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" Gender differences in e-learning satisfaction "

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Gender differences in e-learning satisfaction

Abstract. In line with recent research, the question this paper raises is whether or not gender differences also exist in e-learning. This study is based on a sample of 1,185 students who are doing on-line courses at the Universidad de Granada in Spain. The main conclusion is that female students are more satisfied than male students with the e-learning subjects that make up the sample. Furthermore, we find that female students assign more importance to the planning of learning, as well as to being able to contact the teacher in various ways.

1. INTRODUCTION

Following the advances in Information and Communication Technologies (ICT), several new methodologies have emerged that are based on new tools, changing the conception of teaching (Robin, 2009). The emergence and evolution of the Internet has led to the development of useful and powerful tools for distance learning. As a result, e-learning is becoming increasingly important and is making the learning process more effective in many contexts (Ho and Dzeng, 2010).

The enormous growth of e-learning makes it necessary to reconsider several issues that have been the object of research in the classroom. The reason for this is that the nature of the roles of teachers and students is different in the two kinds of teaching. In the case of e-learning, students must have a different attitude, normally more active and based on self-learning (Gray et al., 2004; Volman, 2005). As regards teachers, their job is to design the course and tutor students. The breakaway from conventional classroom teaching justifies the need to introduce specific instruments in order to study the level of student satisfaction in e-learning environments.

Within this context, gender differences are a factor to take into account in the learning process. Previous studies such as those quoted above confirm that there are differences in the aptitudes of students that depend on gender. Biological and social factors explain the origins of these behavioural and information processing differences (Putrevu, 2001). Therefore, while male students have greater capacity for solving spatial problems, female students have greater verbal skills.[1] The implication of such differences is that teachers should take gender into account when planning their lessons and/or courses.

In spite of the fact that papers addressing gender differences in e-learning are not abundant, they generally conclude that male students are more willing to use and learn about computers than female students. Some authors maintain that male adolescents display greater computer skills than female adolescents (Comber et al., 1997; Whitley,

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[1] Differences are also reflected by the preferences that male and female students show concerning computer activities. A recent study by Lowrie and Jorgensen (2011) proved that female students normally prefer digital games that require problem solving, quantitative computations and graph interpretation, while male students preferred games that require spatial reasoning.

1997; Li and Kirkup, 2007). In addition, recent research also confirms that male students have a more positive perception of e-learning than female students (Ong and Lai, 2006). According to Lu and Chiou (2010), e-learning valuation and satisfaction are greater among male students than female students. Nevertheless, some research studies suggest that gender has no effect on satisfaction or attitudes towards e-learning (Cuadrado et al., 2010; Hung et al., 2010), or on teaching results (Kay and Knaack, 2008; Chu, 2010).

This research contributes new evidence on gender differences in terms of student satisfaction with e-learning teaching. The main contribution of this study is the identification of the differences in overall satisfaction with on-line courses and also with specific aspects of e-learning. Moreover, we study how gender differences influence specific aspects of students' overall valuation. Recognising differences makes it possible to improve teaching and make recommendations in order to plan in accordance with gender (Garland and Martin, 2005). This research employs a dataset of 1,185 students who participated in a course at the Universidad de Granada in the 2008-09 and 2009-10 academic years.

The rest of the paper is organised as follows. Section 2 describes the framework of the research. Section 3 describes the data and methodology. Section 4 presents and discusses the results and finally, Section 5 presents the main conclusions.

2. RESEARCH FRAMEWORK. E-LEARNING AT THE UNIVERSITY OF GRANADA

Most courses at the Universidad de Granada are taught in the classroom, but e-learning has been progressively introduced since the creation of the *Centro de Estudios Virtuales* (e-learning centre in English) in 2001. Courses at the Universidad de Granada are not entirely on-line. Only some subjects and an official Master's Degree are offered in e-learning format. However, it is important to highlight that teachers have a great deal of freedom when it comes to choosing the number of presential sessions.[2]

In order to transform a classroom-based course into an e-learning course, teachers must submit a project to the e-learning centre in response to a call for proposals that is made on a yearly basis. Before the course is made available to e-students, there are two controls to guarantee quality. Firstly, the e-learning centre makes a selection of the best proposals submitted and provides teachers with training in order to convert the subjects into e-subjects, according to several criteria. Following this, the content of the course is blind reviewed by an external committee, made up of lecturers from other universities. This process assures that e-learning materials are both homogenous and of high quality.

Right from the outset, the vice-chancellorship of the University of Granada and the e-learning centre emphasized the need for e-learning to be of the highest quality. As a result, e-learning courses undergo more quality controls than presential courses. Every year, all e-learning subjects are evaluated by students through a questionnaire that is

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[2] Although some courses in the sample have presential sessions, we have opted to use the term e-learning instead of b-learning, because the number of presential sessions is generally quite low.

made available to them through the e-learning platform in the last two weeks of the course.[3]

The questionnaire was designed by a multidisciplinary team at the e-learning centre and covers various aspects such as methodology, course content and teacher attitude. The questionnaire was designed in accordance with the Guide to Assessing Courses Based on ICT, created as part of a quality project in e-learning in which 10 Spanish universities participated (Blanco et al., 2005).[4] According to results in 2008-09, e-learning students were more satisfied than those actually attending lectures. The overall valuation given to the University of Granada was 3.75, compared to the e-learning valuation of 4.22.

3. DATA AND METHODOLOGY

3.1. Data

This research employs a dataset of 1,185 students from 27 courses held in 2008-09 and 2009-10. An expert with ten years of experience at the e-learning centre chose the courses to be included in the study, using the criteria of uniform content.[5] This makes it possible to implement a joint analysis of the dataset in the different subjects. Moreover, it was decided that a high level of participation in the questionnaire was required and that subjects had to be taught for at least two years.

The data capturing process started when specialists from the *Centro de Estudios Virtuales* published the questionnaire with a link on the screen displayed to the student when accessing the course. The questionnaire was available to students approximately 15 days before the end of the course. In order to raise the response rate, the specialists from the *Centro de Estudios Virtuales* sent an email from the platform encouraging students to complete the questionnaire. The email highlighted that all the information gathered would be anonymous. The response rate of the questionnaire was 50.5%. The dataset was made up of 776 female students (69.49%) and 409 male students (34.51%). The gender variable is central to this research, for which reason a variable named "gender" was created that takes a value of 1 for female students and 0 for male students.

The questionnaire that students answered included 23 questions that elicit information about objectives, content, teaching methods, teaching tools and global satisfaction (see Annex 1). All questionnaire items were measured using a 5-point Likert scale ranging

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[3] The Universidad de Granada used the WebCT platform between the academic years of 2001-02 and 2008-09 before it was replaced by Moodle in 2009-10.

[4] The Guide is a reference manual for assessing teaching actions on the web. A questionnaire aimed at evaluating teaching actions at all 10 Universities in Andalusia was elaborated following the instructions in the Guide. The questionnaire elaboration process involved specialists from the Universidad de Granada and Seville, the largest universities in Andalusia in terms of student numbers. During the process, various meetings were held in order to improve the questionnaire. Preliminary versions of the questionnaire were sent to those responsible for e-learning in the other eight Universities in Andalusia to allow them the opportunity to participate in improving the questionnaire.

[5] The 27 courses belong to different knowledge areas, including Office Automation, Psychology Data Processing, Basic Operations in the Agro Food Industry, History of Photography or Child Legal Protection. The number of students on each course varies considerably, ranging from 19 to 180, as does the proportion of female students on each course, ranging from 44.00% to 89.47%.

from 1 to 5: (1) Very disappointed; (2) Disappointed; (3) Neither disappointed nor satisfied; (4) Satisfied; (5) Very Satisfied.

Table 1 presents the descriptive statistics of the variables that are used in this research, including the aforementioned gender variable and the questions on global and specific satisfaction. Average satisfaction with the courses is high, at 4.14, while specific aspects were awarded scores ranging from 3.6 in the case of presential sessions to 4.28 in the case of accessibility.

Insert table 1 about here

3.2. Methodology

The main objective of this research, as mentioned in the introduction, is to analyse gender differences in satisfaction with e-learning courses. The paper also estimates the aspects of virtual teaching that most influence students' overall satisfaction with courses. In order to achieve the first objective, a t-test is performed, while Ordinary Least Squares is used to achieve the second objective. The t-test verifies the null hypothesis that average satisfaction scores are equal within groups. Ordinary Least Squares tests the null hypothesis that the influence of each item on global satisfaction is nonexistent. If this hypothesis is rejected, it is then possible to determine the magnitude of this influence.

4. RESULTS

4.1. Gender differences in valuation

Firstly, a t-test is performed in order to ascertain whether or not there is a significant difference in the degree of satisfaction with the sample e-learning subjects that depends on gender (Table 2). Results lead us to conclude that female students give a higher average global rating to e-learning than male students (p-value=0.0196). This result contradicts past research, which upholds that female students are less satisfied with e-learning.

Insert table 2 about here

4.2. Influence in the valuation of different aspects

The information in the questionnaire is useful when it comes to identifying the possible causes behind male and female students valuing courses differently. In the second stage of the analysis, estimations according to gender are performed. All the responses to the questionnaire are regressed as causes of global satisfaction with e-learning (Table 3). This enables us to ascertain how important the different variables in the questionnaire are in regard to global satisfaction with the course of female and male students, thereby providing a better understanding of gender differences.

Insert table 3 about here

It should be highlighted that the R squares of the three models are quite high: The variables introduced explain approximately 75 percent of the variability in students' global valuation, thereby implying that the models are a good fit. All the sets of variables are important in the overall valuation of the subject: objectives and content, teaching methods, teaching tools and teachers. Moreover, all the variables are found to be significant (with a p-value of less than 10%) and have the expected positive sign, except in very specific cases. The remaining 25 per cent of unexplained variability is due to the omission of variables, some of which could be uncontrollable or unobserved in the teaching process.

When comparing the models with female and male student data, some interesting results are found that are worthy of mention. Generally speaking, some issues that are important for female students when assessing the course, such as planning, participation, practice and tutor contribution are, however, not important for male students. In contrast, there is only one item that is important for men, but not for women, namely the speed at which the course is conducted.

4.2.1. Differences in objectives and content

There were no substantial differences between genders in this set of questions in terms of the formation of global satisfaction.

4.2.2. Differences in teaching methods

The greatest differences are found in teaching methods. Female students assign greater importance to planning and participation in their overall valuation of the subject. These two items are irrelevant for male students. Another difference observed is that male students consider the pacing of the course to be important, whereas female students do not.

One important result must be highlighted: the existence of a negative relationship between presential sessions and the general valuation of the subject in the case of female students.

4.2.3. Differences in teaching tools

Within this set of questions, differences are only observed in one item. While results suggest that female students consider solving practical cases important for their global satisfaction with the subject, male students are not influenced by this aspect.

4.2.4. Differences in teachers

Finally, regarding the valuation of teachers' activity, gender differences are also observed. The results indicate that the contribution of the tutor is important for female students when they form their overall view of the course, while for male students it is irrelevant. Past literature indicates that female students value tutor proximity in the learning process to a greater extent than male students (Sun et al., 2008).

As regards the rest of the variables, we find no remarkable differences in terms of the statistical significance and magnitude of the coefficients between models.

4.3. Gender differences in the assessment of aspects of e-learning

This section is aimed at evaluating the existence of significant differences in how male and female students perceive different aspects of e-learning. In order to do so, a t-test was performed only on the variables that were significant in the formation of general satisfaction for female and/or male students.

4.3.1. Influence of objectives and content

As Table 4 shows, clarity is assigned greater importance by female students than male students (0.11, p-value=0.0220). However, no significant differences are observed between male and female students where the course objectives and duration are concerned.

Insert table 4 about here

4.3.2. Influence of teaching methods

Female students score both planning (0.11, p-value=0.0208) and also presential sessions (0.20, p-value=0.0109) higher than male students, while no gender differences are observed in relation to the speed at which the course is conducted or participation (Table 5).

Insert table 5 about here

4.3.3. Influence of teaching tools

Table 6 presents the gender differences in the importance given to teaching tools. In almost all cases female students assign more importance to such aspects than male students. The difference in accessibility is statistically significant, albeit small (0.08, p-value=0.0754), while content and self-evaluation record greater differences (0.15, p-value=0.0031 and 0.20, p-value=0.0020, respectively).

Insert table 6 about here

4.3.4. Influence of teachers

Female students assign significantly higher values to tutors than male students, the difference being substantial in the case of tutor contribution (0.16, p-value=0.0040) and the use of examples and illustrations (0.19, p-value=0.0001). Interaction, however, reveals only a small difference (0.08, p-value=0.0990). All results are shown in Table 7.

Insert table 7 about here

5. DISCUSSION

This paper assesses the influence of specific aspects of teaching on the formation of e-learning satisfaction, taking into account the gender factor. Gender differences have also been estimated in regard to key aspects of teaching.

Contrary to expectations, the main result worth highlighting is the fact that female students display a greater degree of satisfaction than male students in their overall assessment of e-learning, as well as in regard to specific aspects that affect their global valuation. As regards other specific aspects, the analytical methods implemented indicate that there are no gender differences.

5.1. Objectives and content

According to the results, there are no substantial differences in the variables in this area in the formation of global satisfaction. However, female students value the clarity of aspects of the course significantly higher than male students, while no significant differences are found in relation to the duration of the course or its objectives.

5.2. Teaching methods

In the formation of global satisfaction, female students assign greater importance to planning and participation, while such issues are irrelevant for male students. These results might be due to the fact that female students are better prepared and organised, as well as more participative and committed to the learning process. This result is in line with Ding (2010), who concludes that collaborative communication tools such as forums are used more by female students. Another difference is observed in the pacing of the course. This aspect is important for male students, but not so much for female students. This result could be due to female students adapting better, thereby making the speed at which the course is conducted less important. Concerning the difference in the valuation of planning and participation, female students attach greater value to the elaboration of complete teaching guides that explain the different aspects related to taking and passing the course in detail. A precise schedule of the different stages of the course is an important element for planning tasks correctly. In addition, this result confirms that female students are more inclined to participate actively in the learning process.

It is worth highlighting the fact that there is a negative relationship between presential sessions and female students' global valuation of e-learning. This result might be related to the courses in which the teacher plans few classroom sessions. One possible explanation is, therefore, that female students demand more presential sessions. In contrast, male students appear to be more satisfied with a small number of presential sessions. Another possible explanation, such as female students being less satisfied with presential sessions, contradicts the evidence that average satisfaction where this aspect is concerned is significantly higher for female students. Therefore, the explanation of female students having a greater desire for presential sessions might be a plausible one, although ideally, more detailed information about the number of presential sessions would be required to explore this aspect further.

5.3. Teaching tools

Probably, male students' greater capacity of abstraction is the reason why addressing practical cases does not influence their level of global satisfaction, while it is part of the explanation in the case of female students. However, unlike the case of accessibility, content and self-evaluation, which influence global valuation equally, there are no

significant differences in averages between female and male students where tackling practical cases is concerned. Therefore, despite male and female students not differing in their assessment of this aspect, there is a difference in how it influences the global valuation of the two groups. In contrast, other aspects are significantly different between groups, but influence overall satisfaction equally.

5.4. Teachers

Teachers' attitude is a critical factor that influences e-learning satisfaction (Sun et al., 2008). According to the results, female students are more satisfied with tutors' contribution to the education of students than male students. The effect this aspect has on global satisfaction is significant for female students, but non-significant for male students. However, aspects such as the tutor motivation towards the pupil and the capacity and speed of response of the tutor are not significant in terms of global satisfaction for either female or male students. Other aspects such as tutor-student interaction and the use of illustrations and examples influence global satisfaction formation equally, but register significant and higher scores in the case of female students.

6. CONCLUSIONS

This paper analyses gender differences in e-learning teaching. The interest of the study lies in the possibility of determining which aspects of teaching could be improved to boost the satisfaction of female and male students. The research is based on information from 1,185 students that participated in e-learning courses at the Universidad de Granada.

The estimations performed confirm that there are significant differences between male and female students in terms of their satisfaction with e-learning teaching. Contrary to expectations, female students score e-learning courses higher on average than male students. Moreover, there are significant differences in the importance that male and female students attach to specific aspects of e-learning teaching. The results indicate that female students assign more importance to teaching methods and planning than male students, as well as to fostering active participation in the learning process. In addition, they give greater value to teacher participation, demanding a greater number of presential sessions and prioritising tutorial action and the resolution of practical cases. Female students also take greater satisfaction from the planning of the educational process and having various ways of contacting the teacher.

The main recommendation for those responsible for e-learning that stems from this research is to introduce different learning routes and evaluations with the aim of increasing course satisfaction. For instance, two alternatives could be established to assess the skills acquired by students. One of these routes could prioritise students' ongoing participation throughout the course, through forums and chats, and also collaborative action in problem solving.

It should also be pointed out that this study has limitations and can therefore be improved on in the future. For instance, the questionnaire is too long in opinion of the authors. Moreover, some questions are considered double-barrelled and could generate

inaccurate responses. The fact that the dataset is not a random sample is another limitation that could be partially offset by the large number of students sampled.

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Annex 1- Questions asked to the pupils in e-learning courses in University of Granada

ISSUES	QUESTION
OBJECTIVES AND CONTENT	1. Degree of commitment to the objectives of the course
	2. Course content was clear and adapted to the education needs it intended to meet
	3. The length of the course was adequate in relation to content
	4. The methodology and planning was valid for the objectives and content
	5. Presential sessions (where applicable) contributed positively to the learning process
TEACHING METHODS	6. The course was easy to follow and suited the rate I learn at
	7. The activities and practical exercises were adequate and sufficient to consolidate the content
	8. The course fostered both individual learning and collaboration in groups
	9. The course fostered active participation on behalf of the student
	10. Accessibility, user friendliness and general understanding of the platform of the course
	11. Degree of satisfaction with communication tools (e-mail, forums, notice board…), with the tutor and the rest of participants
TEACHING TOOLS	12. Efficiency of means to answer questions and solve technical problems
	13. There were sufficient teaching resources (web links, videos, glossaries…)
	14. Presentation and organisation of content
	15. Activities and practical cases
	16. Self-assessment exercises
	17. Tutor capacity and speed of response to questions were good
	18. The tutor motivated me adequately and answered my questions correctly and politely
TEACHER	19. The contribution of the tutor was important in the learning process
	20. The tutors showed that they knew their subject well
	21. Tutor-student interaction was fluent
	22. The tutor made adequate use of illustrations and examples
GLOBAL	23. Global satisfaction

Table 1: Descriptive statistics

Variable	Mean/Percentage	Std. Dev.	Min	Max
Global satisfaction	4.15	0.81	1	5
OBJECTIVES AND CONTENT				
objectives	4.19	0.78	1	5
clarity	4.14	0.90	1	5
length	4.10	0.96	1	5
TEACHING METHODS				
Planning	4.05	0.91	1	5
Presential sessions	3.60	1.40	1	5
Course pace	4.04	0.96	1	5
Exercises	4.08	0.97	1	5
Learning	3.77	1.16	1	5
Participation	4.18	0.93	1	5
TEACHING TOOLS				
Accessibility	4.28	0.86	1	5
Tools	4.09	0.93	1	5
Doubts	4.08	0.94	1	5
Teaching tools	4.11	0.95	1	5
Content	4.27	0.89	1	5
Practice	4.06	0.92	1	5
Self-evaluation	3.83	1.11	1	5
TEACHER				
Tutor response	4.28	0.88	1	5
Tutor behaviour	4.27	0.91	1	5
Tutor Contribution	4.10	1.01	1	5
Knowledge	4.54	0.76	1	5
Interaction	4.16	0.96	1	5
Illustrations and examples	4.24	0.87	1	5
GENDER				
Gender (%)	0.65	0.48	0	1

Table 2: Description for global satisfaction

	Mean	Male Mean	Female Mean	Difference	p-value
Global satisfaction	4.14	4.08	4.18	-0.10	0.02

Table 3: Influence of items on global satisfaction

Variable	Male Students	Female Students
OBJECTIVES AND CONTENT		
Objectives	0.28***	0.14***
	0.0000	0.0000
Clarity	0.06**	0.09***
	0.0322	0.0001
Length	0.06**	0.04**
	0.0366	0.0160
TEACHING METHODS		
Planning	0.05	0.10***
	0.1201	0.0000
Presential sessions	0.04**	-0.02**
	0.0116	0.0243
Course pace	0.05***	0.06
	0.0669	0.0066
Exercises	0.03	0.03
	0.2872	0.1573
Learning	-0.01	0.01
	0.5151	0.9364
Participation	0.02	0.05**
	0.4111	0.0161
TEACHING TOOLS		
Accessibility	0.06**	0.05**
	0.0283	0.0180
Tools	0.01	0.03
	0.9465	0.0924
Doubts	0.02	0.02
	0.4653	0.4183
Teaching tools	-0.04	-0.03
	0.1417	0.1728
Content	0.08**	0.05*
	0.0106	0.0586
Practice	0.05	0.08***
	0.1233	0.0006
Self-evaluation	0.06***	0.03**
	0.0021	0.0246
TEACHER		
Tutor response	0.02	-0.01
	0.4839	0.8570
Tutor behaviour	-0.04	0.01
	0.2537	0.7092
Tutor Contribution	0.04	0.10***
	0.2381	0.0001
Knowledge	0.03	0.01
	0.3659	0.8683

Interaction	0.07**	0.08***
	0.0468	0.0023
Illustrations and examples	0.07**	0.08**
	0.0375	0.0037
constant	-0.30*	-0.20*
	0.0516	0.0576
N	409	776
R squared	0.73	0.76

*** Significant at 1%, **Significant at 5%, *Significant at 10%.

Table 4: differences regarding objectives and content

Variable	Male Mean	Female Mean	Difference	p-value
Objectives	4.16	4.20	-0.05	0.1628
Clarity	4.07	4.18	-0.11	0.0220**
Length	4.10	4.10	0.01	0.5410

*** Significant at 1%, **Significant at 5%, *Significant at 10%.

Table 5: differences regarding teaching methods

Variable	Male Mean	Female Mean	Difference	p-value
Planning	3.98	4.09	-0.11	0.0208**
Presential	3.47	3.67	-0.20	0.0109**
Course pace	4.04	4.04	0.00	0.5189
Participation	4.17	4.18	-0.02	0.3754

*** Significant at 1%, **Significant at 5%, *Significant at 10%.

Table 6: differences regarding teaching tools

Variable	Male Mean	Female Mean	Difference	p-value
Accessibility	4.23	4.31	-0.08	0.0754*
Content	4.17	4.32	-0.15	0.0031***
Practice	4.04	4.08	-0.04	0.2272
Self-evaluation	3.70	3.89	-0.20	0.0020***

*** Significant at 1%, **Significant at 5%, *Significant at 10%.

Table 7: differences regarding teachers

Variable	Male Mean	Female Mean	Difference	p-value
Tutor contribution	3.99	4.16	-0.16	0.0040***
Interaction	4.11	4.19	-0.08	0.0990*
Illustrations and examples	4.12	4.31	-0.19	0.0001***

*** Significant at 1%, **Significant at 5%, *Significant at 10%.