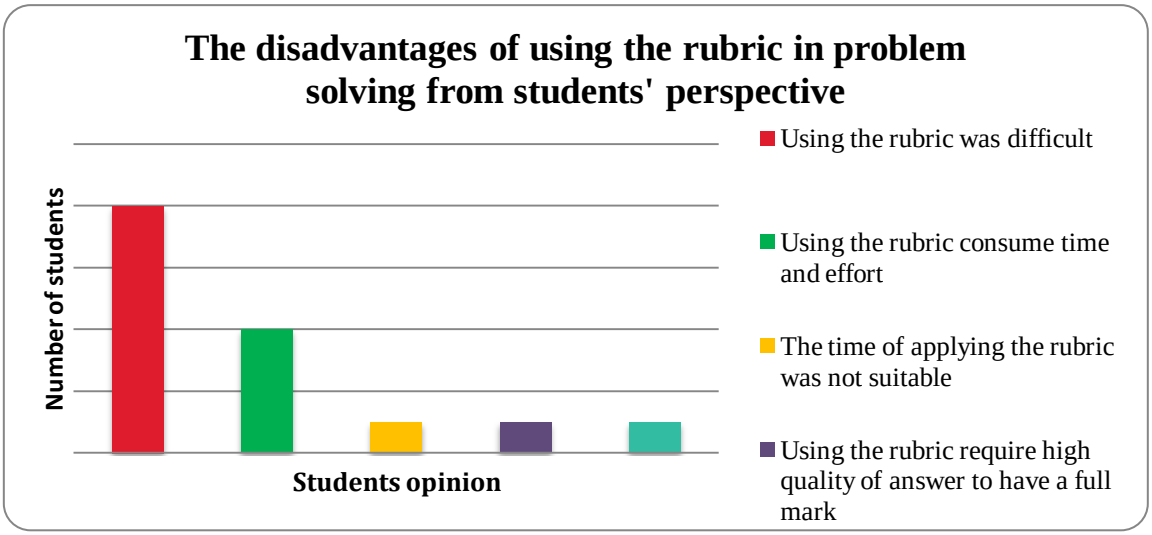


Figure 19. The disadvantages of using the rubric in problem solving from students' perspective.

To sum up, the students found that using the rubric was difficult for many reasons: First, the rubric is very long and difficult, the students didn't understand it. Second, the rubric consumes a lot of time and effort to have a high quality answer. Third, it requires a lot of explanation. Moreover, the students perceived that using the rubric in problem solving makes it less likely to get full marks .Finally; the time of applying the rubric was not suitable.

2.1.10.3. The difficulties that face the students while using the rubric

According to the students using the rubric requires a lot of work, as solving any problem require following a long detailed process, the students reported that studying the content following the rubric was very difficult and consumed more time than usual, the students were used to solve a number of exercises without having to read the theoretical part, they were only used to the application when solving any problem, for that the student have to read the content more thoroughly.

Table 16
The Difficulties that Face the Students While Using the Rubric.

Students' perspective	Frequency	Percentage
Using the rubric requires a lot of work.	4	27%
Using the rubric requires using language to explain every step followed in solving any problem.	1	7%
The time of applying the rubric was not suitable.	2	13%
The rubric is very long and complicated to understand.	7	46%
Using the rubric was without any difficulty.	1	7%

On the other hand one student pointed that using the rubric was very difficult especially on the part that they should explain what and how did they solve the problem, the students are not use to use language in mathematics in order to analyse data, and present them orally and written format .

Some students contribute the difficulties they face to the time of using the rubric, they claimed that presenting this rubric in the third semester was not a good choice, as the students are not ready to experiment a new method; they were worried about passing the course.

According to some students the rubric is very long and complicated, every exercise consumes a lot of time to complete it, and inconsequently the students were not able to solve many exercises. And some students report that they didn't solve all the questions in exam because the time was not enough to solve the question with all the required details.

Some students found that the scoring strategy of the rubric is very difficult, as the teacher designed the exam in a way that the questions have unequal scores however, the rubric designed to assess each question with a fixed score that equals 10. Question 1 equals two points, Question 2 equals three points and Question 3 equals five points. Students faced difficulty in the conversion of scores for each question. Therefore, the students marked each question out of 10 and the teacher did the necessary conversions.

To sum up, the student faced many difficulties while using the rubric such as, First: the students had to study more the theory in order to explain everything; second the rubric was very difficult the students didn't understand it, In addition they found its scoring strategy very complicated Finally, they had to use the mathematical language while they are not accustomed.

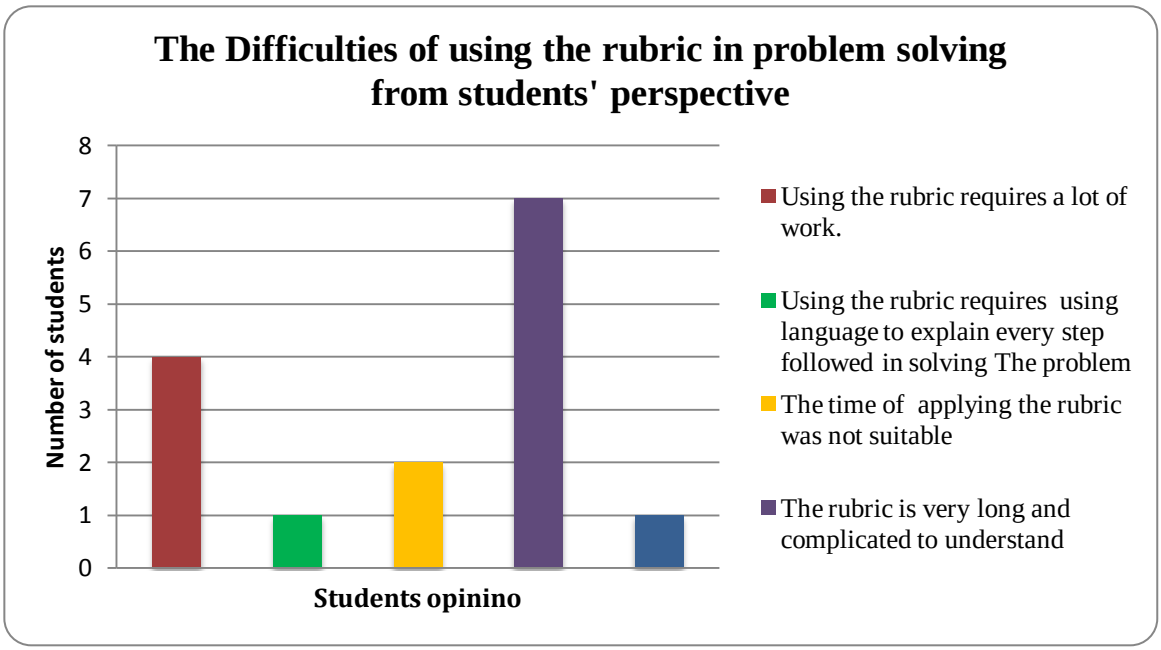


Figure 20. The difficulties of using the rubric in problem solving from students' perspective.

2.1.10.4. What are the rubrics effects on my peers?

Some students perceive that the rubric enhanced their peers' grades, according to the students answering any question following the rubric requires a lot of work in order to solve any question, they had to study the content day by day, and consequently they understand the content very well.

Table 17
The Effect of Using the Rubric from Students' perspective

Students' perspective	Frequency	percentage
Negative	5	34%
Positive	6	40%
In some cases positive and other cases negative	2	13%
No answer	2	13%

In favour of the rubric the Some students asserted that using the rubric make the student always have some grades, it's very difficult to have a zero, since this method evaluate students mathematical knowledge and strategic knowledge and explanation. On the other hand some student argued that it's very difficult to solve the question with all the required details in order to reach the high quality that the rubric require, and for that having a full mark was very difficult.

One student wrote, "Using the rubric affect the students' grades badly".

Some students were not sure about the effect of the rubric on their partners. One student asserted, "Some students got lower grades than usual, but others got higher than usual, and cost them less effort".

Other student noted "In some cases it was good, and in some cases it was bad, for out of time and the need to explain everything".

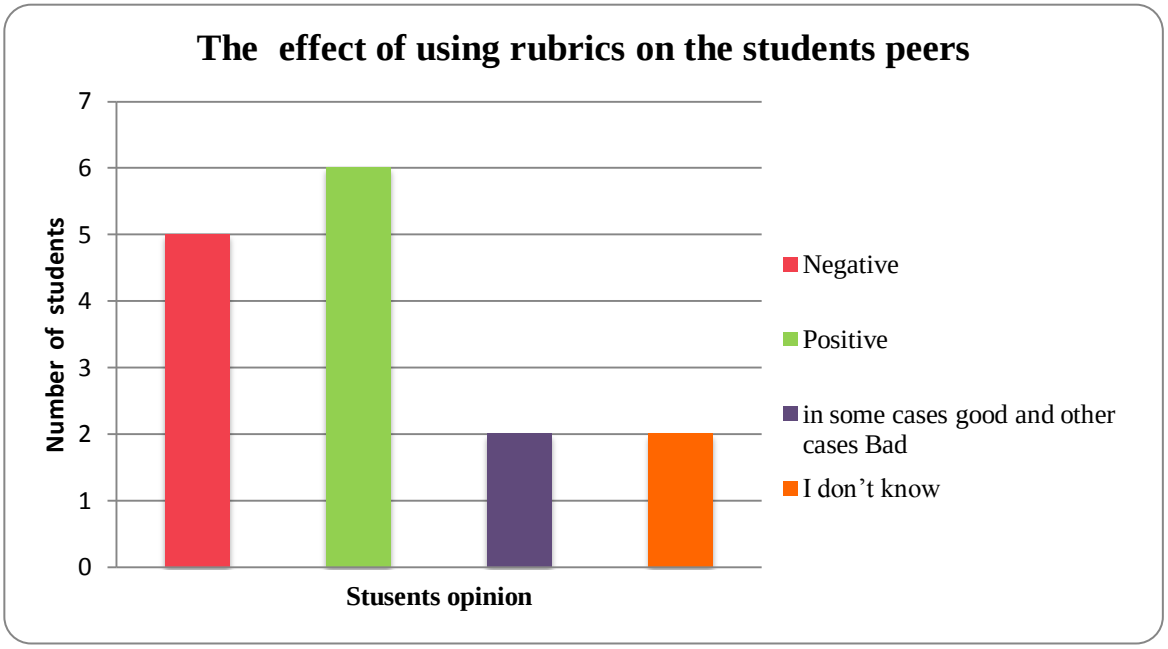


Figure 21. The Effect of Using the Rubric from Students' perspective.

To conclude students' opinion about the effect of using the rubric on their peers was classified in 3 parts, the first part and the biggest, asserted that the rubric affect their class partner positively in a way that they got higher grades and they understood the subject more, the second part saw that the rubric affect their class partners negatively, they get lower scores. And the third part added that with some students the effect was positive and with other the effect was negative, some students' grades were less than usual, but other got better than they got usual, and also cost them less time and effort.

2.1.10.5. What is needed to enhance this rubric?

The students gave many recommendations to enhance this rubric; the following table shows their main ideas.

Table18

How Can we Enhance this Rubric

Student perspectives	Frequency	Percentages
Redesign the rubric to be shorter	7	47%
Rewrite the rubric to be easier	2	13%
Use the rubric in earlier stages and provide the students with more training	3	20%
Enhance the rubric scoring strategy	1	7%
No answer	2	13%

47% of the students wrote that in order to enhance this rubric it should be redesigned to be shorter as it's very long, taking in consecration to remove some parts as the students found it very long and has a lot of repeated parts. And recommended to remove the third part that require explaining. And design it in ways that don't require a lot of work.

Also some students advised to rewrite this rubric to be easier to understand. As the students were not used to this form of assessment, they found it difficult and they asked for more training on using the rubric, also more training in assessing their peers. In addition some students recommended using the rubric in earlier stages and with all the subjects in order to get used to it.

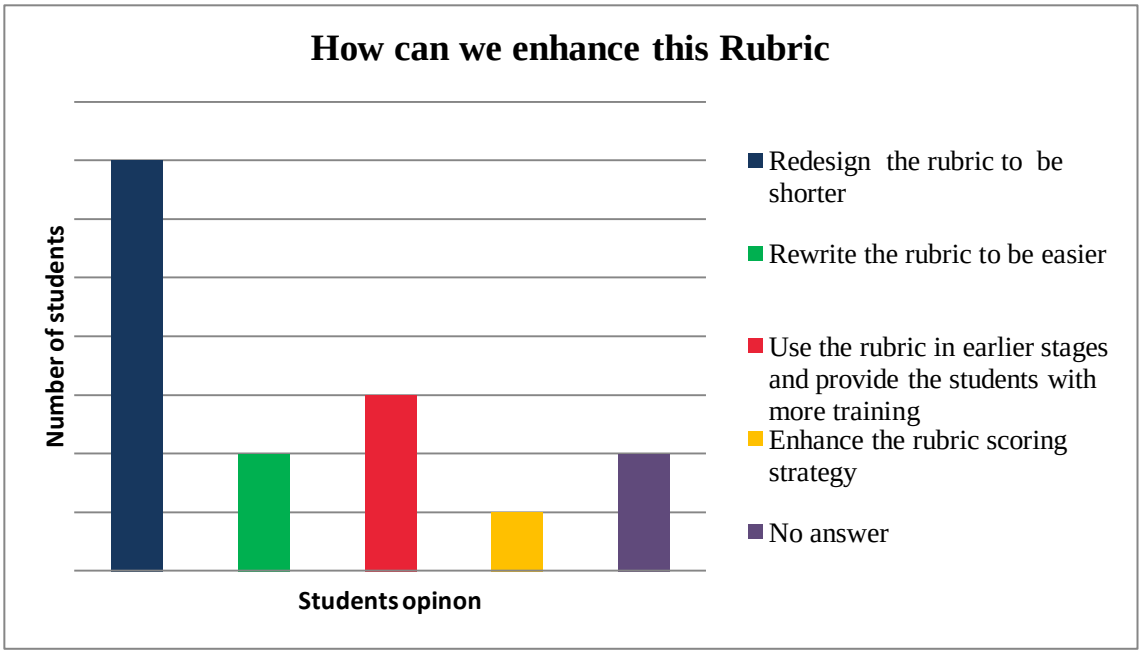


Figure 22. How can we enhance this rubric?

To sum up students made some recommendations in order to enhance the rubric:

- Students asked for more training and practice of using rubrics in general and this rubric in specific.

- Students recommended introducing rubrics at early stages in their education such as primary stages.
- Students asked for better design of this rubric. Students suggest designing the rubric in a way that does not require detailed explanation and much study from students. In addition, they advise to make it shorter by removing some sections. Some students recommend enhancing the scoring system.

*The teacher commented after reading the opinions of her students after using the rubric:

The teacher commented after reading the opinions of her students after using the rubric, she agreed that rubric should be used in earlier stages and with all the subjects, in order for the students to get used to it, and to use it mechanically.

- I completely agree with the students that rubric should be used in an earlier stages, I think it is important to put a rubric for all the classes in general, for the student to use it correctly and easily (DTA).
- And she also agreed with her students that using the rubric made them put more effort to answer every question as the rubric require, and that's good as it make them study more .
- She also agreed that using the rubric help the students to get some grades, as it does not only evaluate the final solution.
- In addition, she agreed that the students repeat a lot of thing when solving many exercises following the rubric.
- The teacher also agreed with her students the rubric was difficult to understand, it should be written in a language that the students could understand.
- She also agreed that using the rubric consume a lot of time, as the students have to write many details according to the rubric, which consume a lot of time.
- I agree with the student that the rubric consume a lot of time in the exam (DTA).
- The teacher also agreed that one of the advantages of the rubric that it's very difficult to answer any question completes as the rubric require, for that it's very

difficult to have a full mark , She agreed that the rubric enhanced the students leaning.

- Many students commented that they learned more with the rubric (DTA).

On the other hand, the teacher disagreed with the students who think that the rubric should be enhanced in a way that does not oblige them to study the content. She noted that one of its advantages.

In addition, she disagreed with the students, who think that the rubric should be enhanced by removing the explanation part (3column); she noted that this is a very important part.

2.2. Case 2: Teacher B

In this part the results of *teacher B* data analysis is presented.

2.2.1. Beliefs about competences evaluation

The teacher asserted the evaluation of competences is not new, she believes that it is poorly structured, as they ask the teacher to evaluate student's skills in all the subjects together and then they asked him to put single number for every subject in order to put it in his record. Which is very difficult?

According to the teacher this type of evaluation is legislated but on the reality it is not applied as it is written, it is applied randomly. Every teacher applies it in his own way; because it is not something that is regulated, well it is legislated admitted the teacher. However, the thing that it is so subjective; every teacher adapts it in his way.

She added that, this form of assessment could be used in a school where the teacher can teach all the subjects, and without having to put a numerical grade. It is better to use it in primary since the grades at the high school are very important in order to have a scholarship or on determining the degree that the students can have.

2.2.2. Teachers' beliefs about assessment

Teachers' beliefs are presented in six sections; they are beliefs about the forms of assessment, benefits from evaluation, the relationship between learning and teaching

and assessment, students learning, the purpose of assessment, and assessment for learning.

2.2.2.1. Beliefs about the forms of assessment

The teacher clarified that the department of mathematics sets the evaluation methods; all teachers should follow the department regulations, she beliefs that it hinders using new forms of assessment.

Table 19
Beliefs About the Forms of Assessment

Beliefs about groups work and projects.
Beliefs about Inviting parents to participate in group work
Beliefs about the rubric.
Beliefs about self and peer assessment.
Beliefs about Exam.

She added that no exist a perfect assessment method. Every group of students has a way to learn. For that, the teacher should try to work according to the group he/she has, as there is a lot of diversity among students, sometimes the teacher have to evaluate the daily work, and some time when the group of students has a high abilities then he should not concentrate a lot about daily work. She said that every student is world, and the teacher has to respect the individual differences.

There is a lot of diversity among students; you cannot say that there is a stander method to evaluate all the students, every student is a world, and this is the difficulty of diversity (IS3TB, p.46: [11:51-12:40]).

The teacher asserted that there is a lot of diversity, there are no a stander method for all the students, every student is unique, and it is very difficult to evaluate taking in consideration that diversity. Teachers have to be up to date to all the new methods, especially these days where there is a lot of diversity.

You have to be open to the new assessment forms, now a day's more because they are a lot of diversity among students (IS2TB, p.39:[09:18-09:30]).

According to the teacher, no exist a strategy that can be 100% fair and reliable, they are trying what they can and what they think is better, they are trying to use collaborative and group work.

I do not believe that there is one perfect method; we should try to use all of them (IS2TB, p.39: [09:18-09:30]).

She also noted that using any assessment strategy depend on the group of students that you have, if the group accept to participate in a new form of assessment, well it's great, but if the group of the students refused to use new forms, the teacher have to evaluate as usual with exams.

On the other hand, she said that she does not prefer using many evaluation methods for two reasons: first, using many evaluation methods require a lot of work. Second, the evaluation strategies are established by the law, the teacher does not have choice in this matter.

2.2.2.1.1. Beliefs about group work and projects

The teacher said that she sometimes use group work, sporadically, because in the group work always one of the group do all the work and the other don't do anything, or work less, the work is not the same.

In addition, she noted that new forms of assessment could be used if the department does not oblige the teacher to do a lot of administrative work, and to put a numerical grade.

She gave the following example: "I have a friend in *Benalúa* of the *Villas*, a town of Jaen, he worked with his own materials, and he did not work with textbooks, he worked in projects in his own way. He told his students let build a house, what do we need? What materials do we need? We need a model, measures of math "What capacity should have the bathtub in order To see how much water can have. We need to Use physics, we need to use all the subjects" (IS3TB, p.48. [21:04 - 23:04]).

The project work had a good result of this kind of centers were the students had problems of motivation, It's a good idea to use this way, but it's very difficult to evaluate such work, how can we put a numerical grade?

In addition, the teacher beliefs that the work of project is more effective in the primary stage where there are a high number of schools leaving. " It's more suitable for the first and the second of the ESO, where there are a lot of school abandon, it's a way to

motivate the students to keep them continue their study, this type of assessment could have success at the school that have a high number of school abandon" (IS3TB, p.49: [24:07-24:58]).

According to the teacher, some teachers' tried to use projects at the school, but it did not give any result. She thinks that the project work is not suitable for the secondary stage as they have many teachers, and every subject have more than one teacher. It's very difficult to make all the teacher work in one project, she thinks that the work by project is more suitable for the primary stage since in this stage there are not a lot of teachers in the same group.

2.2.2.1.2. Beliefs about inviting parents to participate in group work

Some teachers invited parents to participate in-group work among the class, it is as an aid for the parents to see how the work goes, its collaborative work between teachers, parents, but according to the teacher that can be done sporadically not every day because: First, not all parents are willing to participate; second, they do not have free time. Finally, it consumes a lot of effort a lot of effort.

2.2.2.1.3. Beliefs about the rubrics

The rubric was a new form of assessment for the teacher and her students, according to the teacher, the students were motivated to use rubric, but after using it they found that it is very difficult, it requires a lot of work.

Using rubric costs a lot of effort and I had to give them instructions because they cannot assign a numerical grade to each section (DTB).

In addition, added that they resist the way of correcting by rubric, the majority of them failed in the explanation part.

The teacher said that the most important part of this rubric is that it requires that the student give a written or oral explanation to his/her work, as reasoning in mathematics is very important. The rubric forced them to think why they are doing that in mathematics, not just doing it mechanically.

She added that in this way evaluation could be used to enhance learning, the evaluation that requires explaining every step.

I believe that yes, it can enhance students learning, and they will keep this learning they will not forget it (IS3TB, p.43: [02:42-02:55]).

The teacher complained that this method "rubric" consumes a lot of time , she believes that it's better to use it with a small number of students, it consume a lot of time and effort from the teacher. In addition, it is very difficult to assign a number to every block.

The teacher used to evaluate her student with a similar paper but she did not put grades only a descriptive evaluation such as good /bad/excellent. However, the rubric requires a numerical number, which is more objective.

I think it needs a lot of work, and consume a lot of time (IS3TB, p.45: [07:45-08:17]).

Also she added that the students do not know how to assess, they don't know how to put a numerical grade, Sometimes there were discrepancies on the results, in some cases the professor put (7) and the students put (5) or vice versa, they do not know how to assess.

She also noted the using the rubric decreased the grade of the students (DTB), as the students are not accustomed to explain every step they follow.

The student found many difficulties in explaining the steps they follow to solve the problem (DTB).

she added that it was difficult to auto evaluate using the rubric as its complicated to assign a number to each block, also using the rubric consume a lot of effort and time (DTB)

According to the teacher this rubric did not help the students to enhance their grades; the student who used to have a good grades kept having it, and the students who had bad grades continue failing. It does not have a good effect on the students' grades for her as teacher it gives a numerical grade to each section which is objective, not random. It is not as subjective as before.

She noted that she will not make any changes in this rubric, she said : " I think it's good, it's simple, it addresses three components, three blocks of content that you have to evaluate, adding more blocks will require more calculations, therefore would not serve the purpose" (IS2TB, p.42:[11:18-11:42]).

The student done the exercises using the rubric without help from the teacher (in groups), it has been a good experience that every student find his failures through self-assess (DTB).

The teacher believes that this rubric would help her students to write more, at least when they solve problems, to write how did they solve it, to use the written language. In mathematics a lot of time, they put the operation without writing why, in this way they will make more effort in using the written and the oral expression in mathematics.

> "The rubric is a suitable method for competences evaluation" (IS4TB, p.54: [07:32-07:38]).

She added that she used to use a paper that is very similar to the rubric, but she thinks that the rubric is more subjective as the teacher have to put numerical grade not randomly as the evaluation paper that she use.

Also while using the rubric she noted that sometimes the students solve the problems mechanically without thinking, evaluating in this way make them stop a while to see what they have to do and why (DTB).

2.2.2.1.4. Beliefs about peer and self- assessment

According to the teacher, using peer assessment with the rubric was very difficult, the students do not have any experience in evaluating each other work, also it was very difficult to follow the rubric while correcting. She added that some of them were honest and others put a grade that was higher or lower than the real grade, they do not know how to assess and some of them gave up and said why I have to do this.

On the diary, the teacher wrote, "The student done the exercises without help from the teacher (in groups), it has been a good experience that every student was able to find his failures through self-assess" (DTB).

Also she added that this type of assessment don’t save the teacher time , as she have to revise all the exams after the students, and also comparing the grades that they put with the grades that she put don’t serve them in anything .

I think that the auto evaluation does not have any advantages, because the teacher has to correct after the students, it is a double work for the teacher (IS3TB, p.47: [18:11-18:27]).

She asserted that this type of assessment does not serve the teacher and her students; it only makes them see that assessment is not easy. Nevertheless, she added that it is something relative, it depends on the teacher of her students, and it can work with others.

2.2.2.1.5. Beliefs about the exams

The teacher clarified that normally she use exams to evaluate her students work, other forms of assessment are important, but what happens is that that they give more weight to the exam, as it help the teacher to see if her/his students understand or not.

The students don't assimilate and understand the concept if they don't have an exam where they had to study to pass it, for that the exams have the highest percentage, 70% exams and 30% rest" attitude, notebook, behavior and homework."

Also she said that periodic chapter tests are necessary to assimilate and consolidate the concept, in order to use it in the future, the teacher have to establish a solid base , it's very important in mathematics.

2.2.2.2. Beliefs about benefits from evaluation

In this part, the benefits from evaluation for the teachers and the students are presented.

2.2.2.2.1. For the students

When the teacher was asked about the benefit that the students could obtain from evaluation, she answered that the students feel satisfaction of learning new things, besides they have a grade.

She noted that evaluation provide us (teachers, students, parents) with a numerical grade, this grade for example in high school can help to determine what the student can study, and can help them to have a scholarship.

Also she added that if the students saw that the new evaluation method help them to enhance their learning, it's very good, it gives them satisfaction, the student enjoy when they learn new things and apply it to the daily life.

I think if the students saw that the assessment method that the teachers use helps them to enhance their learning, they get a lot of satisfaction. For example when they solve a problem they say "look it can be solved like this", they enjoy when they saw the application of what they are studying (IS3TB, p.44: [05:38-06:06]).

The teacher noted that the students did not have any benefits from using the rubric; because it requires a lot of work from the students, they did not like it. On the other hand, it did not have effect on the student's grade, the student who used to have a good grades they keep having it and the students who had bad grades continue failing.

She added that in order for the students to get benefit from evaluation each student must know the score of each question, and why he didn't get a full mark, whether he miss the concept, the application or the explanation.

She pointed that the evaluation is a way to make a pressure on the students to make them study. In addition, it may help them to see their progress. Otherwise, they do not get any benefit.

2.2.2.2.2. For the teacher

According to the teacher the benefit that the teacher have according to the teacher that if the student respond and was motivated, worked well, respond to all the activates, and participate; obviously it's a pleasure, if they have a group that are not motivated then no.

On the other hand, the evaluation help the teacher to see how her students advanced in their learning, and using the rubric helped her to put numerical number, and this way is more subjective.

Also while using the rubric she noted that sometimes the students solve the problems mechanically without thinking, evaluating in this way make them stop a while to see what they have to do and why (DTB).

2.2.2.3. Beliefs about the purpose of assessment

From the teacher Diary and interviews the following categories were addressed.

Table 20
Beliefs About the Purpose of Assessment.

- Assessment as measurement.
- Assessment as motivation.
- Assessment for accountability.
- Assessment for diagnostic.
- Assessment support learning.

2.2.2.3.1. Assessment as measurement

Assessment is a method to see how the students progress on their learning. a also provide us (teachers, students, parents) with a grade or a numerical grade, this grade for example in high school can help to determine what the student can study, and can help them to have a scholarship.

She complained that in mathematics they taught them to assign a numerical number according to the students progress in their learning, she argued that this is wrong, they have to see students effort and if they have acquired anything from what they have learned.

2.2.2.3.2. Assessment as motivation

Although exams are the most used method in the classrooms in Spain, recently, they are investigating the group work, where the teacher divide the class into small groups and assign a task to each member of the group, and evaluate the whole group work, it is a way to motivate and encourage the students to participation. Especially, the student that who is not motivated to work. For that reason, the teachers have to investigate new methods.

Other teachers tried to invite parents to participate in group work among class, to see how the work goes and participate in the evaluation, and also to motivate the students, but it can be used sporadically not all the parents are willing and have the time to participate.

She added that before choosing an evaluation method she thinks if her students will understand it, if it is suitable for the goals that she want, and she think of the kind of motivation the she had to give to make her students do things right.

We have to think of the assessment method that motivate the students, and make them make their effort to enhance their learning (IS1TB, p.39: [10:58-11:22]).

She also said that, not only the students need motivation also teachers. They need something to give them satisfaction, for example, this year the teacher and her students participated on a statistical contest and they won an award, the students were highly motivated, and they saw how what they learn in class have application in real life, according to the teacher this gave her a lot of satisfaction.

> Evaluation could be used as motivation, this year we won an award, this gave us a satisfaction and motivation, and we participated in a statistical contest this is also gave us a motivation (IS2TB, p.41: [06:45-07:19]).

She added that the teacher have to find the strategy that motivate students , for example she said they participated in recording some videos for the science exposition and this motivate them, because they saw that what they are learning can be applied in everyday life.

In addition, the teacher can motivate the students by incentives. As they always, ask, if I did this, will you put me a good grade? It is a way to stimulate them. For example, the teacher will say, who finishes first the work, will get a point and, it is a way to motivate them

2.2.2.3.3. Assessment for accountability

The teacher asserted that she can't apply new forms of assessment as it's all established from the department of mathematics; she said that it's better to follow the department methods, specially recently there are many complaints from parents regarding assessment. They ask "Why my child is suspended?" the teacher can answer "we follow the department regulations". So it is not easy to use any new method in the middle of the course, the teacher should present it at the begging of the year to the department and the parents to accept it.

She added that inviting the parents to participate in-group work among the class will help the parents to see how the work goes and they can understand the grade that the student got. Normally when the teacher said to the parents that your sons do not work they do not believe, in this way they will have better idea about the students work.

2.2.2.3.4. Assessment for diagnostic

According to the teacher, assessment can help the teacher to see if the students have what they need (concepts, skills…etc) in order to continue learning, and to see if there are facing any problems.

In addition, teacher use assessment to help them see the weakness and the power points of their practices. She said that, a group of teachers agreed to record a class that was done by group work, and every teacher present his recorded class to the other teachers and try to make a discussion about how to enhance it in the future.

She added that through self-assessment students find their own failures. Moreover, try to overcome the difficulties they face.

2.2.2.3.5. Assessment support learning

In mathematics evaluation the teacher should concentrate that the students have the type of learning based on reasoning and rationale mechanisms, apply what he learn into real life, and see if they kept what they learn and that they did not forgot it.

In addition, added that evaluation can enhance students learning if teachers concentrate on of the evaluation that based on reasoning, that force students to explain and justify the way that they solved the problem. In addition, every student must know the score of each question, and why he did not get a full mark, whether he miss the concept, the application or the explanation.

If the teacher make her student participate a lot at class, and make some students give a class it will help the student learn more. Moreover, she added that participating in contests and exhibition support students learning as they can see how what they learn can be applied en everyday life.

Moreover, she added that evaluation is used to make a pressure to make the students work and study every day.

"I believe that the assessment is a way to make pressure on the students to study" (IS2TB, p.40: [00:54-01:15]).

2.2.3. Beliefs about students learning

The teacher beliefs that every student has his own way of learning, for that the teacher has to use evaluation method that is suitable for his group of students, she added that now a days there is a lot of diversity for that teacher cannot only use one method to assess all the students the someway.

You cannot say that there is a stander assessment method, every student is a world, and this is the diversity difficulties (IS1TB, p. 36: [11:51-12:40]).

She noted that, the students don't make any effort to think about any problem, and do things mechanically; as a result they don't explain the reason they solve the problem this way, and they don't apply these math problem on a real situation, it's very difficult for them to adapt or use mathematics in real world situation.

Through my experience as a mathematics teacher, I noticed that the student every year study and think less than before, they do things mechanically, for that they don't explain the reason for solving the problem this way, in mathematics the students find it difficult to apply what they are studying at the real world (IS1TB, p.37:[01:11-01:37]).

If the student saw that the method that the teacher use to evaluate them helped them to enhance their learning and raised their score they will be very satisfied, the student enjoy when they learn new things and apply it to the daily life.

She also added that the student don't assimilate and understand the subject until they have an exam, where they had to study to pass it, otherwise they don't study , for that she thinks that the evaluation is a way to make a pressure on the students to study.

Students enjoy and learn more when teacher participate on activities outside the classroom, for example they s participated on a statistical contest, and they won an award, the students were highly motivated, and they saw that what they learn in class have application in real life; according to the teacher this gave her a lot of satisfaction.

The teacher also thinks that students cannot use self and peer assessment, as they do not know how to assess, and make problems among students, but she think that this form of assessment makes the student aware that the evaluation process is not easy.

Sharing the student with evaluation is very difficult, as they do not know how to evaluate, for that it took a lot of time from the students also from the teacher that has to revise all of their evaluations. In addition that the student do not gain any benefit from that process.

2.2.4. Beliefs about assessment for leaning

In mathematics, it is very important to revise and to make sure that the students have what they need to continue learning. For that it's important that the teacher assess the previous knowledge that the students need to continue their learning, according to the teacher, a subject is like a house, in order to build it well you have to start from the ground and start building, and make sure that it's all go well until you reach the roof.

In mathematics, it is very important to ask the students about what they took the last class, she clarified that they do this daily, asking question or letting some students to solve a question on the bored.

Assessment depend a lot on the students that you have, every student have to know the mark of every question, and why he/she didn't get a full mark, if they miss the concept or the application (IS1TB, p.37:[00:25-00:49]).

According to the teacher, reasoning in mathematics is very important, she added that the explanation part of the rubric is very interesting because it requires giving a written and oral explanation, it forces them to think why they are doing that in mathematics, not just doing it mechanically.

It's important that the students explain their solutions, and apply it to real life situation, it's not enough to put two or three question in the exam in order to see the application of the concept (IS1TB, p.37: [01:45-02:07]).

In addition, she added that in mathematics the teacher should concentrate on the strategies they use to address a problem, explaining every step, what they know, what they have to do and why?

Teachers have to think of the evaluation method that makes the students motivated, in order to enhance their work.

She complained that in mathematics they taught them to assign a numerical number according to the students' progress in their learning, she argued that this is wrong, they have to see students effort and if they have acquired anything from what they have learned.

The teacher clarified that she make sure that her students understand by making them participate on class, solve problems on the board, and let some brave students give class to the students, in this way she see if they have understand or no.

Moreover, she added that they try to make their strategy of evaluation fair, in the final exam I try to put many questions to make it fair, and to be suitable for all the students, none of my students claimed for his final grade.

It is very important to share the students with the evaluation criteria said the teacher, at the beginning of the course, she give the students a list of criteria of evaluation; they know perfectly how they are going to be evaluated and what they have to do.

The teacher also thinks that students cannot use self and peer assessment, as they do not know how to assess, and make problems among students, but she think that this form of assessment makes the student aware that the evaluation process is not easy.

Sharing the student with evaluation is very difficult, as they do not know how to evaluate, for that it took a lot of time from the students also from the teacher that has to revise all of their evaluations. In addition that the student do not gain any benefit from that process.

2.2.5. Beliefs about the relationship between learning and teaching and assessment

According to the teacher, there is a relationship between teaching and learning and assessment, but the students do not see this relation.

I believe that the learning and teaching are connected with the evaluation, but she think that the students interrupt it as a way of passing the course (IS4TB, p.51: [00:10-00:23]).

2.2.6. Changes in teacher's beliefs related to the use of rubric

The following table illustrates the effect of using rubric on teacher's beliefs; some changes could be noticed,

Table 21

Changes in Teacher's Beliefs Related to the Use of Rubric

Subject	Teacher's beliefs before using the rubric	Teacher's beliefs after using the rubric
*Forms of assessment "Exam"	*We use more the exam, because it is where you really see if they have assimilated what they are learning or not. When you are in class you can take and look at their notebook, but they do not assimilate the concept until they have to study for the exam. For that, the exams have the highest percentage 70% test and 30% rest, attitude, notebook, behavior and homework.	* In mathematics they taught us to assign a numerical number according to the students progress in their learning through exams, she argued that this is wrong, they have to see students effort and if they have acquired anything from what they have learned. *We are now investigating new form of assessment such as group work, the teacher divide the class into small group, and assign work for every member of the group, this is a way to encourage students to work more, and to motivate them, we have to investigate new forms of assessment. * I don't think that there is evaluation method fair and reliable , that evaluate students work better than the others, we have to use all of them occasionally * No exit the evaluation method that is standard, every group of students has its own way of learning, *"hay que ir sobre la marcha"*. There is a lot of diversity, so you cannot say that there is a standard evaluation tool, Every student is a world, then you have to assess taking in consideration these differences among the students, it is one of the diversity difficulties.
*Do you prefer using more than one assessment tool?	*I do not like to use one than one method because *"porque los lías"*, the students had to have all the evaluation methodologies and criteria at the beginning of the year.	*There is a standard evaluation method; the teacher has to look for the evaluation methods that are suitable for his students.

Subject	Teacher's beliefs before using the rubric	Teacher's beliefs after using the rubric
		*There is a lot of diversity, so you cannot say that there is a standard evaluation tool, Every student is a world. Then you have to assess taking in consideration these differences among the students, it is one of the diversity difficulties. *The teacher has to look for the evaluation method that would encourage the students to work, and to motivate them.
* The questions that the teacher should ask himself before using an evaluation tool.	Teacher should ask if it would be good or bad, if they will understand it. I will think of the evaluation method that will make them do effort to learn, what kind of motivation the teacher have to give her students in order to work better.	*In mathematics it is very important that the students know what they are doing and why. Teacher should ask above all in mathematics reasoning. The explanation part of the rubric is very interesting because it requires giving a written and oral explanation; it forces them to think why they are doing that in mathematics, not just doing it mechanically.
* The benefits that teacher have from evaluation.	*It is a way to see the students' progress in their learning.	*Well, it has a way to see if the student has obtained the necessary learning based on their own way of reasoning mechanisms, application to real life, and to see if they retain this learning and that they did not forget it.
* The benefits that students have from evaluation.	*No, it is a way to make pressure on the students in order to study.	*Clearly, satisfaction of learning new things, applying them, besides having a final note. *Well I think if they see that the tool you are using is going to help them to make further progress in learning new things, new concepts and applications, then great, it s great satisfaction for the students when they new thing and see how it's used in real life.
* The objective of students'	*We were taught to put a numerical number for the student progress on	*I think this is wrong because we have to evaluate students effort,

Subject	Teacher's beliefs before using the rubric	Teacher's beliefs after using the rubric
evaluation?	their learning.	and if they retained and still have what we tried to teach them
* The advantages of peer assessment.	*Save teachers time and effort.	*Well, it does not save teacher time and effort because teachers have to revise what students did another time. The only advantage that the students can see that the evaluation is not easy. *I do not see advantages of this type of assessment it requires a lot of work, and consume a lot of time. *As the students do not know how to evaluate this type of assessment was not useful for them. *I do not think that the students can have any benefit from this type of evaluation.
*Do you think that the evaluation could be used to enhance learning?	*No, it is a way to make pressure on the students in order to study. *It is a way to see the students' progress in their learning.	*Well the evaluation that based on the explication helps the students to retain what the learn more and enhance students learning.

Before using the rubric the teacher asserted that she use exams to evaluate her students, because it's the most suitable method were teachers can see if there students understand an assimilate the concept, for that reason 70% of the students grade come from their grades on written exams.

After using the rubric a little change in her beliefs can be noticed, she complained that they were tough to evaluate student's progress by exams and giving him /her numerical number according to his progress in learning, which is wrong. She argued that, teacher should concentrate on evaluating students effort, and evaluate if the students have acquired what teacher want them to learn, and if they can use it in real life situation, and obviously this cannot be evaluated by exam.

Also she said that now they investigating new form of assessment such as group work, the teacher divide the class into small group, and assign work for every member of the

group, this is a way to encourage students to work more, and to motivate them, "We have to investigate new forms of assessment" (IS3TB, p.46:[12:45-13:11]).

In addition, she said that she does not believe that there is an evaluation method totally fair and reliable, that evaluates students work better than the others do, and added that they have to use all of them occasionally.

She also noted that as there is a lot of diversity among students, teachers cant only use one method to evaluate all the students, teachers can't say that that there is a standard evaluation tool.

Every student is a world, then you have to assess taking in consideration these differences among the students, it is one of the diversity difficulties (IS3TB, p.46. [11:51-12:40]).

Before using the rubric, the teacher was satisfied with the traditional method, after using the rubric the teacher noted,

Well we are accustomed to use traditional forms of assessment, what happen that its difficult for us to change, but it's important to use other forms (IS4TB, p.52:[01:14-01:34]).

The teacher before using the rubric asserted that, using more than one method because it is a lot of work and it will make them get confused. For that reason she said that she do not prefer using more than one method. In addition, she noted that the students had to have all the evaluation methodologies and criteria at the beginning of the year. After using the rubric, she said, "The teacher has to look for the evaluation method that would encourage the students to work and to motivate them" (IS1TB, p.39: [10:58-11:22]).

In addition, teachers have to look for the evaluation methods that are more suitable for their students. There is a standard evaluation method; the teacher has to look for the evaluation methods that are suitable for his students" (IS3TB, p.46: [11:51-12:40]).

In addition, she said that teachers have to continue searching for new methods that make the students work better, then we cannot only use on method we should use every method for a while.

Before using the rubric, the teacher believed that the most important question to ask her before using any evaluation method was if this method is good for the students. Will they understand it? What is evaluation method that will make the students do more effort to learn, what kind of motivation the teacher have to give the students in order to work better. After using the rubric, the teacher said that she would look for the evaluation method that assess if the students know what they are doing and why. And if they can explain and reason what they are doing, "The explanation part of the rubric is very interesting because it requires giving a written and oral explanation; it forces them to think why they are doing that in mathematics, not just doing it mechanically" (IS3TB, p.43:[02:10-02:34]).

Before using the rubric, the teacher said that the only benefit that teachers gain from evaluation is that it forces the students to study and a way to see the students' progress in their learning. After using the rubric, she said that evaluation helps the teacher to see if the student has obtained the necessary learning based on their own way of reasoning mechanisms, application to real life, and to see if they retain this learning and that they did not forget it.

And about the benefits that students have from evaluation, before using the rubric she said that they only benefit is that the students have a numerical grade, that can help the in the future to apply for a scholarship or to inter a certain faculty. After using the rubric the teacher asserted that evaluation, give the student satisfaction, satisfaction of learning new things, applying them, besides having a final note. if the students saw that the evaluation tool you their teacher is using is going to help them to make further progress in learning new things, new concepts and applications, then great, it's great satisfaction for the students when they learn new thing and see how it's used in real life.

About the objective of the evaluation process, she said that it is for assigning numerical number for the student progress on their learning. After using the rubric she said that But I think this is wrong because we have to evaluate students effort, and if they retained and still have what we tried to teach them.

Before using the rubric the teacher the teacher said that peer and self- evaluation saves teacher time and effort, after using the rubric she said that it doesn't save teacher time and effort because teacher has to revise what students did another time. Do not save

anything, the only advantage that the students can see that the evaluation is not easy. As the students do not know how to assess their work, the teachers do not think that the students get benefit from this type of evaluation.

Before using the rubric the teacher believed that assessment could be used to enhance student learning, she said that it is a way to make pressure on the students in order to study. In addition, it is a way to see the students' progress in their learning.

After using the rubric, the teacher said that the evaluation that is based on explaining every step they follow to solve any problem, help the students to learn more and retains what they are learning.

2.2.7. Forms of assessment that teachers use to assess their student

At the beginning of the school year the teacher provide her students with a set of the evaluation criteria that she's going to follow all the academic year, From the teacher point of view this help the students to know what is going to be evaluated and how, but in the same time Impede using new forms of assessment.

According to the teacher 70% of the students' grade (dedicated for the content) is evaluated by written exams, and the remaining 30% (dedicated for Daily work, Homework, and attitudes in class and towards the subject) is evaluated by indefinite strategies,

The following table presents the assessment strategies that the teacher follow to evaluate her student:

Table 22

The Assessment Strategies That the Teacher Follow to Evaluate her Student

- Direct observation in the classroom.
- Group work.
- Presentations, presents a topic, how do they express orally to the public.
- Tests of the contents.
- Special evaluation form "*Hoja de evaluación*"**.**
- Invite parents to participate in-group work among the class**.**
- Collaborative work**.**
- Project.
- Peer assessment.
- Activates outside the classroom "*contest*".

Although the most common method to evaluate students work in Spain is the exam, the teacher pointed that recently they are investigating the group work in which the teacher divides the class in to groups and assigns a task to every member of the group.

The teacher asserted that, recently there are many calls to use competencies based evaluation instead of content-based evaluation. This year they received some training from the center about how to evaluate competences rather than blocks of contents; they showed them some classes in which they used group and collaborative work, some teacher tried to use it, but it's (still green) under investigation.

Well now there is a new modality which is to assess by competency, then it is still very green (little used) (IS3TB, p. 45: [10:51-11:03]).

She clarified that competences based evaluation focus on the competences that the students should master in a certain grade, such as scientific, society, citizenship, Linguistic, learning is learning "*El aprender es aprender*" competences. Also she added that in this type of evaluation there is no subject called mathematics, the teacher have to evaluate and score all the competences, for example you have to evaluate if in mathematics there is good communication language, it's a way of linking all subjects together .

The teacher clarified, the competences can be evaluated by direct observation, for example to evaluate the students' oral and written expression skills, the teacher should ask the students to go to the board and to explain the exercise to his/her peers or what he/she understands. Or learning is learning "*aprender es aprender*", the students should know "how to solve a problem"," how to teach it to others"/ "How did he get to the concept", "why do they need it?"

According to the teacher this type of evaluation is legislated but on the reality it is not applied as it is written, it is applied randomly. Every teacher applies it in his own way; because it is not something that is regulated, well it is legislated admitted the teacher. However, the thing that it is so subjective; every teacher adapts it in his way.

Competency based Assessment , let's say that there are a number of skills set by law, but what happen that it's not applied as its written its applied randomly (IS3TB, p.46:[13:19-14:10]).

When the teacher was asked if she use alternative forms of assessment, The teacher said that she sometimes use projects, groups and collaborative work, but normally she use direct observation in the classroom, problem solving strategies, group work, present a topic "how do they express orally to the public", then content exams. She normally use exam to evaluate "content blocks", she made an exam every three or four units" grouping of contents", concentrating on students ability of reasoning, explaining, expressing. The teacher confirmed that the student should be able to reason what he learn and apply it to everyday life problems , for that it's important to put at least two or three problems on each exam, in order for the students to see the application of the concept.

The teacher added, "Before I start a new subject I make sure that the students have the necessary previous ideas, if they can apply what they learn? How did they assimilate it? And how do they explain it to each other make as a professor? I make sure that my students understand the content by, asking a lot of question, let the students participate in class, solve problems at the bored, and let some students give a class as a teacher. In this way I know if they understand or no" (IS2TB, p.41: [06:19-06:37]).

Regarding the rubrics, the teacher did not have any idea about them, but when the teacher was given information about the rubric, she said that she has a paper for every student that is very similar to the rubric, it is divided to three parts: the attitude part, the procedural part and conceptual part. In the attitude part, they evaluate the teamwork, daily work, and attitude towards the subject. On the procedural part, they assess the organization, the reasoning, notebook, correcting the errors, completion of work and analysis of images, graphics, etc. In addition, the third block is conceptual part they evaluate if the students assimilate the concepts, apply them to real situations, solve problems and have a mathematical vocabulary (explains it well). The difference between that paper and the rubric according to the teacher, that the teacher does not sign a grade or a number on this paper. If the student was able to reason the concept, explained it consistently, and applied it correctly and not mechanically, the teacher assign a number randomly not explicitly. However, the rubric requires assigning a number to every section.

Furthermore, the teacher highlighted the importance for exploring and using new forms of assessment. "We have to search for a methods to motivate the students for example,

this year we participated in a statistic competition, the students were motivated, also we went to *Seville* to record some videos for the science exhibition. The students were motivated. They said, "this is what we prefer" Because they saw that what they are learning can be applied in real life situation" (IS2TB, p.42: [06:45-07:19]).

Also she said that she know some teachers who have invited parents to participate in group work among the class, its collaborative work between teachers, parents, but the teacher argued that it can be done sporadically. First, not all parents are willing to participate or they do not have free time. In addition, the second thing is the teacher has to put a lot of effort.

A part of the 30% of the students' grade comes from the student notebook. The grade of the notebook is given every semester, but daily the teacher have a look at her students notebook and check if the student did the homework and if it's clean, she doesn't assign a numerical grade daily, but she usually put expressions such as good, bad , regular or positive, negative, as a part of the daily work.

She added, "every day I put a grade but say with positive or negative, good or bad, or whatever, but I put positive and negative, every positive has an assignment. For example if you have many positive note I gave him 0.5 above his grade. The 30% of the grade is divided between the student notebooks, the students' attitude in class, daily work, behavior ... So it is a way of sharing the 30%. Then it is clear that you cannot look at all the student's notebook and put them grade you will become crazy, you can ask if they did the activities or not "Who has made them?" Moreover, if the students did it then positive otherwise negative "(IS3TB, p.50: [30:31-31:38])

The teacher complained that it is very difficult to check all the students' notebooks every day especially when they are 28 students in the class. because it will consume a lot of time. She noted that, by the experience the teacher will be able to know who always bring the homework and who does not, and assign positive to the student who usually did the work and negative for the student who usually didn't do it.

2.2.7.1. Teachers' satisfactions with traditional methods

The teacher was relatively satisfied with the traditional methods of assessment; according to the teacher, the exam is the best way to help the students to assimilate the concepts.

Because it where we know that the students understand or not, when they are at class they can look at their notebooks, but they don't assimilate the concept until they have to study for the exam, for that the exam have 70% and the other 30% is for the students attitudes at class (IS1TB, p. 38: [05:57-06:39]).

She does not prefer using more than one evaluation method as the students will get lost, according to the teacher the student have to get all the evaluation method that will be used at the begging of the academic year.

On the second interview, the teacher expressed her dissatisfaction of the traditional methods, she said that they are obliged to evaluate their students with the numerical grades buy exams, some time they are not satisfied but they are obliged.

We are obliged to assign numerical grade for every student, we can't say it's good or bad, they oblige us, sometimes we don't like it but they oblige us (IS3TB, p.49:[23:11-24:04]).

She added that there is no one method of evaluation that is perfect and suitable for all the students, every group of student has their own way of learning, then the teacher has to follow the learning way of his students.

> There is a lot of diversity among students; you cannot say that there is a stander method to evaluate all the students, every student is a world, and this is the difficulty of diversity (IS3TB, p.46: [11:51-12:40]).

The teacher noted that normally they taught us to put a numerical grade for the students advance in learning, I think it is not good, we have to see the effort that the student put and if you have acquired at least some of what we tried to teach them.

She said that this is not on the hands of the teachers this all set by the department of mathematics, all the evaluation criteria and methods in the school are fixed by the department.

> "The criteria are fixed, you have to follow them there is no another way "(IS2TB, p.44: [08:01-08:14])

2.2.7.2. Desirable forms of assessment

When the teacher was asked about the forms of assessment that she is willing to use she answered: This (Rubric) seems interesting. The teacher did not use the rubric before; actually, she did not have any idea about the rubric.

2.2.7.3. Suggestion for improving the evaluation process

In order to improve the current assessment practices the teacher suggested that the teacher should not be asked to do administrative work, the teacher complained that the department asked her to do many papers, and to concentrate on helping the students use what they learn in real life situations, by providing them with more exercises and more practice.

In addition, the teachers should not be obliged to assign a numerical number when she evaluates her students, and to have the opportunity to evaluate her students properly.

She recommended that teachers should keep searching for new methods that motivate their students. The teacher noted that teachers also need motivation not only the students; using proper new forms of assessment give the teacher satisfaction and motivation.

In addition, teachers need more information about new forms of assessment, and more courses of how to apply new forms of evaluation in mathematics.

> "The assessment could be enhanced by letting the student apply what they are learning in real life situations" (IS4TB, p.54: [08:50-09:24]).

2.2.8. Difficulties that prevent teachers from applying new forms of assessment

From the teacher diary and interviews, the teacher mentioned many difficulties that prevent or make it difficult to use new forms of assessment; the following table presents the difficulties that the teacher encountered:

Table 23

Difficulties That Prevent Teachers from Applying New Forms of Assessment

New forms of assessment consume time and effort.
Number of student in class.
Difficulties from the department of mathematics**.**
Difficulties from the evaluation system**.**
Difficulties from the students**.**
Teacher preparation.
Difficulties from the method itself**.**

2.2.8.1. Difficulties from the students

The teacher asserted that using new forms of assessment depends on the students group that you are teaching, its relative, if the group accepts to participate in a new form of assessment then it is great, but if the group refused to use new forms, you have to evaluate as usual with exams.

One day she asked the students to delete their names on their exam, and then the exams were collected and they were distributed randomly, it consumed a lot of work from the students. They do not know how to assess. Sometimes there were discrepancies on the results, in some cases, the professor put seven and the students put five, there are opposite cases, they do not know how to assess asserted the teacher. sometimes you find students who correct honestly and others put a higher or a lower grade than it should be, they don't know, it coasted them a lot of work and then they gave up and said " why should I do it?", The students didn't like to evaluate their own work or the work of their peers. They prefer that the teacher do it.

They complained a lot especially when they had to use the rubric with peer assessment, as the rubric has three blocks, they did not know how to assign a number for every block. The students were very motivated to participate with this study, but when they saw that they had to work a lot, they start to complain. Moreover, asked the teacher to correct it, and they said "don't put us in troubles with each others, as sometimes there may be discrepancies or differences between the mark that the students put and the mark that the teacher put". "For that I don't use peer assessment a lot, I found that peer assessment makes conflict among them, it's better to delete the students name and make it anonymous noted the teacher" (IS1TB, p.39: [09:44-10:01]).

In addition, the teacher said that the student-faced difficulties while using the rubric as this rubric require a lot of work from the students; it requires that the students explain everything they do, and the students are not a costumed to use mathematical language.

The teacher said that she use group work sporadically, because usually one student of the group work and the other do not do the work or on another word the work is not equal.

What happen is that the students are accustomed to solve the problem mechanically , they are not used to think or defend the way they solve the problem, they only know to solve it mechanically (IS4TB, p.55: [09:53-10:18]).

2.2.8.2. Difficulties from the parents of the students

As the teacher mentioned before that there are many complaints from the parents about assessment it's very difficult for the teacher to go out of the norms, according to the teacher it's better to follow the department methods to be able to define the grade teachers assign for the students.

Also, if the teacher experiment a new method of assessment and presented it to the department at the beginning of the course and the department accept it, but the parents complained the teacher have to go back to the old pattern.

2.2.8.3. Teacher preparation

The teacher pointed that she did not have any courses or training of how to evaluate students. She said that, in the past they did not give us any training, now for example there is a master, but before there was not any training courses, they gained this knowledge from daily experience, and courses that they have signed up, but they did not give them any. They have to train them self.

Recently she participated in a course about competences evaluation, "In the course they told us about this kind of this evaluation "Rubric", but it was sporadic and we didn't get deep in it" (IS2TB, p.43:[12:19-12:33]).

According to the teacher, the competencies evaluation is not something new, it has been legislated before 10 years, but it's very difficult for us to implement this form of assessment. Actually, they gave us two courses and then they forced us to evaluate

competences, and they told us that evaluation should be concentrate on students' skills. However, it's very difficult for us to evaluate by competences, because we do not have a lot of information and training about this form of assessment, so it is an extra work and effort, as we do not have a lot of knowledge and practice about this form of assessment. In addition, we have to take courses to teach us how to use it at the afternoon, and then they obliged you to use it, soon or later you will be obliged to use it.

2.2.8.4. Consume time and effort

The teacher mentioned that, using new forms of assessment consumed a lot of time and effort from the teacher and her students. For example, using the rubric as a new method requires that the teacher explain its idea more than one time, and the students found it very difficult to use, especially when they use peer and self- assessment they did not know how to evaluate and to assign a number for every block.

The teacher wrote on her diary that on the first exercises when they had to use the rubric it was very difficult for them, and they made a lot of effort, and she had to give them a lot of instructions because they cannot assign a numerical grade to each section.

She added that the students' opinion about the rubric use was not good, as they should do more effort to get better grade, especially in writing comprehension and reasoning, they understand the concepts but they find it difficult to explain it. The rubric requires a lot of work in order to get a better grade, especially in the explaining part, the students understand the concepts but at the time of applying and explaining them, they find it difficult.

Also as the rubric, require writing a lot and explaining a lot it consumed a lot of time from the students, and they were worried about how to control the time on the exam.

The teacher added that implementation of rubric requires more time and effort, and the students were very reluctant to put a numerical grade.

The rubric requires a lot of time and effort from the teacher, and the students faced difficulties in assigning numerical number (IS3TB, p.45: [07:45-08:17]).

2.2.8.5. Number of students in class

The teacher reported that when they are 28 students in the class it very difficult to use new forms off assessment, as it would consume a lot of effort from the teacher.

> "You can use the rubric with a small number of students; with a large number of students it will cost you a lot of work, for the teachers and the students" (IS3TB, p.51: [32:05-32:34]).

In addition, the teacher complained that when she has 28 students at the class it is very difficult to evaluate and correct all the students note books and give them the needed feedback.

2.2.8.6. Difficulties from the department of mathematics

According to the teacher, the department of mathematics every year states a list of criteria and methods of evaluation, that all the mathematics teacher have to follow, and share it with the parents, the teacher cannot use new forms of assessment that is not in accordance with the department.

In addition, now there are many complaints from parents regarding assessment, a lot of them ask, "Why my child is suspended? The teacher can justify the students grade easily following the department criteria, as those criteria are stated on the beginning of the course and the parents have it.

Therefore, you cannot invent a new strategy now in the middle of the course. All this is set at the beginning. What we can do only a small experiment like this, or present it at the beginning of the course for the department and the parents to agree about it, if the department agreed and the parents complained you have to get back, you cannot evaluate differently (IS3TB, p.45: [09:32-10:45]).

The teacher added that they use exams as they are obliged to assign number to evaluate students , to put a percent for every content; it’s a decision from the department, which makes it difficult for the teacher to use different form.

All the evaluation strategies that we used are determined by the department, the criteria are established you cannot apply other things; you do not have another exit (IS2TB, p. 42: [08:01-08:14])

Added the teacher: "We can't choose the assessment method that we want to use, we are obliged with certain methods, if they oblige you to use competences evaluation with a certain date, and you have to follow if you like it or no" (IS4TB, p.53: [03:41-03:53]).

Furthermore, according to the teacher the department forced the teacher to do many papers of administrative work that consume a lot of time and effort from the teacher, that make it difficult for the teacher to apply new forms of assessment.

2.2.8.7. The method itself

The teacher mentioned some difficulties caused from the method itself for example this rubric require a lot of work from the teacher and her students, also it was difficult to assign a numerical number for each part.

Also for example in the case of using competences evaluation, teacher should align all the subjects together, mathematics, language , chemistry, physics … etc, this need change the current curriculum because we have every subject separated, and this way of evaluation align all the subjects together , which is very difficult to apply and evaluate.

Using rubric costs a lot of effort and I had to give them instructions because they cannot assign a numerical grade to each section (DTB).

Work and levels accurately, but it was complicated and confusing. Finally, it made the students think more when they solve any problem, but it was difficult to correct with it.

2.2.8.8. Difficulties from the evaluation system

The teacher complained, the evaluation system is a grade-based evaluation, the teacher have to evaluate and assign number grade. In addition, the teacher have to follow many norms such as, this number should be without decimal. This number in some stages can decide the future of many students, and can decide if the student can have a scholarship or not:

In academic transcripts, when the students finish el ESO for example, The teacher have to put a numerical grade. The grade of *"Selectividad*" after the "*Bachillerato*" is an important grade to inter the university and to ask for any scholarship. The teachers have to put a "*Nota media*", which is the average of all the grades. Teachers are obliged to assign a numerical number (IS3TB, p.49:[23:11-24:04]).

> "We are forced to put a numerical grade for each student said the teacher, there is a system like " Séneca " that obliged them to put a numerical grade, they can't say the students work is good, regulate, or worst. We are forced to do that, sometimes we do not like that, but we are obliged" (IS3TB, p.49: [23:11-24:04]).

2.2.9. The process of rubric application in the classroom *"Teacher B"*

In this part the application of the rubric is explained, the whole experience is presented from the own teachers words.

2.2.9.1. Introduction and first contact

When the teacher was asked to apply this new method of assessment (Rubric), she showed a positive disposition, as this method is very similar to what they use to evaluate their student at school, but without clear criteria and clear percentages for every part.

The teacher choose 4º ESO students to apply the rubric with them, as they were only 8 students, and they were motivated, and willing to learn new thing, she told them that using this method is a part of a university research, and they received it in a good way.

The teacher started the function unit with the basic ideas: Definition, domain, and range, the students asked about the definition and its graphic forms. They did some exercises to draw a graph for every formula. The teacher noticed that the student faced difficulties to draw a graph and to interpret it according to the rubric, and as sequence, the students had a bad grade on the first exercise using the rubric.

They continued explaining many examples about the concepts of the domain and range of functions. According to the teacher although the students have many difficulties in

calculating the domains and range of a function, they get used to this form of assessment but it was not easy for them.

The teacher wrote on her diary that when the students used the rubric with the first exercise they made a lot of effort it was very difficult for them, and she had to give them many instructions because they could not assign a numerical grade to each section. "In the first classroom activities using the rubric, they found it difficult and consume a lot of effort, and I had to give them a lot of instructions because they cannot assign a numerical score to each section"(DTB).

By the time, they become used to it, and they find it less difficult, but they are reluctant to evaluate themselves. "Little by little they become used to it, and find it less difficult But they are reluctant to self-evaluate" (DTB).

On April 17, the teacher noted that the students are facing many difficulties on interpreting and explaining any graph, and its application on a real life problem. She added that she got the impression that the students do not understand the concept of space and the plane, for that they face many difficulties.

On the following class the teacher explained the concept of function increase and decrease, according to the teacher the students understand it, but when they had to use mathematical language to interpret it they felt lost.

Then they continued with the concept of the functions limit, but they again encounter difficulties in the use of mathematical language. The teacher said that despite that they have done many exercises the students did not understand the concept. They act sometimes mechanically.

When the student used the rubric with all the exercises, she noted that they sometimes solve the problems mechanically without thinking, with the rubric they had to stop and think of what they need to do and why.

Throughout all the class the student did the work and the exercises (in groups) without help from the teacher, the teacher noted that it was a good experience that every student find his failures through self-assess.

The teacher acted as an observer; if the students faced any significant difficulty, she helps them with her instructions. Then they put a grade to every exercise according to the rubric blocks (mathematical knowledge, strategic knowledge, and explanation).

The teacher noticed that doing many exercises with the rubric and with the time, the students become more independent.

The teacher asserted that the most important thing while using any evaluation method: is to have the definitions and concepts very clear, apply them appropriately, and interpret them.

On May 8, they finished the last elements of the function unit, then they revised the parts where they faced difficulties as: drawing graphs, interpret it, increase, symmetry, concavity, frequency, etc.

2.2.9.2. Rubric in practice

On 10 Mayo, The students had a basic exam that examines all the concepts they have learned, the students had a negative attitudes for the questions, but with the teacher explanation and with the ability to get some help from their note books, they realized that it is not very difficult, and they get motivated when they solve any problem.

They prepared many activities in class for the exam on May 21; some of these activities were done with help from the teacher. Other activities were done independently and self-assessed.

On May 25the students had the exam of the function unit, they complained that its long and they will not have enough time to finish it, but when they saw that the questions are, short they were encouraged to solve it.

On the next day the teacher made copies of the exams and cleared all the students' names, and distributes it to the students randomly, she asked them to correct it using the rubric; the students commented that it is very difficult to put a grade on every block according to the rubric.

Meanwhile the teacher corrected the original copies, she found that all the students had difficulties with the explanation part; her students did not know to explain what they did in a correct way.

After that, they solved the exam on the board, and they compared the grade they put with the teacher grade. The teacher wrote on her diary that in some cases there were difference between the grades that she assigned and the grades that her students assigned.

Table 24

A Comparison Between the Average of Students' Marking and the Teachers' Marking.

Students' marking	Teachers' marking
4.6	6.35
9.64	8.1
3	1.7
9.39	8.1
5.57	7.5
8.96	8.1
5.36	7
4.32	1.57

On the next month, they continued analyzing the parabolic function, inverse function, exponential function thoroughly, The Students were engaged in many activities about those functions, and its applications to real life, they have troubles on understanding the inverse function when they found that they could not divide by zero, and above all the graph of the function. The activities were corrected by peers following the rubric.

The teacher noted that after doing many activities about these functions. The students put more effort in explaining the steps they follow in solving any problem. She reflected on her diary that after using the rubric with the function unit, it became easier for them, and they give more time to think about every step they follow and explain it.

She added that the majority of the students were happy with the results they obtained, but the evaluation with the rubric did not convince them. It is very demanding and reduced their final grades.

2.2.9.3. Main reflections

The teacher after applying the rubric drew the following conclusions:

* There is no significant difference between the teacher grading and the students grading when they corrected the same exam.

Las puntuaciones de los exámenes varían poco de la corrección del alumnado y la del profesorado (DTB).

* The students' opinion about the rubric use was not good, as they should do more effort to get better grade, especially in writing comprehension and reasoning, they understand the concepts they find it difficult to explain it. "La opinión del alumnado no fue buena, ya que debían esforzarse más para conseguir mejor nota, sobre todo en la comprensión escrita y en el razonamiento, ya que los conceptos si los tenían claros, pero a la hora de aplicarlos y explicarlos les costaba mucho trabajo" (DTB).

*Furthermore, as it was at the end of the course, they were very tired and needed more time to do it better. "Además como ha sido al final del curso, estaban más cansados y necesitaban más tiempo para hacer las cosas mejor" (DTB).

* The teacher asserted that the implementation of this rubric requires a lot time and effort, and the students were very reluctant to put a numerical grade.

> "La opinión de la profesora es que la aplicación de rubrica, requiere mucho tiempo y esfuerzo y el alumnado es muy reacio a la hora de poner una nota numérica" (DTB)

*It can be applied in a small group of students, but with a large group, it is not feasible, and the students' results did not improve.

> "Se puede aplicar en un grupo pequeño de alumnos, pero con un grupo numeroso es inviable y los resultados tampoco mejoran que es de lo que se trata" (DTB).

*On the Student tab we put 70% evaluate the contents (exams) and the remaining 30% is distributed in attitude to the subject, class notebooks, and everyday work and in class, included in the programming of the subject. has been allocated within the file for each student the sections that best fit the three blocks of this rubric within these sections are given a weekly note of work relations problems and monthly exams.

*There is no perfect method to assess students work, but we should try to improve it to be more consistent with basic skills. "No existe una forma de evaluación perfecta, pero

debemos intentar mejorarla, para ser más coherentes con las competencias básicas" (DTB).

2.2.10. Students' opinion about using the rubric

In this section, the results of the students' questionnaire are shown.

2.2.10.1. Students' responses on using the rubric in problem solving: The positives and the negatives.

Table 25

The Advantages of Using the Rubric

Students' opinion	Number of students	Percentage
Using the rubric help the students to see their errors.	1	12.5%
The rubric evaluates students work better.	1	12.5%
Made the student study more.	1	12.5%
Using the rubric help, the students Learn to explain better.	1	12.5%
Students can get better marks on the part that requires showing mathematical knowledge.	1	12.5%
No answer.	3	37.5%

According to the students using the rubric helped them to see their mistakes , they were able to see their power and weakness point, and what is needed to enhance their work, as the rubric provide them with a guide to solve and correct their work. In addition, one student added that using the rubric enhanced their skill to solve and explain the way they solve any problem. Also as using the rubric require explaining every step that obliged the students to work harder and to study more, which affect their learning positively and as a result they get better grades.

One student pointed that the rubric help the students to evaluate his or her work and levels accurately, as it describe every needed skill and necessary knowledge to solve any problem. Moreover, it shows how the students can get this mark and why.

Another student claimed that using the rubric forced them to think more when solving any problem. Before using the rubric, they were used to solve questions by putting the equation and putting the answer, they were used solve any problem without having to explain everything. However, the rubric obliged the students to show what they know in order to set a clear plan and to explain it.

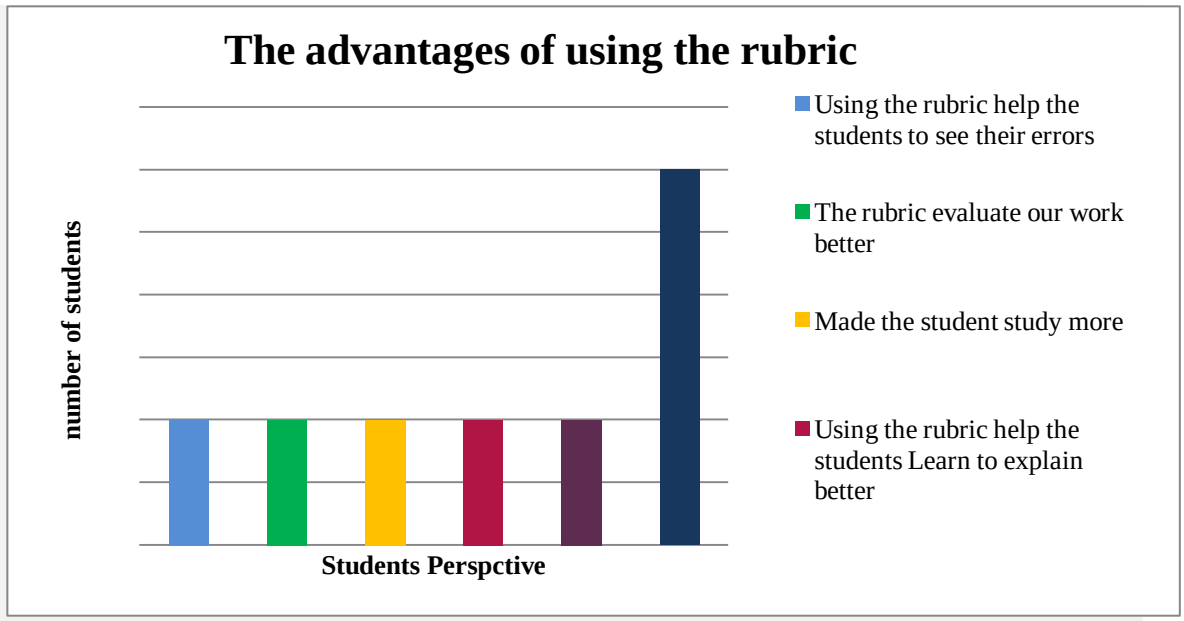


*Figure 23.*The advantages of using the rubric

As a summary, the students reported that using the rubric enhanced their learning for many reasons .First; it helped them to discover their strength and weakness points. Second, it increased the students' skill of explaining their work. In addition, the students pointed that the rubric helped them to evaluate their work and levels accurately. Finally, the rubric forced the student to study and to think more when solving any problem.

2.2.10.2. The disadvantages of using the rubric

In the following table, the students' opinions about the disadvantages of using the rubric are presented.

Table 26
The Disadvantages of Using the Rubric

Students' opinion	Number of students	Percentage
Using the rubric was very difficult and complicated	3	37.5%
Using the rubric require a lot of work	2	25.0%
Reduce the students' mark.	2	25.0%
Using the rubric make the exam very long.	1	12.5%

37.5% of the students found that using the rubric was not easy, according to the students, it was complicated, and they did not understand it, they were not accustomed to this form of assessment.

As it was the first time the students used the rubric they found it very difficult, one student asserted that the teacher had to explain this rubric more than one time in order to understand it, it requires a lot of training before using it, one students complained about the grading strategy of the rubric, and correcting their peers work .

The students also complained from the third part of the rubric-the explanation part- they found it very difficult, they are not used to explain what they have done and why, which was a challenge for them.

Another student added that it is very complicated, and consume a lot of time and work, because we are not accustomed at this form of evaluation.

Some students asserted that using the rubric have decreased their grades, as this rubric requires solving the problem thoroughly in order to have a high mark, and the time of the exam was insufficient to solve all the question with all the required details, for that we didn't have the grade that we want.

To sum up, the students found that using the rubric was difficult for many reasons: First, the rubric is very long and difficult, the students didn't understand it. Second, the rubric consumes a lot of time and effort to have a high quality answer. Third, it's difficult to have high marks. Finally, it requires a lot of explanation.

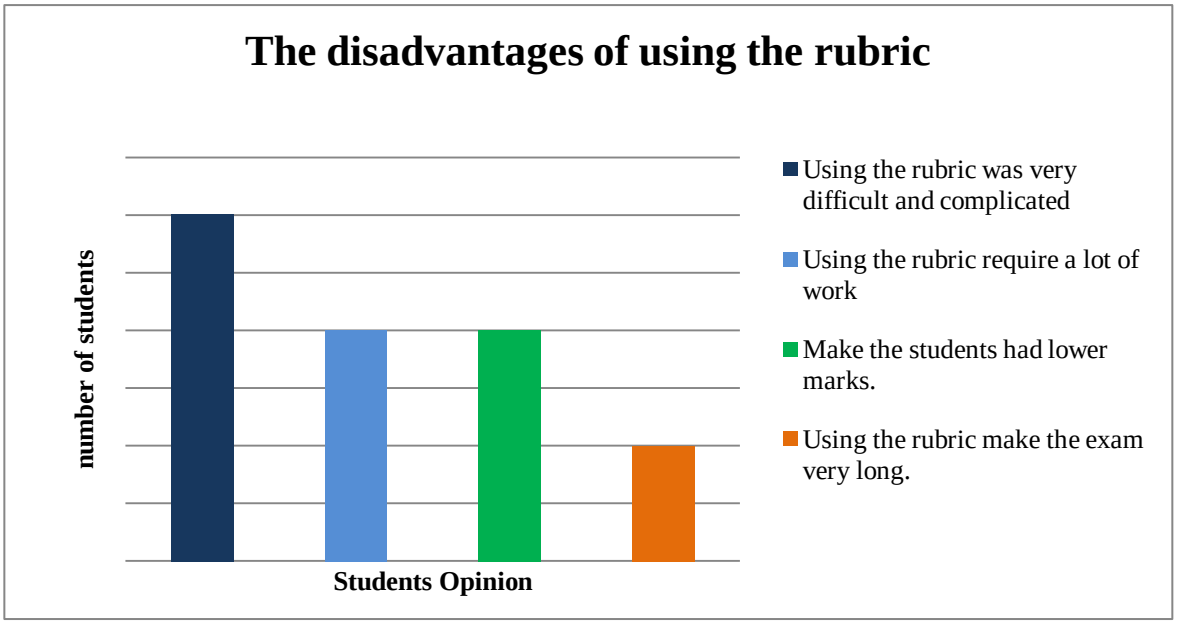


Figure 24. The disadvantages of using the rubric.

2.2.10.3. The difficulties that face the students while using the rubric

The table 27 presents the following difficulties.

Table 27

The Difficulties That Face the Students While Using the Rubric.

Students' opinion	Number of students	Percentage
Difficult to correct with the rubric.	3	37.5%
Difficult to understand the rubric.	2	25.0%
The rubric is complicated.	1	12.5%
Require explaining every step of the work.	1	12.5%
The rubric is long and has many details.	1	12.5%

37.5% of the students found the rubric difficult to use. They said that correcting with the rubric is very difficult, as every student has his own way of solving any problem, also it require a lot of work in order to explain everything. In addition, the rubric itself is difficult to understand as it has three evaluation criteria and every criterion have performance levels it was confusing for the students. Moreover, as it was the first time they used it. They asked the teacher to explain it more than one time in order to understand it,

Some students complained about the grading strategy of this rubric they found it difficult and complicated, one student wrote, "I didn’t know how what grade should I put"

Another student found it very difficult to correct the exam of another student she said, "I didn’t know how to correct it as everyone does his exam in his own way".
One student complained that she always forgot to explain her answer, as she is not accustomed to do it.

Another student said that the use of the rubric consume a lot of time in order to solve the problem with all the required details, this made it very difficult to use in the exams while we have a short time, and this affects our grades.

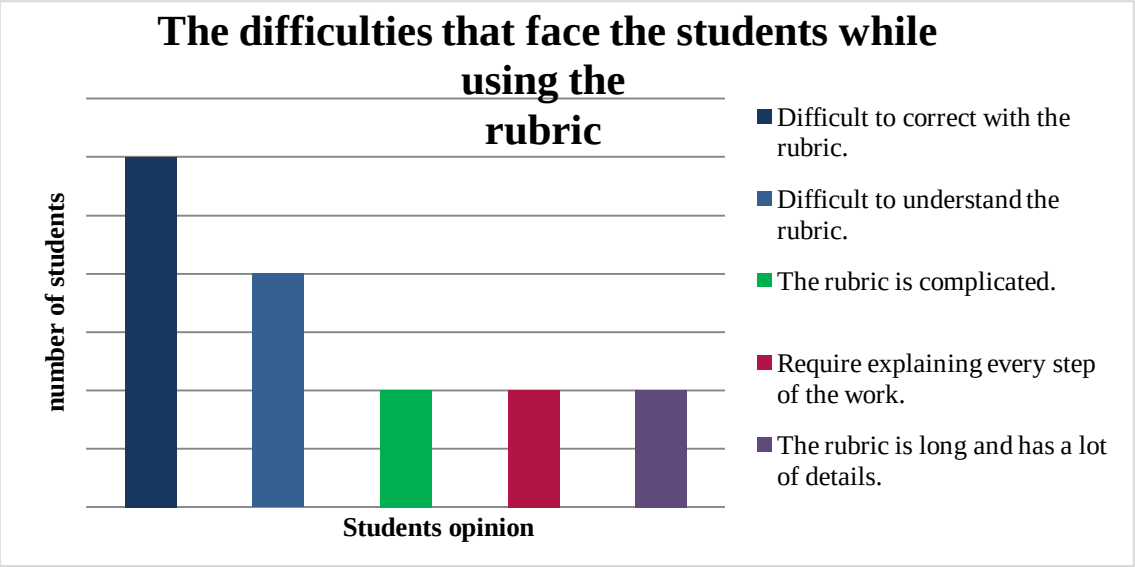


Figure 25. The difficulties that face the students while using the rubric

To conclude, the students faced many difficulties while using the rubric such as, first: the rubric was difficult and the students did not understand it. Second, the rubric itself is difficult to understand, as it has three evaluation criteria and every criterion have many performance levels; it was confusing for the students. Third, it requires a lot of explaining of the answer. Finally, it is very long and consumes a lot of time.

2.2.10.4. What is needed to enhance this rubric?

75% of the students wrote that in order to enhance the rubric the explanation part should be removed, as it consumed a lot of effort from the students. Another student advised to rewrite the rubric to be easier to understand, as the students were not accustomed to this type of assessment, it requires to explain every step they do to solve any problem.

Table 28
What is Needed to Enhance this Rubric

Students' opinion	Number of students	Percentage
More practice.	1	12.5%
Remove the explanation part.	6	75.0%
Make it easier.	1	12.5%

12.5% of the students asked for more training on this form of assessment, in order to use it easily.

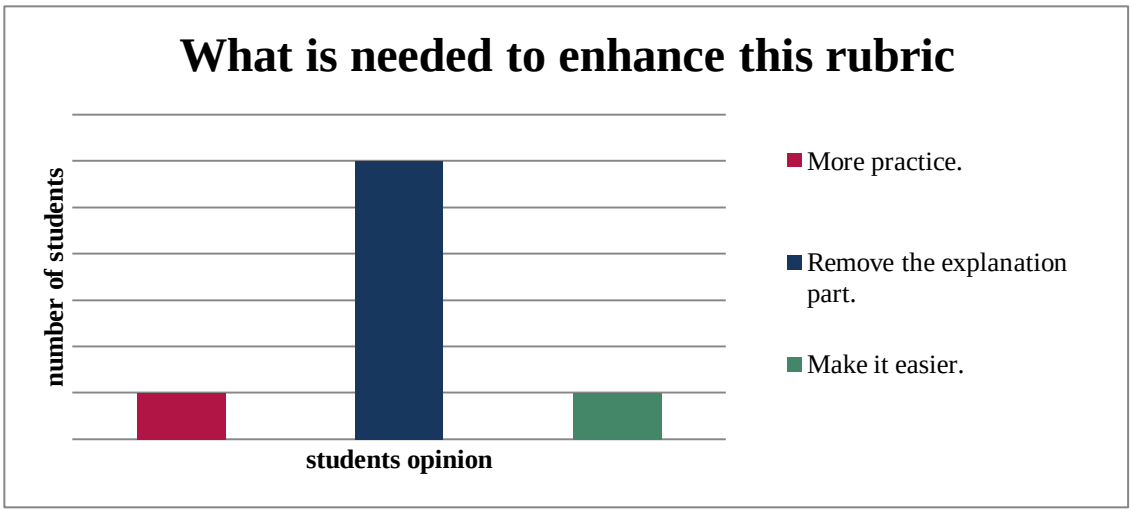


Figure 26. What is needed to enhance this rubric?

To sum up students made some recommendation to enhance this rubric:
The students asked to remove the explaining part from the rubric.
The students asked for more training on using this form of evaluation.
The students asked for better design of this rubric, as they found it difficult and complicated.

2.2.10.5. The effect of using the rubric from students' perspective

The majority of the student agreed that the rubric in some cases had a positive effect and on the other cases negative effect on their peers, some student claimed that it helped them to see their strength and weakness point, but on the other hand it was very difficult to understand and to use.

Another student pointed that the rubric helped them to explain their work better, but on the other hand they got a lower grades than usual, as the rubric consume a lot of time this was the problem on the exam the time was not enough to solve everything completely.

Table 29
The Effect of Using the Rubric from Students' perspective

Student perspective	Frequent	percentage
Positive	1	12.5%
Negative	2	25%
In some cases positive and In some cases negative	3	37.5%
No answer	2	25%

Another student claimed that the rubric made the students think more when solving any problem, but its scoring strategy was very difficult, it was very difficult to correct others exams using the rubric.

Another student asserted the rubric helped them to evaluate their work and level accurately but it is difficult and complicated.

On the other hand 25% of the students found that using the rubric had a negative effect on their peers, they said that their peer face many difficulties while using the rubric, its complicated, and the students had lower grades because they didn't explain everything very well.

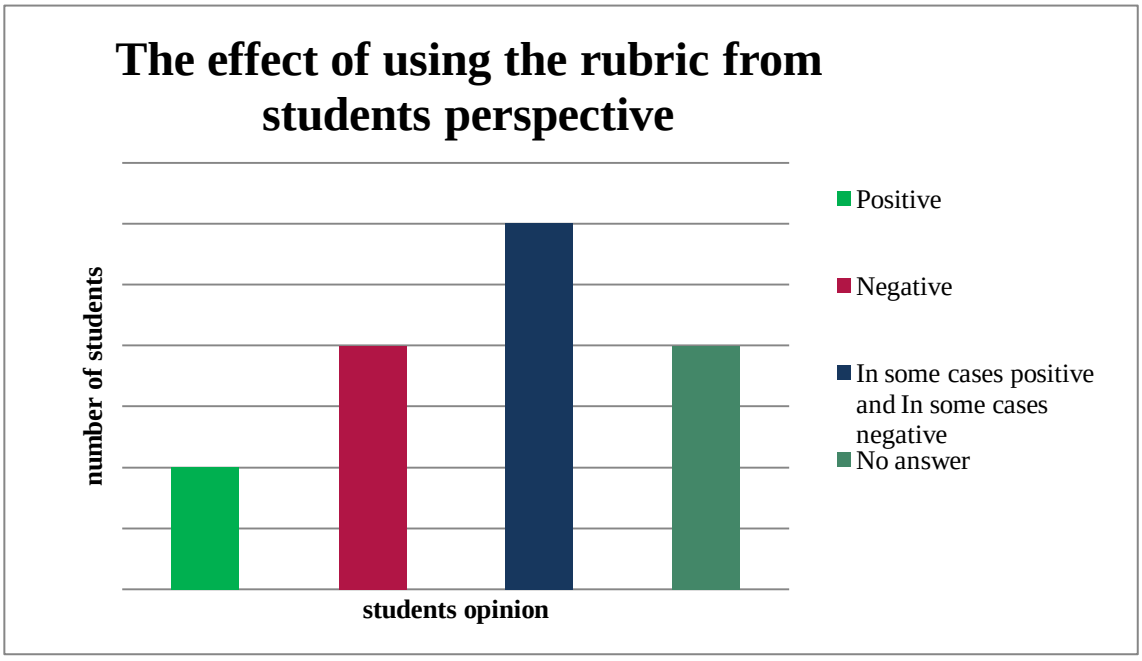


*Figure 27.*The effect of using the rubric from students' perspective.

To sum up, the students agreed that the rubric had appositive and negative effect on their peers for many reasons. First: the rubric helped the students to see their strength and weakness points but on the other hand, it was very difficult. Second, the rubric helped the students to explain their work better, but it decreases their grades. Third: it evaluates their work and levels accurately, but it was complicated and confusing. Finally, it made the students think more when they solve any problem, but it was difficult to correct with it.

3.Cross-case analysis and discussion

This section presents the horizontal or cross-case analysis where we looked for Systematic differences similarities across the two cases (e.g., supporters and opponents). In this section, the results and a discussion of the study are presented in four sections: The first section, presents present teachers' beliefs about assessment, and the second section, present the changes that happened to the teacher's beliefs related to the use of rubric. Section three present, the methods that a secondary mathematics teacher uses to assess their students. Moreover, the fourth section presents the reasons that prevent teachers from using new forms of assessment.

3.1. Teachers' beliefs about assessment for learning

The results of the study showed that teachers hold some beliefs about assessment for learning that need to be taken it in consideration such as:

- Teachers should help students to get benefits from assessment by informing them accurately what they will be graded or assessed, and how. More information the students get, is better.
- Assessment feedback should benefit both students and teachers. It Help them to know each other more, and students' results will improve consequently.
- Rubrics help the students to enhance their work. As many students do not know what they had to do to enhance their work, using the rubric helped them to know what they showed do and how. It is true that this method "rubric" makes them more aware of what they are doing; it is like a self-assessment, through self-evaluate they can know the error they can do and cannot do, which is good.
- I believes that students and teachers are prepared to use self and peer assessment with rubrics , what need is to inform our students with more details of all criteria used and all the things that will be rated positively, and what the things that will be rated negatively. In addition, teachers should ask themselves before determine to use a certain assessment strategy: what we should or what we want to obtain.
- Direct question is the key to make sure that the students understand or no, if the students remained silent when the teacher ask a question that means that they didn't not understand.

- Repeating examples and exercises is the way to know that the students meet my expectations, as it is very difficult to know.
- I know that my assessment strategy was fair only from the results of the exams. If the results of the exams are not very good, then the strategy that I follow is not good.
- Assessment for learning refers to one's own way of assessing students, by giving them tools to improve their responses on the tests or the time to solve a problem, assessment for learning" is to learn, assess for learning, what they normally do is to assess learning. She added that using assessment for learning is very difficult, because they do not have time.
- Whenever we perform any exam, we usually write it on the board and solve it, and then the students correct their mistakes. For the next time they take an exam or other trail; they know what steps they have to follow, how to respond in order to get more scores, even if it's for the score they are predisposed to learn how to do or how to solve this problem well.
- In mathematics, it is very important to revise and to make sure that the students have what they need to continue learning. For that, it's important that the teacher assess the previous knowledge that the students need to continue their learning, according to the teacher a subject is like a house in order to build it well you have to start from the ground and start building and make sure that it's all go well until you reach the roof.
- In mathematics, it is very important to ask the students about what they took the last class, ask many questions or let some students to solve a question on the bored.
- Reasoning in mathematics is very important; she added that the explanation part of the rubric is very interesting because it requires giving a written and oral explanation, it forces them to think why they are doing that in mathematics, not just doing it mechanically.
- In mathematics, the teacher should concentrate on the strategies they use to solve a problem, explaining every step, what they know, what they have to do and why?
- Teachers have to think of the evaluation method that makes the students motivated, in order to enhance their work.

- In mathematics we were taught to assign a numerical number according to the students progress in their learning, she argued that this is wrong, they have to see students effort and if they have acquired anything from what they have learned.
- I make sure that my students understand by making them participate on class, solve problems on the board, and let some brave students give class to the students, in this way I see if they have understand or no.
- I try to put many questions to make sure that the exam is fair, and suitable for all the students.
- It is very important to share the students with the evaluation criteria in order to know perfectly how they are going to be evaluated and what they have to do.
- The students cannot use self and peer assessment, as they do not know how to assess, and make problems among students, but she think that this form of assessment makes the student aware that the evaluation process is not easy.
- Sharing the student with assessment is very difficult, as they do not know how to assess, for that it took a lot of time from the students also from the teacher that has to revise all of their assessments. In addition that the student do not gain any benefit from that process.

For example, *Teacher (A)* said that, repeating examples and exercises is the way to know that the students meet my expectations, as it is very difficult to know. *teacher (B)* said, I make sure that my students understand what I give them by making them participate on class, solve problems on the board, and let some brave students give class to the students, in this way I see if they have understand or no.

Wrotham (2008) noted that teachers should determine the goals and expectations, and should clarify learning intentions and success criteria and share it with his students, a dialogue between the teacher and the students could be beneficial in developing understanding of expectations and standards, and the way to reach it. In order for the assessment for learning to be affective, teachers and students should be partners in the assessment for learning process. the teacher have to share the achievement goals with his students, make his expectations clear, and the student have to do his best to

understand what success looks like, to use the feedback to enhance his performance (Stiggins, 2007).

After using the rubric *teacher (A)* noted that the rubric helps the students to enhance their work. Many students do not know what they had to do to enhance their work, using the rubric helped them to know what they have to do and how. This method rubric makes them more aware of what they are doing; it is like a self-assessment, through self-evaluate they can know the error they can do and cannot do, which is good. Which implies that the teacher start valuing the assessment as an important part of the learning process?

The strategy teachers use to make sure that their assessment was fair one teacher said; I try to put many questions to make sure that the exam is fair and suitable for all the students. Moreover, the other teacher said I know that my assessment strategy was fair only from the results of the tests. If the results of the tests are not very good, then the strategy that we follow is not good (IS2TA, p.19: [16:24-16:36]). Wrotham (2008) argued that for assessment to be fair for all students the assessment should reflect how each student could best achieve the learning goals, assessment should reflect a clear picture of every student progress and needs. The teacher should be aware of the individual differences and select the assessment methods that are relevant to the information needed and uses the results in planning for curriculum and instruction

Gepps and Murphy (1994) argued that the focus of attention should be paid on each student's learning, as everyone is believed to have his or her own particular requirements. Rather than unrealistically seeking equality of outcomes and the provision of identical experiences for all, equity in assessment is thus about assessment practices and interpretation of results that are fair and just for everyone .

Teacher (B) said whenever we perform any exam, we usually write it on the board and solve it, and then the students correct their mistakes. For the next time they take an exam or other trail; they know what steps they have to follow, how to respond in order to get more scores, even if it's for the score they are predisposed to learn how to do or how to solve this problem well.

Biggs (cited on Frankland, 2007) suggested that assessment determines what and how students learn. The current assessment philosophy seems to focus much more heavily on summative assessment (grading) than on formative assessment (learning). This makes many students thinks only how to get a grade, also students don't have any chance to get benefit from the assessment feedback.

The feedback that teachers usually give to students is at the end of an assessment task when the grade is given. Consequently, students do not have the chance to improve their performance after studying the feedback they received since the assessment is already complete and the grade for that particular task has been given. However, they can often use the formative feedback given to improve themselves for the next task (Frankland, 2007).

Biggs also added that the feedback which is given after the assessment task can only be called comments since the assessment task has already been completed and students do not have chance to improve their learning and grade. In other words, in a grade-oriented culture, comment has a relatively lower effect on stimulating students to learn since their grades are already determined and they can do nothing to change it anyway (Frankland, 2007). Whereas feedback, which is given during the learning process, before the final grade is given, fulfils it's most important function of facilitating and enhancing students' learning. In addition, students are also encouraged to improve their grades by studying the feedback and learning the content of the subject better (Frankland, 2007).

Teacher's feedback shouldn't only contain information about how students worked compared to the standards, but should also help the student to enhance their work in order to close the gap (Sadler, 1989). The biggest impacts occurred when feedback told not just what to do to improve, but also how to go about it. Dylan (2006) and Stiggings (2008) argued that teachers should stop believing that test scores are capable to support student learning. *Teacher (A)* added that teachers should help the students to get benefits from assessment by informing them accurately what they will be graded or assessed, and more information they get, is better.

The teachers before using the rubric said that the students can't use self and peer assessment as they don't know how to assess. After using the rubric the teacher said, I think students can use peer and self-evaluation what need is to inform our students with more details of all criteria used and all the things that will be rated positively, and what the things that will be rated negatively. In addition, teachers should ask themselves before determine to use a certain assessment strategy and what we should or what we want to obtain. The other teacher agreed: It is very important to share the students with the evaluation criteria in order to know perfectly how they are going to be evaluated and what they have to do.

Stiggins (2008) added that the belief that assessment is something that adults do to students, has to change. Adults are not the only ones who can assess students. In fact, students can assess themselves too. "Involving the learner is at the heart of the shift from assessment that measures learning to assessment that promotes learning" (The Centre for Comprehensive School Reform and Improvement, 2008, p.1).

Learners can be involved in assessment by providing them with the expectations and standards that explain how their work will be evaluated. Students also can show work that is excellent and work that needs improvement and they can get help analyzing the differences between them (The Centre for Comprehensive School Reform and Improvement, 2008).

3.2. Teachers' beliefs about the relationship between learning and teaching and assessment

Teacher (A) believe that there is a clear relationship between teaching and learning, assessment is apart, in mathematics teaching and learning is continuous, assessment is something discreet. Teachers cannot do a continuous assessment of students' work because they do not have time.

Teacher (B) commented that for the majority of our students the teaching-learning process is incomplete. That is mean, the teacher teaches and explains until he/she thinks that the students understand and comprehend the concepts. Then the teacher tests their level of understanding by asking questions or by sending one student to the board,

which is not enough for all the students, as every student have a certain problem that the teacher did not see.

Assessment is a critical link between learning activities and teaching, learning outcomes, and content (Flinders university website, 2010). Moore (2010) argued that good assessment is part of the learning process, not just a means of documenting or judging that learning. Assessment cannot really be separated from instruction; it is an integral part of what good teachers do on a routine basis through their classroom observations, activities, assignments, and tests. "Assessment is not something to be despised or ignored as irrelevant or impossible but embraced as an essential aspect of learning and the best way to truly understand and improve that learning" (Moore, 2010, P.1).

Academics at Alverno College in North America describe assessment for learning "AFL" as that kind of assessment that is integrated within the learning process and students can use self-assessment according to explicit criteria, in this way the students can use what they need to make progress (2005). In mathematics education, it is important for the teacher to understand that assessment is a part of a circular process; and that the assessment results help the teacher to understand their students better, and help the students to enhance their academic achievement (Whang, 2004).

Frank land (2007) suggests that the teacher is clearly the person who is most familiar with the subject, should be allowed to specify what the most appropriate assessment method should be. In this way, it will be aligned with the subject's learning outcomes. There is a whole range of methods that can be used, such as; examinations, tests, quizzes (closed book, open book, with many variations), assignments, case studies, projects, presentations, poster sessions, interviewing, reflective journals, etc. The teacher must be allowed to make use of these if he/she deems them the most appropriate.

Black and William (1998, p.19) pointed that assessment should be integrated in the teaching and learning process. Assessment is to be seen as a moment of learning, and students have to be active in their own assessment and to picture their own learning in the light of an understanding of what it means to get better. The National Council of

Teachers of Mathematics (2000) noted that assessment is a tool for learning mathematics.

Biggs and Tang (2003) argued that students would learn what they believe they will be examined on; and the assessment determines what and how students learn more than the curriculum itself. This is called the backwash effect. If a system is poorly aligned , and the grading criteria is not aligned to the subject objectives; or if the criteria are not given to students, they will not be clear about what they are required to learn, what criteria their performance will be measured against, and what is meant by good work. As a result, students will engage themselves in surface learning, and cause a negative backwash. In other words, the assessment criteria must be aligned to subject objectives, and this needs to be communicated to students at the beginning of the learning process. Teaching staff are then able to evaluate the extent to which students' performance matches or does not match the criteria (which is aligned with the subject's objectives), and inform them accordingly. Moreover, teachers can suggest ways in which students can improve, and give them the opportunity to do so.

3.3. Teachers' beliefs about assessment

Teacher's beliefs from the tow cases with a discussion are presents as follows: beliefs about the forms of assessment, the benefits from evaluation, the relationship between learning, teaching and assessment, students learning, assessment for learning, purpose of assessment.

3.3.1. Teachers' beliefs about the purpose of assessment

The teachers in the current study believe that the main and clear purpose of assessment is to measure the level of the achieved goals from the goals that have been set in the course plan at the beginning of the year. Every teacher have to put a numerical grade for his/her students, this grade will be a critical issue in taking a decision about students passing/or failing the course, and will decide if the student can have a scholarship or not. In addition, the numerical evaluation could be a way of helping teachers to defend the grades that they put for their students if any parents complained (assessment for accountability).

In addition, the teachers mentioned other purposes of assessment that could be called sub- purposes or minor purposes, such as: (1)-The evaluation helps teachers to see the problems that our students are facing in their learning process. (2)- Evaluation is a kind of motivation for the good students to continue advancing on their learning. (3)- Evaluation supports students learning.

The results of this study support Susuwele-Banda (2005) study results that indicated that in most cases, teachers assess in order to rank students and not to identify individual capabilities and weaknesses. For example, one participant perceived assessment as a process for promoting students from one grade to another. Assessment practices in the classes were limited, incomplete and not tied well to the learning activities.

I would agree with Stigging opinion that, the main purpose of assessment should be changed from measuring students learning to enhancing students learning. In the past, assessment was used to rank students from the lowest to the highest achievers in order to channel us into the various segments of our social and economic system. but in recent years, we began to realize that if all schools do is sort students, then the bottom third of the rank order plus all those who drop out before being ranked will fail to develop the essential reading, writing, and math proficiencies needed to survive in an increasingly complex society. So over the past few decades, the mission of sorting has evolved into a mission of ensuring certain minimal competencies; to help all students become competent readers, writers, and problem solvers (Stiggins, 2005).

Nasri, Roslan, Sekuan, Bakar, and Puteh (2010) added that assessment should be used to facilitate learning and skills development, and motivate students to perform better and prepare students for self-directed and lifelong learning. When it's used to diagnose areas of weaknesses and develop remedial instruction to facilitate mastery of content and skills. And suggested that, assessment should be used to help student to learn "Assessment as a means not an end" by using assessment to serve the following functions: Diagnostic, remedial/ enhancement, motivation.

According to the University College Dublin (2011), we should assess student for the following points, (a) to drive student learning, since students generally focus on assessment first, we have to design assessments to encourage students to focus on the

development of a deep understanding of key concepts and the application of transferable skills they will need after graduation. (b) Assessments can be designed to align with learning outcomes including graduate attributes, content areas including key concepts, principles, skills, attitudes and teaching and learning activities and evaluation. Teachers know what they want students to learn. How do they plan to design and redesign their assessments to motivate students to engage with these learning outcomes? (c) Assessment is a professional activity and judgment required for quality assurance and certification.

The following statements reflect teachers' beliefs about the forms of assessment:

*Assessment as measurement

- The main purpose of assessment is to measure the level of the achieved goals from the goals that have been set in the course plan.
- In general, we assess to put grade. The evaluation is to determine whether the student has reached the level that the student had to reach or no. To assess whether the student learned what he have to learn, or if the student reached the minimum levels required by law.
- With the low of the minimum effort students can pass the course if they have six suspended subjects, because our system is very bad, if any student have (6) suspended subjects he/she can pass to the following course, that is a big error, in this way assessment means for the teachers to give the students their final grades, to see if they can pass the subject or not, also we evaluate to see if the students have the level required by the law in order to pass or fail the course.
- Until now, assessment is used to quantify the degree to which students have exceeded the stated objectives.
- For teachers assessment means to give a grade to the students, as they had to put a numerical number for every student, the teacher give the students many exams, and the average of the entire exam is the students' grade.
- When teachers assess students work, in a certain way, they evaluate their labor as educators, if the students had low grade that means that students did not understand from the teacher. Moreover, if all the students had a good grade that means that the teacher did a good work.

- Assessment is a method to see how the students progress on their learning, also provide us (teachers, students, parents) with a numerical grade, this grade for example in high school can help to determine what the student can study, and can help them to have a scholarship.
- In mathematics we taught us to assign a numerical number according to the students progress in their learning, which is wrong, we have to see students effort and if they have acquired anything from what they have learned.

* Assessment support learning

- Assessment is a mean to make the students work more in order to understand the subjects, as the students are not used to study every day, they only study for the exam.
- The exams feedback should benefit both students and teachers. It helps them to know each other more, in this way the students' results will improve consequently.
- Sharing the students with teacher expectation, and involve them in the assessment method through rubric, assessment in this way can be used for learning.
- I use assessment for learning: whenever we perform any exam, we usually write it on the board and solve it, and then the students correct their mistakes. For the next time they take an exam or other trail; they should know what steps they have to follow, how they should respond in order to get more scores, even if it's for the score they are predisposed to learn how to do or how to solve this problem well.
- Assessment for learning refers to one's own way of evaluating students, by giving them tools to improve their responses on the tests or the time to solve a problem. Assessment for learning" is to learn, what we normally do is assess learning.
- We can't use assessment for learning, as it's continues and we had to do it every day, we don't have enough time as we had more than 30 students in the class also we have a syllabus to follow.
- In mathematics assessment teachers should concentrate that the students have the type of learning based on reasoning and rationale mechanisms, apply what he learn into real life, and see if they kept what they learn and that they did not forgot it.
- Assessment can enhance students learning if teachers concentrate on of the assessment that based on reasoning that force students to explain and justify the way

that they solved the problem. In addition, every student must know the score of each question, and why he did not get a full mark, whether he miss the concept, the application or the explanation.

- If teachers make their students participate a lot at class, and make some students give a class it will help the student learn more. Moreover, she added that participating in contests and exhibition support students learning as they can see what they learn can be applied en everyday life.
- Assessment is used to make a pressure to make the students work and study every day.
- Assessment is used to detect possible learning problems, if all the students didn't solve a question that means that the students are facing problems with this subject , that means that the teacher have to change her teaching method in order to overcome this difficulty.

* Assessment as motivation

- Assessment is a kind of motivation for the good students to continue advancing on their learning, but for the bad students' it does not provide them with anything.
- The most important thing is that the students stay motivated, and this could happen if the assessment strategy could be changed.
- Teacher also are not motivated, there should be teacher productivity. that productivity is not that" if you have a certain number of student passes the course, or to get more money". Teachers need a real productivity, an external exam for example "if your students have a higher level, and if they can demonstrate that the teacher that they have is better prepared than the other teachers", in this way, the teacher receives productivity, but that is impossible at this time and age.
- Although the exams are the most used method in the classrooms in Spain, recently they are investigating the group work, where the teacher divide the class into small groups, and assign a task to each member of the group, and evaluate the whole group work. It is a way to motivate and encourage the students to participate, especially the students who are not motivated to work. For that reason, the teachers have to investigate new methods.

- Invite parents to be part in-group work among class, to see how the work goes and participate in the evaluation, motivate the students.
- The teacher should think before choosing an assessment method, we have to think of the following: (a) if her students will understand it, (B) if it is suitable for the goals that she want, (c) the kind of motivation the she had to give to make her students do things right.
- Not only the students need motivation, but also teachers need something to give them satisfaction. For example, this year the teacher and her students participated on a statistical contest and they won an award, the students were highly motivated, and they saw how what they learn in class have application in real life; according to the teacher this gave her a lot of satisfaction.
- The teacher have to find the strategy that motivate students , such as exposition where the students saw that what they are learning can be applied in everyday life.
- Teachers can motivate the students by incentives. As the students always, ask, if I did this, will you put me a good grade? It is a way to stimulate them. For example, the teacher will say, who finishes first the work, will get a point and, it is a way to motivate them.

* Assessment for accountability

- It’s better to follow the department methods for evaluating, as these day they have a lot of complement from parents, in this way the teacher can easily defined himself, he can say this is all established by the department it’s all written at the beginning of the year. "We can’t go out of the department methods of evaluation because then if any student protests we can defend our self" (appendix 3, p.31: [04:32-05:20]).
- The students do not have any benefit from evaluation, it is a way or a method the students are punished or reward according to it.
- The parents may ask why my child is suspended?, the teacher can answer we follow the department regulations .So it’s not easy to use any new method in the middle of the course, the teacher should present it at the begging of the year to the department and the parents to accept it.

- Inviting the parents to participate in-group work among the class will help the parents to see how the work goes; they also can understand the grade that their son got. Normally when the teacher said to the parents that your sons do not work they do not believe, in a way they will have better idea about the students work.

* Assessment as diagnosis

- Assessment helps teachers to see the problems that our students are facing in their learning process. Students' evaluation provides teachers with information about the students and about their learning process, in this way, they can solve any problem that faces their students, assessment can help the teacher to see that some students that had difficulties to achieve the minimum goals.
- Assessment can also help the teacher to see if the students understand or not, for example Direct questions are the key to see if your students understand what teachers want, when you explain and then ask a question If they all the students remain silent that mean that they have not understand.
- I never know for sure that my students understand what I really want. But from the examples we discuss in class, the activities we make I think they understand what I explain in class. Moreover, the direct observation of students make me see if they have understood or have not understood. The key is when you explained and then ask a question if they all remain silent that mean that they have not understand.
- Repeating examples and exercises helps the teacher to know that her students meet her expectations, as it is very difficult to know.
- I know that my assessment strategy was fair only from the results of the tests. If the results of the tests are not very good, then the strategy that we follow is not good.
- Assessment can help the teacher to see if the students have what they need (concepts, skills…) in order to continue learning, and to see if there are facing any problems.
- Assessment help us to see the weakness and the power points of our practices, she said that a group of teachers agreed to record a class that was done by group work, and every teacher present his recorded class to the other teachers and try to make a discussion about it, and how to enhance it in the future.

- Through self-assessment, students find their own failures and try to overcome the difficulties they face.

3.3.2. Teachers' beliefs about the benefits from evaluation

The results of this study showed that the teachers' believe that mathematics teachers draw more benefits from evaluation than students, *teacher B* said, "*The* information that the evaluation give is not very important for the students. It's a motivation for the good students, in order to continue as they are, and for the bad students for nothing" (IS4TA, p.33: [12:07-12:50]). The benefits the students got from evaluation according to the teachers: (a) it only allows their parents to punish or reward them according their grades, otherwise they do not get any benefit from evaluation. (b) It is motivated for the good students, in order to continue as they are, and for the bad students for nothing. (c)-Evaluation provides us (teachers, students, parents) with a numerical grade, this grade for example in high school can help to determine what the student can study, and to have a scholarship or no.(d) The assessment is a way to make a pressure on the students to make them study. In addition, it may help them to see their progress. (e) The students feel satisfaction of learning new things, besides they have a grade.

Teacher (A) pointed that the tradition method of assessment does not support learning. On the other hand, the teachers draw more benefits from assessment than the students, the students do not have any benefit assessment, and they are limited to respond the exams questions.

The benefits that teachers got from evaluation according to the teachers:

- Provide teachers with information about the students and about their learning process, in this way, we can solve problems that face the students, we can see some times that there are students who could not achieve the minimum goals. For that, we have to change our plans to help those students.
- To know if the students get the level that he has to get.
- To know if the student learned what he had to learn.
- To put a numerical grade on students work.
- To make a decision if the student can pass or fail the course according to the law.

- To measure the level of the achieved goals from the goals that has been set in the course plan.
- To quantify the degree to which the students have exceeded the objectives, also to detect possible learning problems.

It is clear from the teachers' comments that the students do not get a significant benefit from assessment and the main benefit the teacher gain from assessment that it provides them with numerical information that helps them to take administrative decisions. That supports Morgan and Watson (2002) results that most teachers view classroom assessment as an added requirement to their teaching job and not as a tool to improve their teaching. The NCTM (1995) believes that assessment has the potential to enhance mathematics learning and to promote students' interest in mathematics.

Chester and Quilter (1998) in their study that aimed to understand the in-service teachers' perceptions of educational assessment concluded that teachers' perceptions play a major role in choosing or misusing different forms of assessment. Moreover, that teacher' perceptions of classroom assessment affected their assessment classroom practices. In addition, that in-service training should focus on helping teachers see the value of assessment methods rather than how to do assessment.

Stepanek (2002) added that assessment should be at the centre of instruction to give students insights into their own thinking and growth, and students gain new perspectives on their potential to learn mathematics. The shift from assessing students' achievement to assessing how they are learning helps the teacher to explore better ways of supporting the students in learning mathematics better. Additionally, assessment for learning helps the students to know the areas they need to work on. In this case assessment is used to improve both teaching and learning. Assessment for learning, therefore, becomes part of the day-to-day teaching and learning process (Susuwele-Banda, 2005).

Monitoring students' learning in mathematics may be more critical than establishing what students have achieved at the end of the course. Although achievement information collected at the end of the course is what schools, parents and teachers are mostly interested in, the information does not help the learners to learn any better, since it comes at the end of the learning phase. If learning is defined as construction or

acquisition of new knowledge, then teachers should be particularly concerned with how the process is managed and not how it is evaluated (Susuwele-Banda, 2005).

3.3.3. Teachers' beliefs about the forms of assessment

The results of this study show that teachers hold incompatible beliefs about using the traditional forms of assessment that is based on paper and pencil tests, teacher (B) noted that exams are a better way to assess student understanding especially when there are high number of students in class. On the other hand *teacher (A)* believes that exams should be eliminated; exams do not seem to be a good evaluation tool, but it is very difficult not to do exams, since exams are the only norm the students know, the ideal thing would be not to be obliged to do exams in order evaluate my students.

The teachers expressed the following beliefs about using exam:

- Exams should be eliminated; they do not seem to be a good evaluation tool, but it is very difficult not to do exams, since the exams are the only norm the students know, the ideal thing would be not to be obliged to do exams in order evaluate my students.
- Exams are not an effective way to evaluate the students, but we are obliged to evaluate by exams.
- Exams are the better way to evaluate large number of students.
- The exams allow me to see if my students understand what I want.
- The students do not assimilate and understand the concept if they do not have an exam where they had to study to pass it.
- The periodic chapter tests are necessary to assimilate and consolidate the concept, in order to use it in the future, the teacher have to establish a solid base , it's very important in mathematics.
- Periodic chapter test help us to see the problems that our students are facing in their learning process, and also we have to evaluate their daily work, both are useful and necessary.
- The assessment that occurs before and during a unit or chapter of study assesses the learning process in the ideal way, because we have to evaluate our student daily, and to follow their work.

One question might come to our minds, Should the traditional mathematics exams predominate in mathematics secondary school teaching? In this study, the teachers that participate gave several reasons why we should be concerned:

First, many students solve mathematics problems mechanically without having the ability to explain their answer; traditional forms of assessment do not encourage students to think of what they are doing. Watt (2005) argued that, while it is not necessarily true that written tests are restricted to computation and routine skills, and while they are capable of assessing a wide range of mathematical capability if set appropriately. Unfortunately, many of these tests are not well written, and the traditional mathematics test typically focuses on repetition of learned procedures using small sets of problems.

Teacher (A) added that Reasoning in mathematics is very important; she added that the explanation part of the rubric is very interesting because it requires giving a written and oral explanation, it forces them to think why they are doing that in mathematics, not just doing it mechanically.

Second, students are not motivated, there is a high number of school failure and repetition, and teachers have to look for new methods of assessment to motivate their students. Such as contests, exhibitions, projects…etc. Sainsbury and Walker (2007) mentioned four functions of assessment that relate directly to student learning: motivating learning, focusing learning, consolidating and structuring learning, and guiding and correcting learning. *Teacher (A)* noted, our students are not motivated; they do not do any effort to study that is a result of the minimum effort low; the students know that they will pass the course without studying seriously.

Teacher (B) noted, the teacher should think before choosing an evaluation method (a) if her students will understand it, (b) if it is suitable for the goals that she want, (c) the kind of motivation the she had to give to make her students do things right.

Third, there is a lot of diversity among students, every student has a different background, and it is unreasonable to use one method to evaluate all the students. (Stiggins, 2008) asserted that current assessment and grading procedures unfortunately

help some students to succeed rather than helping all students. Our current assessment systems are causing harm to huge numbers of students, and this harm caused directly from the failure in connecting assessment to school improvement in meaningful ways.

Teacher (B) in this study argued that, It's very difficult to choose a sound evaluation strategy; this greatly depends on the group of students you are working with. If the students were active and motivated then it will not cost the teacher a lot, but if the students were not motivated then it is better not to use anything new with them. On the other hand she said, No exist a perfect assessment method, every group of students have a way to learn, and for that, the teacher should try to work according to the group he/she has, as there is a lot of diversity among students. Also added there is a lot of diversity among students, there are no a stander method for all the students, every student is unique, and it is very difficult to evaluate taking in consideration that diversity. Teachers have to be up to date to all the new methods, especially these days where there is a lot of diversity. I do not believe that there is one perfect method; we should try to use all of them.

Finally, through exams teachers usually assess if the students assimilate concepts. According to the teachers, this is not enough, mathematics teachers should evaluate (1) students effort. (2) If the students have acquired that, their teachers want them to know, if they can use what they learned in a real life situation. (3) If they retain what they have learned, obviously this cannot be assessed by written exams.

Niss (1999) added that many of the assessment modes and instruments in current use in mathematics education fail to provide valid insight into what students know, understand, and can achieve, in particular as far as higher order knowledge, insight and ability are concerned. No single assessment instrument is sufficient for this purpose; balanced sets of instruments are needed.

Teacher (B) said that what experience have taught me is that the form of evaluation should contemplate and foment daily work on the part of the students. In mathematics, this seems to be fundamental; since evaluating the constancy of the work helps the students to learn and understand the material, better .*Teacher (A)* agreed, "The form in which students are evaluated should include a series of criteria. *Teacher (B)* added, "In

mathematics the teacher should concentrate on the strategies they use to solve a problem, explaining every step, what they know? What they have to do? And why? Black and William (1998) asserted that we need the type of assessment that meet all students' needs, and help them to reach the desired level, by trying to bridge the gap that exists by their current level and their desired level; in this way, student will be more motivated to learn.

On the next part, some beliefs about some forms of assessment that is used by the teachers sporadically will be discussed. For example both teachers believes that direct observation is the best way to enhance student learning and to detect any problem, but they both agreed that it's not easy to use with the large number of students in class.

The teachers expressed her desire to evaluate her student with direct observation for the following reasons:

- Through direct observation, the learning process is evaluated in a better way, as it evaluates better students' improvement and evolution (progress).
- Using direct observation will improve my assessment process.
- One of the main problems facing students of mathematics is the students misunderstand issues; we can overcome this problem by studying the level of each student in particularly, directly, by direct observation.
- Student's bad results can be improved by direct observation.
- Direct observation helps the teacher to concentrate more on every student.
- Direct observation show whether students understand or not.
- Direct observation is a good way to evaluate student's improvement.
- It is impossible to use direct observation when there are more than 30 students in the class.

Maxwell (2001) agreed that teacher observations provide teachers with a rich and diverse range of evidence on student learning outcomes from observations of their students. In addition, observing and listening to students enable teachers to respond better to students' learning needs, and facilitate teachers' ability to make informed instructional decisions (National council of teachers of mathematics, 2000).

After using the rubric with peer assessment *teacher (A)* believe of its benefits and she is willing to use it next year, she said, The students become more conscious of their own failings when they see the mistakes of their classmates, and how to correct them in order to get a better grade. In this way, they are encouraged to work harder to understand the mathematical concepts.

Teacher (B) commented that students do not know how to evaluate, so teachers have to revise students' correction, which consume a lot of time. Kerr, Park and Domazlicky (1995) concluded that student' scoring abilities as well as the quality of their work improved by using peer assessment. Although added that students are able to assess their peers work, they are able to distinguish good work from bad.

After using the rubric the teachers noted:

- Peer assessment gives the teachers more time.
- With self-assessment students can score their exam immediately, they do not have to wait days until they get there scores, as I need many days to give the student their exam corrected.
- Self-assessment allows students to learn from their failures.
- The students include many things when they assess themselves or when they have to assess their classmates. They also tend to be very critical in correcting each other's exam.
- Since the grading tends to be public, they tend to work harder in order to have a good grade.
- Peer assessment encourages the students to work collaboratively in a group.
- The students become conscious of their own failings when they see the mistakes of their classmates, and how to correct them in order to get a better grade. In this way, they are encouraged to work a little harder to understand the mathematical concepts.
- Since the grading tends to be public, they tend to work harder not to have a low grade.

* Disadvantages of self and peer assessment

- When using peer and self-assessment teacher has to review what the students have done, because probably if the students get used to the teacher always doing the

correction this way, they will not correct well and they will put things that do not belong. It is the only disadvantage of peers and self-assessment.

- It is necessary to be followed up by a supervision of the teacher.
- It takes a lot of time that we need to complete the programs.
- It is possible that some students use tricks in their answers.
- Competition and conflict among students could occur, or an argument if a student is not in agreement with the assessment of his classmate.
- This type of assessment does not save the teacher time, as she has to revise all the exams after the students.

Topping (1998) asserted that peer assessment is as reliable as educator assessment, McLaughlin and Simpson (2004) asserted that peer assessment with clear criteria could be a reliable method of assessment for groups. Williams (1992) pointed that clear criteria for assessment makes the task more objective, also with explicit criteria, students were more open to sharing responsibility for assessment. Pond and Ulhaq (1997) found that peer assessment help students to be responsible for their work. Freeman (1995) conclude that peer assessment encourage students to look at the quality of the outputs rather than only at the inputs and efforts.

Teacher (A) said that, she did not hear of inviting parents to participate and evaluate a group work. On the other hand, *Teacher (B)* noted that, Inviting parents to participate in-group work among the class, is an aid for the parents to see how the work goes. Its collaborative work between teachers, parents, but according to the teacher that can be done sporadically not every day because: First, not all parents are willing to participate; second, they do not have free time. Finally, it consumes a lot of effort a lot of effort.

Mattingly, Prislin, McKenzie, Rodriguez and Kayzar (2002) analyzed the evaluations of 41 parent involvement programs aimed at school aged (K–12) children in the United States. The results provide little support for the widespread belief that parent involvement programs are an effective means of either improving student academic achievement or changing parent, teacher, and student behavior.

About the group work and the work in project, the teachers expressed many beliefs that explain why they do not use it in their classroom. Such as:

- In the group work, always one student of the groups does all the work, and the other students do not do anything, or work less. The work is not the same.

- I beliefs that this kind of work can be used if the department do not ask the teacher to do a lot of administrative work. And do not oblige them to put a numerical grade.

- The project work is suitable for centers were the students had problems of motivation, it is a good idea to use this way, but it is very difficult to evaluate such work, how can we put a numerical grade?

- I beliefs that the work of project is more effective in the primary stage where there are a high number of schools leaving.

- I believe that, the project work is not suitable for the secondary stage, because they have many teachers, and every subject have more than one teacher. It is very difficult to make all the teacher work in one project. I think that the work by project is more suitable for the primary stage since in this stage there are not a lot of teachers in the same group.

Vygotsky (Cited in Galton and Williamson, 2004) argues that all higher mental functions are developed through interaction with either adults or peers, during some interactions the more capable people serve as mediators. They focus attention on relevant dimentions of the environment, supply strategies for dealing with problems. According to vygotsky , the skills that the child learns in this way are internalized through prolonged developmental process and once internalized the skills learnt are no longer subject to the same rules that controlled them previously during the interaction with adults and peers. Without the interaction with other children, it is difficult to internalize new skills and only after a skill has been internalized to be carried out independently. There is therefore a gap between what children can do in conjunction with other people and what can they do alone (Galton and Williamson, 2004).

Vygotsky, therefore stresses the co-operative nature of learning: learning a wakens a variety of developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with peers. Once these processes are internalized, they become part of the child s developmental achievement (Galton and Williamson, 2004).

Brown (1994) decided to have her students do semester-long projects. She wanted them to have an immediate application for what they were learning in class, and she wanted them to walk away from the course with a product. The students were required to design, carry out a statistical study, and then present their data with a brief analysis in a report.

Students were given guidelines for the projects, and they all know what was expected of them, they first had to choose a topic and whether they would do a survey, an experiment, or a study based on available data. Examples were given in each category, but the students were urged to choose a topic that truly interested them. They were told that they needed to get information about several different factors concerning their topic since they would be required to explore how the factors were related. Eventually they would examine associations between their variables by constructing tables of cross-classified data or computing correlation coefficients; however, it was difficult to make these requirements precise early on. The report was to consist of a detailed explanation of how or where they got their data, a display of their data in tabular and graphical form using the spreadsheet, and a brief summary of any interesting information they found. The students were to summarize their data and provide any statistics that would help describe their data. They were to discuss any patterns or relationships they found. Moreover, the researcher shared the student with the timetable, the requirements at each stage, and what had been covered in class at each point (Brown, 1994).

At the end of the semester, the students were asked to comment on the course including the project component. Of the 21 questionnaires completed, only three had negative responses to the project-related questions, these were complaints about the amount of time, and effort the project and the computer work required. The rest of the comments were positive, indicating that the students thought the projects were a worthwhile part of the course and that they had learned something from doing it. Some of the most specific comments included the following:

- The project was a good way to tie the course together.
- The deadlines were reasonable and I did actually enjoy seeing the project go from its early stages to the final completed report.
- It brought the entire material together well.

- The project was interesting because it was a topic of our choice.
- The project made you look at statistics in hands on way.
- Most of the students found the periodic deadlines and feedback very reassuring. It also helped them regard the projects as a learning experience and not focus on the grade.

Teacher A and B don't have a lot of information about competences evaluation, *teacher A* noted that competences evaluation is poorly structured, as they ask the teacher to evaluate student's skills in all the subjects together and then they asked him to put single number for every subject in order to put it in his record. This is very difficult. In addition, this type of evaluation is legislated but on the reality, it is not applied as it is written it is applied randomly. Every teacher applies it in his own way; because it is not something that is regulated, well it is legislated admitted the teacher. However, the thing that it is so subjective; every teacher adapts it in his way.

Teacher B noted that, this form of assessment could be used in a school where the teacher can teach all the subjects, and without having to put a numerical grade. It is better to use it in primary since the grades at the high school are very important in order to have a scholarship or on determining the degree that the students can have.

3.3.4. Teachers' beliefs about students learning

Teachers A and B noted that, now a days the students are not motivated, they don't make any effort to enhance their work. According to *teacher (A)* this is all a result of the bad evaluation system in Spain. According to the low of the minimum effort the student can pass the course without having to make a lot of effort, so the students are not motivated, as they can pass the course. When the excellent students find that he/she can get the same result with minimum effort, they will not do more effort to get the same. The students should be given motivation in order to work.

Moreover, the student who failed two subjects should not pass the course, in order to motivate him to study. Because if we let all the students pass at the primary stage we gather the school failure from the primary with the failure in the secondary, and the good and excellent students will be affected negatively.

The statements that reflect teachers' beliefs about students learning:

- I believe that the students in the past used to study more, they were more motivated, but nowadays although there are a lot of thing and tools to motivate students, the students do not work seriously.
- Students nowadays do not work although there are many forms of assessment. In the past students worked and learned more, because they like to learn and to do more projects, but things have changed now it is very difficult to find students who have all their work up to date, and who want to complete many projects.
- The students always choose not to take exams, because they do not want to study. They are very lazy and want the minimum law of effort.
- When the excellent students find that he/she can get the same result with minimum effort, they will not do more effort to get the same. The students should be given motivation in order to work.
- The student who failed two subjects should not pass the course, in order to motivate him/her to study. Because if we let all the students pass at the primary stage we gather the school failure from the primary with the failure in the secondary, and the good and excellent students will be affected negatively.
- One of the main problems facing students in mathematics is that they do not understand things well, Many times, for example, students who are not brilliant do not even know what to do in order to pass. Moreover, this could be solved by studying the level of every student alone.
- It is always true that there are few students, who may catch or understand the concept or the idea from in the first time; therefore teachers should put an exercise and say: What comes next? Try a little to involve them, try to make them participate in what you are explaining, is the only way to know if they have understood or not.
- I do not prefer using new forms of assessment because when I use another way of assessment some of the students will manipulate and cheat. Students cheat in the exams that count for the grade. Imagine if you know that in this exam, you are going to autocorrect it, -we care for the note-, sure you are going to try to change the answer. This is the only problem.

- After using the rubric with self and peer assessment, Students can use self and peer assessment right. The only thing teachers need to do when using self and peer assessment is to take a way the pen to avoid cheating, or let them correct with red pen only.
- On the other hand when using self and peer assessment teacher have to review what the students have done, because probably if they get used to the teacher always use this way of assessment, they will correct less, and sometimes they will not correct well and put things that do not belong.
- After using the rubric I found that the students are very accurate and fair when correcting their peers exam, also they are very strict when using self and peer assessment.
- I believe that every student has his own way of learning, for that the teacher has to use assessment method that is suitable for his group of students, she added that now a days there is a lot of diversity for that teacher cannot only use one method to assess all the students the someway.
- The students don't make any effort to think about the problem's they are solving, and do things mechanically, as a result they don't explain the reason why they solved the problem this way, and they don't know how to apply math problems on a real situation, it's very difficult for them to adapt or use mathematics in real world situation.
- If the student saw that the method that the teacher use to assess them helped them to enhance their learning and raised their score they will be very satisfied, the student enjoy when they learn new things and apply it to the daily life.
- The student don't assimilate and understand the subject until they have an exam, where they had to study to pass it, otherwise they don't study , for that she thinks that assessment is a way to make a pressure on the students to study.
- Students enjoy and learn more when teacher participate on activities outside the classroom, for example they participated on a statistical contest, and they won an award, the students were highly motivated, and they saw that what they learn in class have application in real life. According to the teacher, this gave her a lot of satisfaction.

- Also they thinks that students can't use self and peer assessment as they don't know how to assess, and make problems among students, but they think that this form of assessment makes the student aware that the evaluation process isn't easy.
- Sharing students with evaluation is very difficult, as they do not know how to assess, for that it took a lot of time from the students also from teachers, as they have to revise all of the students' self- assessment. In addition the student do not gain any benefit from that process.

Bezuk, Cathcart, Vance and Pothier (2001) noted that in a constructivist setting the teacher is responsible for establishing a learning environment that sparks children's interest in mathematics. This can only be achieved if the teacher is able to provide learners with appropriate materials, activities and support. However, for teachers to be able to provide relevant activities and materials they must understand the learning needs of their students, and this is obviously could not be achieved by traditional forms of assessment. *Teacher (B)* noted if the student saw that the method that the teacher use to evaluate them helped them to enhance their learning and raised their score they will be very satisfied, the student enjoy when they learn new things and apply it to the daily life. In addition, the students enjoy and learn more when teacher let them participate on activities outside the classroom. For example this year they participated on a statistical contest, and they won an award, the students were highly motivated, and they saw that what they learn in class have application in real life; according to the teacher, this gave her a lot of satisfaction.

Teacher (A) said that students do not assimilate and understand the subject until they have an exam where they had to study to pass it otherwise they do not study. For that she thinks that the evaluation is a way to make a pressure on the students to study. According to Frankland (2007) this type of approach only tends to encourage surface learning by students and to cause the negative backwash effect, just to rote learn how to answer standard questions, and then after the examination is finished, and they have obtained their grade, they forget most of what they learnt (if anything) and move on to the next subject. The teacher plays a key role in this process, and if there is an emphasis on this type of assessment, it only leads students to focus on how to get the highest grade with the minimum effort.

Teacher (A) noted that that: One of the main problems facing students in mathematics is that they do not understand things well, many times, for example, students who are not brilliant don't even know what to do in order to pass. Moreover, this could be solved by studying the level of every student alone. *Teacher (B)* also commented it is always true that there are few students, who may catch or understand the concept or the idea from in the first time.

It is clear that there is a lot of diversity among students, and it will be not worthy to assess all the students the same way as the exams are usually done after any unit or a group of units so it does not provide students with the needed feedback. when teacher use several assessment strategies, he actually open new doors to students who have been unsuccessfully in a more traditional classroom, in addition, teacher gain a more complete picture of students leaning and achievement, some types of assessment tasks focus more on students ability to perform mathematical procedures while others emphasize more high- level thinking and problem- solving skills . *Teacher (B)* added I believe that every student has his own way of learning, for that teachers have to use evaluation method that is suitable for their group of students, she added that now a days there is a lot of diversity, teachers cannot only use one method to assess all the students the same way.

3.4. The methods that a secondary mathematics teacher uses to assess students understanding

The main forms of assessment that teachers use to evaluate their students in mathematics in the secondary stage, according to the teachers they assess:

*70% of the students work by written exams.

*15% students' attitude toward the subject, and towards the members of the educational community (by unclear methods).

*15% for daily work at home and in class (by unclear methods).

The teachers added that they evaluate their students with written exams during the whole year they do not change. Also clarified that maybe teachers in other subjects as

languages, can use other forms of assessment, but generally, *teacher (A)* do not know anyone that uses other forms of assessment in mathematics.

A part of the 30% of the students' grade comes from the student notebook. The grade of the notebook is given every semester. However, daily the teacher have a look at her students notebook and check if the students did their homework and if it's clean or not, she doesn't assign a numerical grade daily, but she usually put expression such as good, bad, regular, positive or negative, as a part of the daily work.

The teachers noted that they use direct questions to see if the students understand what they want, the teacher usually explains and then ask a question and if the all the students remain silent that mean that they did not understand.

They always assess student after each unit or a group of units, they never did it during the unit. They are used to give their students many exams and students score is the average of all the scores.

3.4.1. Teachers' satisfactions with traditional methods

The teachers were not satisfied with the traditional methods of assessment, as students' results are not good; and there are a lot of school failure and repetitions. *Teacher(A)* pointed that mathematics teachers agreed that something should be done to overcome this school failure, because the things are not going as they want, the results are very bad, and the students levels in mathematics is very low. "I think the form of assessment, like so many things in education, must be changed. Not because it's bad, but because the results and the level of our students are not as we want" (IS3TA, p.27: [04:45-06:04]).

Teacher (A) also commented that for the most students the teaching-learning process is not complete. Teachers teach or explain until they think that students understand or comprehend the concepts. Then they check this degree of students understanding by asking certain student to solve a problem on the board, which is not enough for all the students.

Teacher (A) noticed that in the past, the number of the excellent students was more and the number of bad students was less than now a days . She commented that it is a result

of the bad evaluation system as the student could pass the course even though he/she does not have the appropriate mathematical level.

Teacher (B) was relatively satisfied with the traditional methods of assessment; according to the teacher, the exam is the best way to help the students to assimilate the concepts (IS2TB, p.38: [05:57-06:39]). She do not prefer using more than one evaluation method as the students will get lost, she added that the student have to get all the evaluation method that will be used at the begging of the academic year.

On the second interview *teacher (B)* expressed her dissatisfaction of the traditional methods, she said that they are obliged to evaluate their students with the numerical grades by exams, some time they are not satisfied but they are obliged.

She added that there is no a perfect evaluation method, and suitable for all the students, every group of student has his/her own way of learning. The teacher has to follow the learning way of his students, as there is a lot of diversity among the students then one certain method is not enough for all the students.

Well we are accustomed to use traditional forms of assessment, what happen that its difficult for us to change, but it's important to use other forms (IS4TB, p.52:[01:14-01:34]).

Teacher (B) noted that normally they taught us to put a numerical grade for the students advance in learning, I think it is not good, we have to see the effort that the student put and if you have acquired at least some of what we tried to teach them.

She teacher also said that this is not on the hands of the teachers this all set by the department of mathematics, all the evaluation criteria and methods in the school are fixed by the department.

Although assessment reform has been a major educational issue in many countries including Spain, the characteristics of the evaluation system that the teachers are following in 2013 are similar to characteristics of the evaluation system before 20 years that was mentioned on Rico (1993):

1- There is a rigid pattern of timing, since the assessment is centered on one or two written tests each term, with some weeks dedicated exclusively to carrying out examination or reexamination.
2- The explicit aim of the tests is to give a course mark.
3- The overall character of the marks given to the pupils is that of a summary of different aspects and information obtained with different exercises; the complexity of the learning achieved by the pupils is masked by assessment that yields one item of information.
4- The level of an accepted command of the knowledge is indicated by an arbitrary line, which is called the "pass level", or to have a (5 out of 10).
5- Neither the students' mistakes nor their unanswered questions are in any sense evaluated.
6- There is a compulsory retest in September for a considerable number of unsuccessful students; those who do not pass the retest must repeat the course (Rico, 1993).

Black (1998) argued that the main weaknesses in classroom assessment are that:
Classroom evaluation practices generally encourage superficial and rote learning, concentrating on recall of isolated details, usually items of knowledge that pupils soon forget.
Teachers do not generally review the assessment questions that they use and do not discuss them critically with peers, so there is little reflection on what is being assessed.
The grading function is over-emphasized and the learning functions under-emphasized.
There is a tendency to use a normative rather than a criterion approach, which emphasizes competition between pupils rather than personal improvement of each. The evidence is that with such practices the effect of feedback is to teach the weaker students that they lack ability, so that they are de-motivated and lose confidence in their own capacity to learn (Black, 1998, p. 111).

Shulman (1986) asserted that the assessment of mathematics learning remained virtually unchanged throughout most of the last half century. In most classrooms assessment was limited to evaluations such as: (a) class work where student completed practice problems that mimicked the skills and procedures demonstrated by the teacher during instruction, (b) homework that usually consisted of more skills- and procedural-based problems to be completed at home for further practice, (c) quizzes and other tests given

at the end of chapters, units, and semester that were periodic assessments of skills and procedures demonstrated in class, (d) standardized tests that were normed assessments so that comparisons could be made among students, schools, districts, states, and countries. Student usually completed these assessments individually using only paper and pencil as tools (Shulman, 1986; NCTM, 2000).

Classroom assessment must change in two fundamentally important ways. First, its form and content must be changed to represent important thinking and problem solving skills in each of the disciplines. Second, the way that assessment is used in classrooms and how it is regarded by teachers and students must change (Shepard, 2000, p. 5)

Traditional assessment forms focus on a single skill or fact, which is not presented in a multiple-choice format on a test. These assessment practices were based on the notion that learning mathematics meant mastering a series of isolated bits of knowledge disconnected from other subjects or the real world. Berenson and Carter (1995) said that, traditional assessments have contributed to students' pursuits of grades rather than pursuits of learning. They suggest that broadening the system to include alternative assessments that provide an opportunity for students to make conceptual connections and reflect on understanding can refocus students towards the pursuit of learning.

According to Moskal (2000) a single score can't provide the students the needed feedback. For example, a student who gets a 70 out of a 100 may not know how to improve his/her performance on the next assignment. With a single score, students are often left with a lack of clarity on the specific cause of drop in points or how to improve. In contrast, well-written instructional rubrics can provide clearness and equity to the process, can provide the student useful feedback, and can precisely indicate performance expectations using a variety of categories that focus on specific criteria. Thus, they assist students in better understanding how the instructor scores their papers (Andrade, 2000). *Teacher (A)* noted "One of the main problems facing our students in mathematics is that they do not understand things well, Many times, for example, any student who are not brilliant don't even know what to do in order to pass" (IS4TA, p.33: [13:02-14:28]).

The result of this study support Altinisik, Demirbas, Bayrakci (2011) study results that teachers mostly use filling in the blanks, multiple choice tests, true or false, written examinations, project and performance evaluation activities. The teachers have also expressed that they do not frequently use alternative measurement and evaluation techniques due to the time limit.

Also Grimison (1992) study result indicates that: (1)-Traditional written tests dominate other forms of assessment; 2- Attitudes to using alternative methods of assessment in the class room were fairly negative; 3-The most common forms of alternative assessment were, oral, practical, observation, and students' journals, many teachers indicated that many of these forms were used in their assessment, but only as informal assessment which didn't contribute to the final mark.

Also it supports the results of Watt (2005) study that indicate that the main assessment method teachers reported using was the traditional mathematics test. Other methods they listed were assignments and bookwork/homework (which likely overlap each other), observation, problem solving, practical work, oral work, and group work. Of the alternative assessment methods, the most common form used was assignments, followed by observation. Raboijane (2005) results also showed that few mathematics teachers use alternative assessment methods.

Beckmann, Senk and Thompson (1997) studied the assessment and grading practices of (19) high school mathematics teachers. Their study revealed that the most frequently used assessment tools were tests and quizzes and these determined about 77% of students' grades. Twelve of the nineteen teachers used other forms of assessment, such as written projects or interviews with students. These other forms of assessment counted for about 7% of students' grades. They found that test items were of low level, involved very little reasoning and were almost never open-ended.

Susuwele-Banda (2005) revealed that the teachers had limited ways and methods of assessing their students. These teachers mainly used tests to assess their students. Although teachers gave individual exercises toward the end of every lesson, the exercises were given to the students to practice and consolidate what the teacher had just demonstrated. This kind of approach encourages memorization of procedures and

processes. Also revealed that, teachers use exams results to promote students from one grade level to the next, and to check if they have mastered the subject matter at the end of a topic or term. This seems to suggest that assessment means testing.

Morgan and Watson (2002) reported that most middle and high school teachers use teacher-constructed tests to assess students' achievement. In addition, Morgan and Watson found that most teachers view classroom assessment as an added requirement to their teaching job and not as a tool to improve their teaching.

Cooney (1992) study, and Garet and Mills (1995) found similar results. Cooney surveyed high school mathematics teachers' assessment practices while Garet and Mills surveyed grade 4 to 12 mathematics teachers across the United States. Both studies reported that teachers mostly used short-answer tests for assessment. The two studies further reported that there was a strong influence of readymade tests on classroom practices. Teachers use the readymade tests without making modifications to them (Cooney, 1992; Garet and Mills, 1995).

The results of the current study indicate that teachers are not satisfied with the assessment methods they use, this result counter Watt (2005) results that showed that teachers were satisfied with traditional tests as valid measures of student ability, particularly for senior school years. Teachers in her study did not favour implementing alternative assessment methods, although those with the least years' teaching experience reported more positive attitudes. A major concern raised by teachers about the use of alternative assessment methods related to their perceived subjectivity.

Rico (1993) asserted that, the intellectual restlessness of the Spanish teachers in general basic education with respect to assessment is an indicator of their awareness that there is a strong need to orientate the evaluations and judgments of the teacher in direction that will contribute to effective learning and to the development of self-esteem, communication ability, and social integration. *Teacher (A)* noted, "I think the form of assessment, like so many things in education, must be changed. Not because it's bad, but because the results and the level of our students are not as we want" (IS3TA, p.27: [04:45-06:04]).

In order to enhance the assessment in mathematics teachers according to Rico (1993):

1- Should consider assessment as a continuous and interdependent process with the other components in the curriculum; content, objective and methodology, but rather must be contemplated as interconnected. Assessment is not an isolated single element but one that should impregnate all the stages that make up mathematics teaching and learning.

2- The formative and orientate character of assessment is another idea that has to be developed, assessment should be considered a critical judgments that stimulates, orientates, and promotes better understanding, and a greater control of knowledge on the part of students , that shows success, and that make them feel satisfied with the effort. The teacher should stimulate and develop this style of working on a daily base.

3- Need to use a variety of methods and instruments, some that are systematic, and others that favor the creative aspects of mathematics (Rico, 1993).

3.4.2. Desirable assessment methods

Teacher (A) said that next year she would propose using peer and self-assessment with her students, according to her when the students involved in the evaluation process, they can see their weakness point. Also the students can correct honestly, sometimes they are stricter than the teacher, which is good because it makes them aware and feels more involved in the education process, and these things are good for the students' character.

Both teachers pointed that they would enjoy more evaluating the students by direct observation, not by tests, without papers, just watching their work and its evolution, but of course this is impossible complained the teacher, because of the large number of students they have in class, they have sometimes 30 students, it is impossible to do anything like that.

According to *teacher, (A)* she would like to evaluate her students by directly observe their work, because, "In this way the learning process and the student's improvement and evolution can be evaluated better" (IS1TA, p.14: [06:40-07:04]).

Both teachers are willing to use the rubric with their students, one of them said, "I hope I will be able to use it (rubric) all the year" (IS4TA, p.30: [01:55-02:29]).

Teacher (B) commented that this rubric seems interesting.

Both teachers did not use the rubric before; actually, they did not have any idea about the rubric.

3.4.3. Reported use of alternative assessment

Although the most common method to evaluate students work in Spain according to the teachers is the exam, the teachers pointed that recently they are investigating the group work in which the teacher divides the class in to groups and assigns a task to every member of the group. At the same time, the teachers asserted that, recently there are many calls to use competencies based evaluation instead of content- based evaluation. This year they received some training from the center about how to evaluate competences rather than blocks of contents; they showed them some classes in which they used group and collaborative work, some teacher tried to use it. Nevertheless, it's (still green) under investigation.

When *teacher (B)* was asked if she use alternative forms of assessment, she said that she sometimes use projects, groups and collaborative work, "normally I use direct observation in the classroom, problem solving strategies, group work, present a topic orally, how do they express orally to the public, then content exams" (IS3TB. p.43:[00:53-01:21]).

Teacher(B) added that, "before I start a new subject, I make sure that the students have the necessary previous ideas, if they can apply what they learn? How did they assimilate it? And how do they explain it to each other make as a professor? I make sure that my students understand the content by, asking a lot of question, let the students participate in class, solve problems at the bored, and I let some students give a class as a teacher, in this way I know If they understand or no" (IS2TB, p.41:[[06:19-06:37]).

Regarding the rubrics, *teacher (B)* did not have any idea about them, but when the teacher was given information about the rubric, she said that she has a paper for every student that is very similar to the rubric, it is divided to three parts: the attitude part, the procedural part and conceptual part. In the attitude part, they evaluate the teamwork, daily work, and attitude towards the subject. On the procedural part, they assess the organization, the reasoning, notebook, correcting the errors, completion of work and

analysis of images, graphics, etc. In addition, the third block is conceptual part they evaluate if the students assimilate the concepts, apply them to real situations, solve problems and explain it with accurate mathematical vocabulary (explains it well). The difference between that paper and the rubric according to the teacher, that the teacher don't sign a grade or a number on this paper, if the student was able to reason the concept and explained it consistently and applied it correctly and not mechanically, the teacher assign a number randomly not explicitly. On the other hand, the rubric requires assigning a number to every section, which is more objective.

Furthermore, *teacher (B)* highlighted the importance for exploring and using new forms of assessment such as competition. "We have to search for methods to motivate students added the teacher. For example, this year we participated in a statistic competition, and the students were motivated, and they said, "This is what we prefer", because they saw that what they are learning can be applied in real life situation" (IS2TB, p.41:[06:45-07:19]).

Also she said that she know some teachers who have invited parents to participate in group work among the class, its collaborative work between teachers, parents, but the teacher argued that it can be done sporadically. First, not all parents are willing to participate or they do not have free time. Moreover, the second thing is the teacher has to put a lot of effort.

One of the methods the *teacher (A)* used this year with a group of students in the second semester, she tried not to evaluate them by test, because she had only 13 students she assessed them by reviewing everything they have done at class and at home, and it was successful. However, what happens is that even so, there are five of the 13 have not even been able to keep up with this pace, because they did not study.

One of the strategies that *teacher (A)* also used to help her student to learn, was to ask her students to copy the necessary theories from their books. Since the students have to return their book at the end of the year, and her goal was to let them use these formulas to solve activities that contain finding the area and the volume of some geometric shape, and she assessed them accordingly, and In this way the students didn't forget what they learn.

When the *teacher (A)* was asked if she use more than one method to evaluate her students. she answered, In high school she prefer to use a hard and rigid and more traditional evaluation process, because there is an agenda and a schedule to meet and a syllabus to follow, and also they cannot decrease the level we must take in our account the compulsory syllabus in high school. However, in the ESO she added that they can use different forms of evaluation, evaluation criteria, and other ways of evaluating that are based on the students work, on the students' daily work, and on their behavior and attitude.

Teacher (A) also pointed that she did not used rubric or self and peer assessment before, sometimes she evaluated students' skills on using calculators, and she admitted that:

We evaluate what we think they have learned. We do not have any strategy that the students can participate in the evaluation process (IS4TA, p.30: [00:09-00:56]).

3.5. The difficulties that face or prevent the teachers from applying new forms of assessment

The results of the current study presents many difficulties that prevent or make it difficult for the teacher to apply new forms of assessment, such as the insufficient time, the large number of students in class, difficulties from the department of mathematics, difficulties from the evaluation system, difficulties from the students, teacher preparation and difficulties from the method itself

Obstacles in implementing alternative assessment are worthy of attention. Attention should not be paid for the test scores, teacher educators must continue to advocate for the primary objective of assessment: to help students learn rather than to fail them (Serafini, 2002; Stiggins, 2002).

also the teachers mentioned some difficulties caused from the department of mathematics for example they are obliged to evaluate according to the department plan, the teachers don't have freedom to evaluate her students, in addition to the administrative work the teacher have to do.

It seems clear that whatever happens with external, imposed assessment, a key direction for the future lies in the development of teachers' classroom assessment skills (Gipps, 1999, p. 387).

Other problems come from the evaluation system; the teachers complained that the evaluation system in the secondary class is grades-driven, for the measurement purpose. According to the minimum effort low if students have low level he/she can pass to a another class (level), although they may have six suspended marks, they may pass the course, as a result the teacher focus only on putting the final grade and classifying students to pass or fail the subject using exams.

Teachers need to 'step up' and challenge the current assessment paradigm. We need to question the traditional school structures and assessment practices that limit the possibilities of children (Serafini, 2002, p.83).

Watt (2005) also found that the main reasons that secondary teachers don't not employ alternative assessment methods were (a) insufficient time for implementation, (b) unsuitable, (c) unreliable/ subjective, (d) insufficient resources at hand to permit implementation. The final category, (e) suitable and beneficial, related to employment of alternative assessment methods

Another major difficulty is that the teachers don't have information about the alternative assessment tools that could be used in mathematics, they only know the methods that the department of mathematics obliged them to use, as they graduated from the faculty of science and not from the faculty of education, for that they don't have any new forms of assessment. "When I studied to teach, my major was mathematics, but they did not teach me how to give a class or how to evaluate" (appendix 7, p.20: [09:23-10:04]).

Janisch, Liu and Akrofi (2007) noted that one of the important aspects of implementing alternative assessment is knowledge about the theory that undergirds and supports various assessment means and the benefits to both students and teachers. The use of portfolios or other alternative assessment tools requires a theoretical knowledge base about the purpose underlying their use, such as responsive teaching and children's metacognitive awareness of their own accomplishments and future learning goals.

Broadening and deepening teachers' knowledge base about alternative assessment methods and the underlying theory is critical. Offering preservice and in-service teachers the "how to do" as well as the "how to think" would enhance teacher preparation and development and reinforce the status of teachers as professionals who are able to engage in reflective decision making (Janisch, Liu and Akrofi, 2007, p.8)

Fennel, Heiss, Kobett, and Sammons (1992) suggest that specific training is necessary for teachers to learn to assess children's thinking by analyzing students' discourse. Dean (1999) contends that most teachers' education programs skim over classroom assessment, leaving teachers to assess in the way they were assessed when they were in school.

Hoffman, Paris (2001) surveyed teachers to determine how testing affects teachers, students, the curriculum, and instructional practices. The results showed that excellence in teaching might be threatened or compromised by high-stakes testing, and that alternative assessment and classroom-situated measures of student achievement offer viable means of improving teaching and learning. Therefore, helping university students in teacher preparation programs, as well as in-service teachers, to understand alternative classroom-based measures and be aware of the procedures and underlying policies of standardized testing is essential.

In addition, the students are not motivated, they do not work because they know that they will pass the course with a minimum effort they will not do any additional effort to enhance their work. They also mentioned that, the parents make it also difficult to use new forms of assessment, as there are many complaints from the parents about assessment. It is very difficult for the teacher to go out of the norms, it is better to follow the department methods in order to be able to define the grade that you assign for the students.

the results of this study also support Zepeda and Mayers (2001) that teachers not only lacked experience with designing activities that could be alternatively assessed and but also felt the pressure of accountability and thus "played it safe" and only used paper-and-pencil assessments. One teacher indicated that he would not be in a defensible position if a student or parent challenged a semester grade when using assessments

other than paper-and-pencil assessments. The first-year teachers' assessment problems were furthered complicated by the administration's stressing accountability and student achievement.

Yang (2007) study also conclude that difficulties such as heavy work load, time constrains, classroom management, and pressure from parents may impede teachers from use alternative assessment tasks, and added that teachers' beliefs affect their extensive use of assessment techniques, teachers in this study perceived alternative assessment to be more difficult from traditional assessment.

One teacher added that mathematics, as a subject does not allow teachers to use alternative methods of assessment; other subjects like languages different forms of assessment could be used. *Teacher (A)* noted that she do not know any mathematics teacher who uses alternative forms of assessment. Watt (2005) also found that Teachers generally perceived mathematics curriculum as permitting utilization of alternative assessment methods.

The results of this study support Raboijane (2005) study result the Participants pointed out a number of constraints that impede the use of alternative classroom assessment. They mentioned inadequate resources: time and large classes as the major limitation to the adoption of classroom-based assessment practices. The nature of the examination-driven education system is also another valid factor that dictates teachers' assessment practices. Teachers do not want to risk losing precious time for content coverage by trying out innovative assessments, as this would compromise the performance of their students in the public examinations. Their stand is supported.

Raboijane (2005) concluded that few mathematics teachers use alternative assessment methods, partly due to their ignorance in the value of this kind of assessment and partly because of the structural constraints. Since the education system in Botswana is examination driven, the success of the education system is judged by the performance of students in the examinations, which is taken as evidence that learning has occurred. Consequently, teachers' instructional and assessment practices are highly influenced by the need to make sure students pass the examinations at the end of their junior secondary education.

Clarke (1987) suggested that mathematics teachers oppose the idea of using alternative assessment techniques in order to protect the high status accorded to mathematics in our society; mathematics teachers oppose the idea of using alternative assessment techniques. This explanation may also relate to the extent to which mathematics is perceived as objectively assessed, with an implicit assumption that numerical ratings are more defensible than other forms of assessment, Despite the fact that such scores or ratings may subsume elaborate judgments that remain invisible (Delandshere and Petrosky, 1998). Other possible explanations relate to teacher indifference, given the lack of any imperative to change their assessment practices; or to deeply embedded knowledge's and beliefs about teaching mathematics (Firestone, Winter, and Fitz ,2000).

OCDE (2008) added that while formative approaches to teaching and assessment often resonate with practitioners and policy makers, there are barriers to wider practice. They include:

- Perceived tensions between formative assessments and highly visible summative tests to hold schools accountable for student achievement (teachers often teach to these summative tests and examinations).
- Fears that formative assessment is too resource-intensive and time consuming to be practical.

Chen (2003) concluded some difficulties that primary school English teachers while employing multiple assessments were time constraints with work overload contexts, large class size, time-consuming activities, and notions of subjectivity surrounding multiple assessment.

Aschbacher (1994) addresses some of the barriers that facilitators encountered in helping educators design and use alternative assessments at the classroom and district level, researchers provided technical assistance to teachers and administrators at six sites and collected data on problems encountered and educators' evolving concepts of alternative assessment. Data was collected primarily via written surveys, interviews, and observations of working sessions. The key areas of difficulty educators faced in developing a deep understanding of alternative assessments included a tendency to focus on classroom activities rather than student goals, uncertainty in specifying criteria dimensions and desired performance levels for judging student work and anxiety about

the high stakes of assessment. They also faced several generic challenges to implementation, such as lack of time, training, reluctance to change and planning. Facilitators included a sense of purpose, being part of a group, administrative support, and sustained technical assistance or coaching. Many teachers reported that grappling with alternative assessments led to more positive views of assessment, greater reflection on their own work increased collegiality, and clarification of goals.

3.5.1. Teachers suggestions for improving the current assessment practices

The teachers suggested the following in order to enhance assessment current practices:

- Teachers have to be more like psychologists and less like judges of the children. They must change their way of thinking, as teachers are used to evaluate only what students know or what they have learned, they should learn to evaluate the development and the learning process, from the beginning until the end, that's what teachers should value more.

- In addition, teachers should be provided with a lot of information and training in the new evaluation techniques, as teachers do not know how to evaluate well; they need a lot of information and training.

- They also recommended that, teacher should participate in professional development seminars and conferences, according to the teachers one of the most interesting things that can improve the results of the students, also mathematics teachers should concentrate on helping the students to use what they learn in real life situations, by providing them with more exercises and more practice.

- On the other hand teachers should work to enhance their assessments strategy, "One way would be to recycle ourselves, because we are stagnant in the same way for more than twenty years ago, and things have changed" (IS1TA, p.15 : [18:24-25:06]).

- *Teacher (A)* recommended change the law of the minimum effort as it affect both the teachers and the students negatively, the students don’t make any additional effort to enhance their work, and as a sequence the teacher evaluate only to see who get the required minimum level, and to see who success and who fail. "When the

student knows that they can pass the course with minimum effort they will never put more effort to have the same result" (IS4TA, p.34: [14:34-18:20]).

- In addition, they suggested that the student who fails two subjects should not pass the course, in order to avoid joining the failure of the young with the old. They also recommended that the teacher should keep searching for new methods to motivate their students. They added that not only the students need to be motivated but also the teachers using good new forms of assessment give the teacher satisfaction and motivation. *Teacher (B)* suggested that teachers should be motivated through an external exams or events that the student can see that their teacher is better prepared than the others are.

- They also recommended changing the department policy about assessment as follows:

- To give teachers the right to evaluate their students as they find it suitable.

- To change the current evaluation percentage which is 70% for written exams and 30% for the students' attitude and his notebook? Because some students can pass the course without having the appropriate mathematical level.

- Teacher should not be asked to do administrative work; *teacher A* and *teacher B* complained that the department asked them to do many administrative papers.

- Teachers should not be obliged to assign a numerical number when she evaluates her students, and to have the opportunity to evaluate her students properly.

- Exam should be eliminated, as the exams do not seem to be a good evaluation tool.

- Students should be evaluated by direct observation.

- The high number of students in classes should be reduced.

3.6. Understand the process of rubric application in the secondary classroom

3.6.1. Students' opinion about introducing rubrics

Students' comments regarding rubric use were consistently positive. Most of the students found positive relationship between using the rubric and their learning. Some students claimed that using the rubric in problem solving raised the quality of their answers. Also some students claimed that using the rubric facilitate understanding the topic content. According to the students, before using the rubric, they and the teacher have to solve several problems in order to understand the topic content. However, with the rubric it is enough to solve one or two problems to understand. Also some students claimed that it is easy to get some scores in the exam. Others considered it very difficult to have full mark because it requires a lot of explanation to have a high quality answer.

These findings provide support for Heidi Andrade, and Ying Du (2005) results that the rubric helped the students to focus on their efforts, produce work of higher quality, earn a better grade, the students' comments also revealed that most of the students tend not to read a rubric in its entirety. Jonsson, Svingby (2007) added that Rubrics seem to have the potential of promoting learning and improve instruction. This also lends support to the view that rubrics have the potential to act as 'instructional illuminators' (Popham 1997, 75).

The students found that using the rubric in problem solving is more difficult and more complicated than solving without the rubric, since it requires much explanation and consumes longer time than usual. Those students found it difficult to complete solving the problem according to the rubric. Also Students used to provide numerical answers to math questions. However, using the rubric forced them to explain what they had learnt orally or written format. Therefore, students should understand every step in problem solving to be able to explain it perfectly. Thus, according to students, the rubric forced them to study more and subsequently they learn more. Moss, Gosnell, Brookhart, and Haber, (2002) asserted that using analytical rubrics can help both students and teachers to become expert problem solvers, decision makers, and goal getter.

Most of students criticized the time of rubric application, as the rubric was introduced to the students during the third semester. Students express their dissatisfaction with this sudden introduction and state that it would be more beneficial to them if the rubric was introduced in the first semester. Some students advise that students should be exposed

to rubric at primary years of their study. According to students, the time did not allow training, practicing and good understanding of the rubric. Andrade (2000) asserted that to enhance student learning it's not enough to provide a rubric to middle school students, and concludes that students must engage deeply with rubrics, perhaps by co-creating them and using them for self- and peer assessments. Petkov and Petkova (2006) also suggested that involving students in the development and use of rubrics or sharing an instructor-developed rubric prior to the submission of an assignment was associated with improvements in academic performance.

Some students found it difficult to understand the rubric, they asked for more practice and training. According to them two or three hours of training is not enough to understand what a rubric is and how to use it in problem solving and in scoring. Since it was the first time they used rubric. That support Heidi Andrade (2005) article finding that Students need help in understanding rubrics and their use. She said, "When I once handed out a rubric that we had co created in class and assumed that students knew what to do with it because we had co created it, I was in for a surprise. The more motivated students anguished over what to do with it and the less motivated filed it in their notebooks and promptly forgot about it. Most of them had never seen a rubric before, so I needed to explain it and give them a bit of practice with it by doing a mock critique as a class" (Andrade, 2005. P2).

Also the students found it difficult to understand the rubric scoring system, a possible explanation of this finding is that the teacher designed the exam in a way that the questions have unequal scores however, Question 1 equals two points, Question 2 equals three points and Question 3 equals five points, while the rubric is designed to assess each question with a fixed score that equals 10. Students faced difficulty in the conversion of scores for each question.

Some students complained for difficulty in assessing their peers, as they are not accustomed to assess each other, it create problems between them. Which agreed also Heidi Andrade (2005) article finding that Students are not always good at peer and self-assessment at first, even with a rubric in hand? And that peer assessments can be cruel or disorienting, and self-assessment can be misguided or delusional, and recommended that the score of peer and self- assessment shouldn't be count for the final grade in order

for the students to see that assessment as a way to enhance learning instead of being a way of giving reward or punishment.

Students' opinion about the effect of using the rubric on their peers was classified in 3 parts, the first part and the biggest, asserted that the rubric affect their class partner positively in a way that they got higher grades and they understood the subject more, the second part saw that the rubric affect their class partners negatively, they get lower scores. And the third part added that with some students the effect was positive and with other the effect was negative, some students' grades were less than usual, but other got better than they got usual, and also cost them less time and effort.

The student noted that to enhance this rubric first, it should be put it into practice from inferior courses, second should be designed in a way that doesn't oblige them to study very much, in a way that doesn't require explaining a lot, because they have to explain every step which takes a lot of time. Third it's very long it's better to be shorter by removing some part, since there are some parts are similar or repeated. Finally it should be designed and explained in a way that students can understand; also the rubric scoring strategy should be enhanced. (Saunders, Glatz, Huba, Griffin, Mallapragad, Shanks, 2003). Indicate that it is important to involve students in revising and finalizing the rubrics, with a discussion about the characteristics of the excellent work, and to engage students in the learning experiences they hope to achieve. Moreover the study revealed that Rubrics allow students to learn in new ways and can improve communication between teacher and students. And that rubric student had the opportunity to learn from one another, and that rubrics can help students form and adapt lifetime standards for assessing performance.

3.6.2. Reflections about changes in teachers' beliefs related to the introduction of rubric in the practice

The results of this study showed that there is some changes in teachers' beliefs related to the use of rubric, using the rubric made the teachers realize that assessment could be used to enhance learning, not just an administrative process to decide whether the student can pass or fail the course. The results of this study also indicate that providing teachers with a special program or new method that could convince them with its

benefit for them as teachers and for their student could positively affect their prior beliefs.

The results of this study support Stuart and Thurlow (2000) indicate that teachers reevaluate and change their believes through special programs about teaching and learning mathematics. In addition, the results of Feiman-Nemser, McDiarmid, Melnick, and Parker (1989) study showed that teachers change their beliefs in an introductory course. Such as believing that teaching was more complex than they had originally thought, however while some changes may occur, change is not always found in all participants depending considerably on the beliefs that they bring in to the class with them.

Hart (2002) study that was conducted with pre service elementary teachers participating in an alternative certification program for teaching in an urban setting. He suggests that the program was successful in changing preservice teacher beliefs.

Vacc and Bright (1999) also found that Cognitively Guided Instruction (CGI) as part of a mathematics methods course changes pre service elementary school teachers' beliefs about teaching and learning mathematics and their abilities to provide mathematics instruction that was based on children's thinking. Mapolelo (2003) in his research that aim to document whether changes in teachers' beliefs accompanied changes in their classroom practices and more importantly, what influenced the teachers to commit to change The results, however, reveal that the two participants' beliefs on how to learn mathematics changed from emphasizing algorithms to understanding concepts.

Hough, Pratt and Feikes (2006) showed that prospective elementary teachers can change their beliefs about mathematics and its teaching by focusing on how children learn and think about mathematics. Wong (2013) added that there are changes in students' teaching practices because of their experiencing an overseas professional development course (PDC). Vainoa, Holbrooka and Rannikmaea (2013) showed that collaborative action research had appositive effect in eliciting change in teacher beliefs.

The results of this study seem to be counter to the previous research finding that teachers' beliefs are resistant to change. Tillema and Knoll (1997) examined action and

belief change in teacher candidate who were engaged in a conceptual change process, and found that while they changed some teaching behavior, they did not change beliefs; they suggested that without changes in beliefs, changes in performance would be superficial. Schram and Wilcox (1988) found that teachers' beliefs about what it means to know mathematics were challenged when conceptual development, group work, and problem-solving activities were emphasized during a mathematics content course. However, emphasizing these components had little effect on the teachers' beliefs about what should be included in elementary school mathematics education.

The result of this study also supports Hart (2002) suggestion that most beliefs are formed through experience over time, pedagogical practices that support constructivist theory can be nurtured by engaging teachers in constructivist experiences in learning and teaching and assessing mathematics. The teachers who participated in the current study had the opportunity to think deeply about their works as mathematics teachers. *Teacher (B)* said that using the rubric make her realize that teachers should search for new methods that motivate students, and *teacher (A)* added that using the rubric made her feel that she can't relax until she make her students understand what they are doing and explain it with a suitable mathematical terms. Which also support Kagan (1992) conclusions that in order to change teacher belief, teachers should engage in ongoing self-reflection by questioning and reconstructing their own pedagogical beliefs.
The changes in the teachers' beliefs that occurred in this study may be attributed to, that the teachers had the opportunity to use a new method of evaluation that they did not know before. The teachers were given the needed information to use it along a teaching unit for two months, the teachers explained the rubric idea to the students and used it every day with every problem, they let their students evaluate their peers and evaluate themselves using rubrics.

Using the rubric according to the teachers helped both students and teacher to understand each other more, which support Kagan (1992) conclusions that in order to change teacher belief, teachers need to have extended opportunities to interact with and study their students. *Teacher (A)* said that using the rubric helped her to discover many difficulties that her students face that will never discover without using the rubric. The teachers after using the rubric found that sharing the students with the criteria and let them participate on the evaluation process enhanced their learning.

When the teachers used the rubric they found it difficult to get used to it, however, they found that it had a positive effect on their work as teachers and enhanced their students work. The result of this study suggest that teacher beliefs about assessment and evaluation can be changed by (1) - giving the teachers the information about new methods of evaluation, (2) - giving the teacher the freedom to choose the evaluation method that is suitable for their students. (3)- giving them the needed time to use it with their students. Kalgan (1992) also added that in order to change teachers' beliefs the content of the university courses needs to be connected to the exigencies of classroom teaching, university courses need to focus on procedural knowledge and practical strategies as well as theory. Hart (2002) argued that the experience alone does not ensure change, but certainly facilitates it. Change is limited when pre service teachers learn mathematics content differently than they learn mathematics methods. Given the limited amount of time pre service programs have to impact teacher development, if the mathematics content is taught by lecture and the methods courses use a constructivist environment, the experience is diluted, and the chance for change is significantly decreased (Hart. 2002).

The following spot the light of some changes in teachers' beliefs:

A clear change was found on the teachers' belief about the main objective of assessment. Before using the rubric, *teacher (A)* was thinking of assessment as a measurement tool she asserted that evaluation is used to quantify the degree to which our students have exceeded the minimum objectives according to the law, also to give them a grade without thinking or concentrating if this student understand the subject or no.

> "We evaluate to see if the students have the level required by the low in order to see if they can pass or fail" (IS3TA, p.33: [11:15-11:58]).

After using the rubric *teacher (A)* said that assessment should be used to enhance students learning and to reflect our work as teachers; she added that it is true that through evaluating students work we evaluate our work as teachers, which is a reflexive process. "After using the matrix of evaluation I have to say that of course we can use the evaluation to enhance students learning" (IS3TA, p.34: [02:10-02:40]).

In addition, she asserted that it is necessary to use different resources with the goal of improving the academic achievements of the students. In addition, she pointed that the form of assessment should contemplate and foment students' daily work. In mathematics its fundamental, since assessing students' work every day help them to learn and understand the material better.

About the objective of the evaluation process *teacher (B)* said before using the rubric that we assess for assigning numerical number for the student progress on their learning. After using the rubric she said, I think this is wrong because we have to evaluate students' effort, and if they retained and still have what we tried to teach them.

When *teacher (A)* was asked about the question that she should ask herself before determining a main assessment strategy, before using the rubric she answered that she would ask herself if the students will understand the question she will put, and if the time will be enough to solve all the questions in the exam, a significant change can be noticed after using the rubric she said, that teachers should ask themselves what they should or want to obtain..

Before using the rubric, the *teacher (B*) believed that the most important question to ask her before using any evaluation method was if this method is good for the students, if they will understand it or not, What is the evaluation method that will make the students do more effort to learn? What kind of motivation the teachers have to give the students in order to work better?

After using the rubric, the teacher said that she would look for the evaluation method that assess if the students know what they are doing and why. And if they can explain and reason what they are doing, "The explanation part of the rubric is very interesting because it requires giving a written and oral explanation; it forces them to think why they are doing that in mathematics, not just doing it mechanically" (IS3TB. p.43:[02:10-02:34]).

Before using the rubric, *teacher (A)* was convinced that student don't have any benefit from assessment, the only benefit according to the teacher is that they get a numerical grade that make them punished or reward from their parents. also they can have a holiday after the exams. She also added that evaluating students' attitudes with 30% give the more opportunities to pass the course despite failing the exam.

After using the rubric a clear change can be noticed she said the students obtain a clear benefit from assessment, using the rubric make the students participate in the evaluation process and that help them to know what is expected from them, and focus to enhance their learning. "With this method you gave me "Rubric", evaluation serves the students to improve and to learn" (IS4TA, p.33: [12:07-12:50]).

According to *teacher (B)* this rubric makes the students more aware of what they are doing, also sharing the students with the assessment helps them to know the error that they make. As they participate in the assessment makes them improve their effort, at least they become aware of what they know or do not know. Having the rubric helps them to know what they have to do to get full mark. Some students, who are not brilliant, do not know what to do in order to pass. For that, the rubric provides them with written criteria to help them pass, and to let them use it during exams, the student who takes zero knows that he did not do anything.

She also believe that the benefits that the students obtained from using the rubric was that they had to learn the subject very well, in order to explain every step they do, and in consequence many of them have understood the concepts of the subject. "With the use of the rubric the students are participants in the teaching-learning process, since they explain more in this process and that is beneficial" (IS3TA, p.28: [08:46-09:05]).

In addition, about the benefits that students have from evaluation, before using the rubric *teacher (B)* said that they only benefit is that the students have a numerical grade, that can help the in the future to apply for a scholarship or to enter a certain faculty. After using the rubric, the teacher asserted that the assessment gives students satisfaction, satisfaction of learning and applying new things, besides having a final note. if the students saw that the evaluation tool their teacher is using is going to help them to make further progress in learning new things, new concepts and applications, then great, it's great satisfaction for the students when they learn new thing and see how it’s used in real life.

About the benefit teachers obtain from assessment *teacher (A)* clarified before using the rubric that teachers have more benefits from evaluation than students, the evaluation provide teachers with information about the students and about the learning process, in this way they can solve problems that face their students.

After using the rubric the teacher noted that the greatest benefit from using the rubric that made her aware that she cannot relax as a teacher, she has to keep her students motivate, and to teach them to explain better and work harder to employ all the necessary mathematical terms.

Before using the rubric, the *teacher (B)* said that the only benefit that teachers gain from evaluation is that it forces the students to study and a way to see the students' progress in their learning. After using the rubric, she said that assessment helps the teacher to see if the student has obtained the necessary learning based on their own way of reasoning mechanisms, application to real life, and to see if they retain this learning and that they did not forget it.

Teacher (B) before using the rubric asserted that she does not prefer using more than one assessment method because it is a lot of work and it will make them get confused, also she noted that the students had to have all the evaluation methodologies and criteria at the beginning of the year. After using the rubric she said, "The teacher has to look for the assessment method that would encourage the students to work and to motivate them" (IS1TB, p.39. [10:58-11:22]).

In addition, teachers have to look for the assessment methods that are more suitable for their students. "There is a standard assessment method; the teacher has to look for the evaluation methods that are suitable for his students" (IS3TB, p.46: [11:51-12:40]).

In addition, she said that teachers have to continue searching for new methods that make the students work better, then we cannot only use on method we should use every method for a while.

Before using the rubric *teacher (B)* asserted that she use exams to assess her students, because it's the most suitable method were teachers can see if there students understand an assimilate the concept, for that reason 70% of the students grade come from their grades on written exams.

After using the rubric, a little change in her beliefs can be noticed. She complained that, they were tough to assess students' progress by exams and giving them a numerical number according to his progress in learning, which is wrong. She argued that teacher should concentrate on evaluating students' effort, and evaluate if the students have

acquired what teacher want them to learn, and if they can use it in real life situation, and obviously, this cannot be evaluated by exam.

Also she said that now they are investigating new form of assessment such as group work, the teacher divide the class into small group, and assign work for every member of the group, this is a way to encourage students to work more, and to motivate them, "We have to investigate new forms of assessment" (IS3TB, p .46:[12:45-13:11]).

In addition, she said that she does not believe that there is an evaluation method totally fair and reliable, that evaluates students work better than the others do.

She also noted that asthere is alot of diversity among students, teachers cant only use one method to evaluate all the students, teachers can't say that that there is a standard evaluation tool. "Every student is a world, then you have to assess taking in consideration these differences among the students, it's one of the diversity difficulties" (IS3TB, p.46: [11:51-12:40]).

Before using the rubric *teacher (A)* asserted that direct questions is the key to know that her students understand what she want. If they solve something on the board, and from direct observation, after using the rubric she said that the students understand clearly what I need as they had everything written at the rubric, and the student who had zero knows exactly that he didn't do anything. She said that some students, who are not brilliant, do not even know what to do in order to pass. With rubric, the students have all the criteria written to help them pass, also they can use it during exams, who takes a zero knows that he does not solve anything.

Before using the rubric the teacher asserted that the way to know if the assessment strategy was fair through the exam results. The teacher noted that if the results of the tests are not very good, then the strategy that they follow is not good.

After using the rubric she said that the students had to have clear criteria to let them know what the teacher want at that way we can say the evaluation process was fair, with the rubric the student know exactly what he has to do to pass the exam.

About the feedback the *teacher (A)* before using the rubric said that the feedback helps the student to know what steps they should follow in order to learn for the next exam, whenever they perform any test, then they usually solve it on the board, and correct it on

their notebooks. After using the rubric she said the feedback should benefit both the students and the professors. As each knows the other better, the results would have to improve.

About using self and peer assessment *teacher (A)* asserted that she prefers correcting the exams of her students alone at home. After using the rubric she said that using self and peer assessment make the students participate in the evaluation process and this make them aware of their weakness and strength points. She added that she didn't think that the students corrected the exam fairly. She added that sometimes they were stricter than the teacher; according to her this is good because it makes them feel more involved in the education process, and it's good for the students.

Before using the rubric the *teacher (B)* the teacher said that peer and self- assessment saves teacher time and effort, after using the rubric she said that it doesn't save teacher time and effort because teacher has to revise what students did another time. The only advantage that the students can see that assessment is not easy. As the students do not know how to assess their work, the teachers do not think that the students get benefit from this type of evaluation.

About the relationship between teaching and learning and assessment, before using the rubric *teacher (A)* asserted that the relationship between Learning and teaching is very clear. The relationship here is clear: the teacher explains, the children learn. It is true that the assessment is not always present in the process, the evaluation present only in the exams. In addition, the relationship between learning and teaching is daily, continuously. Moreover, the other thing is eventually, evaluation is a more sporadic. Assessment is not always present in the whole process of teaching and learning, and if the teaching-learning process is daily and every minute. The assessment process is not.

After using the rubric a significant change can be noticed, she said it is true that we should evaluate through the learning process not after it, not only in exams. She asserted that after using the rubric she is convinced that the evaluation can be used to enhance learning. Moreover, she noted that it is better to involve this way of evaluation "rubric" in the teaching learning process. Finally, she added the evaluation should be used to enhance students learning and to reflect their work as teachers; "It's true that through

evaluating students work, we evaluate our work as teachers" (IS3TA, p.32: [03:58-04:11]).

Before using the rubric the *Teacher (B)* believed that assessment couldn't be used to enhance student learning, she said that it's a way to make pressure on the students in order to study. In addition, it is a way to see the students' progress in their learning. After using the rubric, the teacher said that the evaluation that is based on explaining every step they follow to solve any problem, help the students to learn more and retains what they are learning.

CHAPTER FIVE: CONCLUSIONS

This chapter provides a brief review of the study and presents a summary of the key findings, the contributions and the implications of the study, and recommendations for further research.

1. Summary of the key findings

This case study has sought to capture secondary mathematics teacher's beliefs about assessment for learning and the forms they use to assess their students. In addition, this study aims to integrate a rubric as an assessment for learning method and to study any possible effects of using this rubric on teacher's beliefs. A qualitative research method was chosen to address the main purposes of the study. A purposeful sampling technique was used to select participants. Data collecting methods compassed one-on-one interviews, questioners and diaries.

The analysis of the qualitative data was guided by the framework suggested by Miles and Huberman (1994) which involves data reduction, data display, and drawing conclusions and verifications. Data reduction refers to the processes of selecting, simplifying, abstracting and transforming data into themes through coding (Creswell, 2006; Miles and Huberman, 1994). The coded data were then organized and assembled into representations including mind maps and case summaries. This process is known as data display. The final stage in data analysis was drawing conclusions and verifications from the data. The findings discussed in this research were obtained by performing single-case analysis for each of the two teachers to reflect the particular case and to avoid aggregation. In addition, across the two cases analysis was made to find common themes for comparison and generalization (Liamputtong, 2010).

A key thematic finding that emerged in this study was that secondary mathematics teachers mainly use traditional assessment methods such as paper and pencil exams. They evaluate 70% of the students work by written exams, 15% for students' attitude toward the subject and towards the members of the educational community (by unclear methods), and 15% for daily work at home and in class (by unclear methods).

A part of the 30% of the students' grade comes from the student notebook. The grade of the notebook is given every semester, but the teacher have a look every day at her students notebook and check if the students did their homework and if it's clean or not, she doesn't assign a numerical grade daily, but she usually put expression such as good, bad, regular, positive or negative, as a part of the daily work.

The teachers use direct questions to see if the students understand what they want, the teacher usually explains and then ask a question and if the all the students remain silent that mean that they did not understand.

They evaluate their students with written exams during the whole year, and always assess student after each unit or a group of units, they never did it during the unit. They are used to give their students many exams and students score is the average of all the scores.

On the other hand, the teachers reported using some alternative assessment tool but sporadically, such as group work, competition, competences based assessment, observation, projects, and inviting parents to participate in the evaluation. The teachers did not use the rubric before and did not have any idea about it.

In addition, teachers showed dissatisfaction with this situation and expressed their preference to direct observation method of assessment. *Teacher (A)* reflects, "For the most students the teaching-learning process is not complete. Teachers teach or explain until they think that students understand or comprehend the concepts. Then they check this degree of students understanding by asking certain student to solve a problem on the board, which is not enough for all the students.

Teacher (B) was relatively satisfied with the traditional methods of assessment; as she beliefs that exam can show that the students have assimilated the concept, also she don't prefer using more than one evaluation method as the students will get lost. She added that the student have to get all the evaluation method that will be used at the begging of the academic year.

After her experience with the rubric, she expressed her dissatisfaction of the traditional methods; she also clarified that no exists the evaluation method that is perfect and suitable for all the students. Every group of student has his/her own way of learning,

then the teacher has to follow the learning style of his students, asthere is alot of diversity among the students then one certain method is not enough for all the students.

The teachers complained that a lot of time, they are not satisfied with the traditional method, but they do not have another choice as it is all determined by the department of mathematics.

Both teachers express their desire to evaluate students by direct observation, not by tests, without papers, just watching their work and its evolution, but of course this is impossible complained the teacher, because of the large number of students they have in class, they have sometimes 30 students, it is impossible to do anything like that.

Both teachers are willing to use the rubric with their students, and will propose using peer and self-assessment with her students, as the students are involved in the evaluation process, they can see their weakness point. Also the students can correct honestly, sometimes they are stricter than the teacher, which is good because it makes them aware and feels more involved in the education process, and these things are good for the students' character.

Both teachers express their desire to assess student through competition, and math exhibitions. As in this way, the students show that what they are learning can be used in real life.

According to the teachers, alternative assessment methods are not used for the following reasons: First, the great amount of time and effort consumed in applying alternative methods, second, the large number of students per a class. Third, certain difficulties caused by the department of mathematics and other difficulties from the evaluation system such as the design of the evaluation policy. Fourth, parents and students factors, and finally, factors related to the subject itself.

The teachers complained also that they do not have the information needed to use the new forms of assessment, as they studied only mathematics at the university, they dint have any course about how to teach mathematics or about the methods of evaluation. In addition, they complained about the large number of students in class, they noted that the best way to evaluate 30 students is the exam.

In addition, the teachers noted that the evaluation strategies are determined from the department of mathematics, the teachers had to follow the departments plan, and they cannot choose another ways. In addition, the teacher had limited time to finish the curriculum; using new forms will consume effort time from the teacher.

Moreover, the teachers noted that mathematics, as subject does not permit to use many forms of assessment; it is easier to use alternative assessment tools with subject as languages.

After using the rubric, the teachers faced many difficulties such as: (1) the Students are not used to this method, (2) Using the rubric greatly depends on the group of students you are working with. If the student are motivated or not, and if the students accept being assessed with new forms of assessment, (3) the design and the language of the rubric is Difficult to understand ,(4) Require a lot of time and work from the students and the teacher,(5) The rubric is very long and the students are not used to read.

The teacher recommended the following to overcome the above difficulties:

-Teachers have to be more like psychologists and less like judges of the children. They must change their way of thinking, as teachers are used to evaluate only what students know or what they have learned, they should learn to evaluate the development and the learning process, from the beginning until the end, that's what teachers should value more.

- Provide mathematics teacher with a lot of information and training in the new evaluation techniques, as teachers do not know how to evaluate well; they need a lot of information and training.

- Teacher should participate in professional development seminars and conferences.

- Mathematics teachers should concentrate on helping the students to use what they learn in real life situations, by providing them with more exercises and more practice.

- Teachers should work to enhance their assessments strategy, "One way would be to recycle ourselves, because we are stagnant in the same way for more than twenty years ago, and things have changed" (IS1TA, p.15 : [18:24-25:06]).

- Change the law of the minimum effort as it affects both the teachers and the students negatively.

- The student who fails two subjects should not pass the course, in order to avoid joining the failure of the young with the old.

- Teacher should keep searching for new methods to motivate their students.

- Teachers should be also motivated through an external exams or events that the student can see that their teacher is better prepared than the others are.

They also recommended changing the department policy about assessment as follows:

- To give teachers the right to evaluate their students as they find it suitable.

- To change the current evaluation percentage that is 70% for written exams and 30% for the students' attitude and his notebook, because some students can pass the course without having the appropriate mathematical level.

- Teacher should not be asked to do administrative work; *teacher A* and *teacher B* complained that the department asked them to do many administrative papers.

- Teachers should not be obliged to assign a numerical number when she evaluates her students, and to have the opportunity to evaluate her students properly.

- Exam should be eliminated, as the exams do not seem to be a good evaluation tool.

- Students should be evaluated by direct observation.

- The high number of students in classes should be reduced.

The findings of this study disclosed some important beliefs that affect teacher's decision in choosing a method for evaluation, such as beliefs about different forms of assessment, beliefs about the purpose of assessment, beliefs about the relationship between learning, teaching and assessment, beliefs about assessment for learning, beliefs about students learning, and beliefs about the benefits of assessment.

In addition, the results of this study showed that giving teachers the opportunity to use new assessment tools such as a rubric contributed to change in some of their beliefs.

The teachers had the opportunity to reflect about their beliefs about assessment for learning, and reevaluate their practices.

2. Limitations and contributions of this study

This study added to the limited literature related to assessment for learning in mathematics in the following parts: First, it presented in details, Spanish teachers' experiences in using a new method of assessment (a rubric) as an assessment for learning tool in mathematics classes. Presenting the experiences of some teachers in applying a new method for assessment for learning is expected to be beneficial to their Spanish colleagues through allowing for reflection, appreciation and understanding.

Second, this study disclosed some important beliefs that affect teacher's decision in choosing a method for evaluation, such as beliefs about different forms of assessment, beliefs about the purpose of assessment, beliefs about the relationship between learning, teaching and assessment, beliefs about assessment for learning, beliefs about students learning, and beliefs about the benefits of assessment. Which can explain many misconceptions and lack of information about assessment as a process and about alternative assessment tools? These believe would be a very important starting point for any reform process. In addition, this study contributed to some changes in teachers' beliefs, which would open the door for many reform processes, starting from addressing teachers' beliefs and then design training courses that would help the teachers to change their beliefs and adapt new assessment forms that could enhance their students learning. As many researchers found that teachers' beliefs affect their classroom practices (Pajares, 1992; Beswick, 2008; Wilkins, 2008).

Third, this study revealed some problems in the current evaluation system in Spain. It showed that traditional assessment methods dominate the Spanish evaluation system and alternative assessment methods are not common. In addition, it showed that current assessment methods focus mainly on the evaluative aspect of teaching and learning process and ignore the learning aspect. Moreover, this study revealed Spanish teachers' dissatisfaction with the evaluation system employed at their schools. Therefore, this study alerts decision makers in the Spanish education system to an urgent need to take serious steps to change and enhance the current evaluation practices in high schools, by

paying attention to teachers' needs and giving them the freedom to choose the suitable way to evaluate their students.

According to Frankland (2007) the subject lecturer is the most familiar with the learning content, therefore, he/she should be allowed to specify the most appropriate assessment method for their students. In this way, the assessment methods will be aligned with the subject's learning outcomes. There is a whole range of methods that can be used, such as; examinations, tests, quizzes (closed book, open book, with many variations), assignments, case studies, projects, presentations, poster sessions, interviewing, reflective journals, etc. A teacher must be allowed to make use of these methods if he/she deems them the most appropriate.

Fourth, a main contribution of this study was addressing the difficulties that restricted Spanish teachers from applying new forms of assessment. Some of these difficulties are insufficient time, large number of students in class, and the administrative work the teacher have to do. Teachers also criticized the current evaluation system obliged by Spanish education system. The teachers described the current evaluation system as grades driven that focuses on measurement purpose rather than students' learning. Another main and important factor that restricts teachers from using alternative assessment methods is the lack of knowledge and training on applying alternative assessment tools. Presenting these difficulties is expected to help educational decision makers, school principals and parents to understand the problems that face teachers in using assessment for learning that may help to share in overcoming these difficulties. In addition, researchers who are interested in integrating new methods of assessment will become aware to these difficulties during designing and implementing their studies.

Finally, this study provided audience with suggestions to enhance the current evaluation system at Spanish secondary schools. These suggestions, if considered by Spanish educational policy makers, have the potential to enhance the current evaluation system in Spain because they are based on actual experience of teachers.

This qualitative case study aims to explore teachers' beliefs about assessment for learning. More specifically, this study intends to investigate Spanish teachers' reflection on their current beliefs and practices in assessment and evaluation and to explore the

changes that occurred to their beliefs due to applying an alternative (a nontraditional) assessment for learning tool (a rubric) at mathematics classes.

However, this study was limited by many factors. First, the nature of this inquiry limited generalizing its findings because as any qualitative research, the results are valid in contexts that have similar educational conditions to that exist in the qualitative study. Second, time acted as a major limitation. Teachers' time was full of learning and administrative activities that affected applying some activities of this study such as training students to the use of rubric and collecting data from teacher using diaries. Another limitation related to time was timing of the rubric application since it was at the end of the second semester where the teachers and the students were concerned about the final exams and finishing the curriculum.

Third, there are some limitations related to data collection and analyzing. The interviews affected by the teachers' conditions. For example, one of the teachers had to quit participate this study as she moved to another city that consumed more effort and time in finding another teacher to replace her. In addition, the method, which was used to collect data from the students (the questioner), was less effective than interviewing them; however, the researcher had no choice since according to the school lows it was not permitted to interview students. Besides, using the diary was important to collect the information from the teachers however; the teachers were not used to write their notes in the diary after every class. Sometimes they did it at the weekend, which is expected to cause the loss of some important information that affects our deep understanding of the experience.

Fourth limitation was related to the rubric itself. This rubric was adopted from another school, so the teachers and their students did not participate in designing it. This is expected to limit the benefits that the teachers and students had from using this assessment for learning method. Fifth limitation was related to variations in participants' experience that affect the way of their thinking and responding to the questions. This required a lot of time and more instruments as teachers' beliefs are very difficult to understand or to discover from interviews or diaries through a short time.

Finally, as a researcher, I recognize that my training, knowledge, culture and beliefs may have influenced how the research was guided, especially in collecting and

analyzing the data, for that, I consider it as limitation, but they are aspects that are difficult to control.

3. Implications of the study

The researcher of this study provides the following recommendations related to the use of assessment for learning in general: First, special attention should be paid for teachers' beliefs related to assessment for learning and its techniques, as teachers' beliefs play a fundamental role on their class room practices and decisions. Second, the findings of this study emphasized the importance of educating and training teachers on using assessment for learning. Teachers should be involved in professional development seminars and conferences that are concerned with assessment knowledge and techniques. Third, the results also highlight the important of motivating teachers to use assessment as a learning tool through external evaluation of teacher's performance, such as projects, exhibition, and contests among a number of schools or cites. Finally, the results of this study emphasized the need for cooperation between the relevant authorities to help teachers use alternative assessment tools voluntary, and not to obligate them with a certain assessment-method.

In addition, the researcher provides some implications on the use of a rubric as an assessment for learning tool. These implications are; first, it is deemed necessary that teachers and students develop a lucid understanding of the value and use of rubrics as instructional and grading tools. This should be established at the outset and must be used all throughout the year. Teachers must be taught and trained on its proper use to achieve optimal results for instruction and grading. Second, it is crucial that students take part in the creation of the rubric. Students' involvement in instructional decision-making such as this, empower them to be more engaged and active in their own learning. Collaborative creation of the rubric can address students' difficulties in understanding the expectations of the teacher that can improve learning outcomes.

Third, a discussion between a teacher and his/ her students about strong and weak solutions might also help in making students understand expectations set in the rubric. Fourth, rubric improvement must always be done with the help of students' suggestions. More attention should be paid for the length and the clarity of the rubric language teacher's comments on the students work is very important in providing personal

interaction with the student. Finally, a rubric can be best utilized to improve instruction if teachers and students used it frequently. Thus, this implies that rubrics should be used in solving daily exercise, in order for the students to take advantage of the rubric in helping them improve their learning.

4. Recommendations for further research

This study revealed some teachers' beliefs related to assessment. It would be beneficial to carry out a quantitative study to evaluate the extent to which these beliefs dominate teachers. As understanding teachers' beliefs about an educational method highly affects the success of its application.

This study showed that a rubric is a new concept to the participants. The researcher considers it important to carry out a quantitative study to gauge Spanish teachers' knowledge and use of rubrics in assessment and learning. In addition, the researcher recommends carrying out a qualitative study that focuses on exploring the extent to which teacher's preparation curriculum put value on assessment for learning and alternative assessment methods.

Since rubrics are widely used in most developed countries, qualitative studies that aim to explore how these countries succeeded in using assessment for learning methods in their schools should be carried out. Such studies should examine educational polices, evaluation rules, teacher's preparation courses, training programs for teachers and the educational curriculum for students in countries which encourage the use of assessment for learning.

The researcher recommends carrying out similar studies using other alternative assessment tools such as, portfolios, journals, interviews, observation….etc, in order to explore teachers' beliefs about assessment for learning, the changes that may happen to these beliefs and to get feedback based on lived experience regarding assessment for learning tools.

As the results of the study showed that teachers do not use technology in assessing their students, the researcher would recommend a study that investigates whether pre-service teachers' assessment approach related to their assessment technological knowledge,

their assessment technological content knowledge, their assessment technological pedagogical knowledge and their assessment technological pedagogical content knowledge.

The researcher recommends replicating the same study using a rubric that is developed and designed by a teacher and his/her students as the rubric in this study was adopted from an external source. In addition, the researcher recommends replicating the same study using an e rubric.

Teachers in this study criticized a rule in their evaluation policy named as "Law of the minimum effort". The researcher recommends conducting further studies to investigate the impacts of this law on learning and teaching.

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