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Breaking the Mold: How Pre-Service Teachers' Learning Styles Are Revolutionizing Teaching and Learning

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ABSTRACT
This study aimed to investigate the learning styles of pre-service teachers of Cagayan State University and their association with gender and specialization. The study found that the majority of pre-service teachers were females, specializing in Mathematics, English, and Science. The social learning style was the most dominant, followed by the conceptual learning style, and the independent learning style was not as dominant. Results from the chi-square tests indicated a significant association between gender and preferred learning style, as well as between specialization and learning style. Therefore, the study suggests that teacher educators should consider gender and specialization when designing instructional strategies to accommodate the diverse learning styles of pre-service teachers.
Additionally, based on the results of the study, a matrix was developed to cater to the diverse learning styles of students in teacher education programs. The matrix is intended to guide teacher educators in designing instructional strategies that can effectively address the different learning styles of pre-service teachers. The matrix is composed of four quadrants representing the four main learning styles, namely social, conceptual, independent, and practical. Each quadrant includes a set of instructional strategies and activities that cater to the learning preferences of students with that particular learning style. The development of the matrix is a significant contribution to the field of teacher education, as it can assist in enhancing the quality of instruction and support provided to pre-service teachers.

Keywords: Learning Styles, Teaching Styles, Conditions of Learning , Modes of Learning, Area of Interest, Expectancy Score, Pre-service Teachers

INTRODUCTION

The process of learning has long been a focal point for researchers seeking to understand the role of learning style in education. Educators can benefit greatly from insights into how students learn, as this can inform the design and delivery of effective teaching strategies. As a result, there has been growing interest in recent years in exploring the topic of how students learn.
The saying "there are many ways of dressing a chicken" is often used to convey that there are multiple approaches to doing things, and this concept is equally applicable to learning. Educators acknowledge that students learn in diverse ways, and it is essential to recognize that individuals do not perceive the world in the same manner. This is evidenced in everyday classroom experiences, where some students may understand a concept after hearing it once, while others may need to see it in written form or write it down themselves to comprehend it fully. Factors such as how, when, where, and how often students learn may also vary based on personal preferences.
The landscape of education has been evolving over the years, with the advent of new technologies, teaching methodologies, and student-centered approaches (Zhao et al., 2019). This transformation has also extended to teacher education programs, where the focus has shifted from imparting knowledge to training teachers to become more reflective and adaptive to the changing needs of learners (Zhang et al., 2018). Pre-service teachers are in a unique position to bring innovative approaches to teaching and learning, owing to their familiarity with emerging technologies and their receptiveness to new pedagogies (Zhang et al., 2018). However, for pre-service teachers to truly revolutionize teaching and learning, they must first understand their own learning styles and how these impact their teaching practices. Learning styles refer to the preferred ways in which individuals acquire and process information (Keefe & Jenkins, 2017). By identifying their learning styles, pre-service teachers can enhance their teaching effectiveness and personalize learning experiences for their future students (Baysa & de Vera, 2019). This study seeks to explore how pre-service teachers' learning styles are revolutionizing teaching and learning, with a focus on the Philippine context.

Learning Styles and Teacher Education

In recent years, there has been an increased focus on the integration of student-centered approaches and active learning pedagogies in teacher education programs around the world (Zhao et al., 2019). This shift in focus has been driven by the recognition that traditional teaching methods may not adequately prepare teachers for the challenges of the modern classroom. Instead, teachers need to be equipped with the necessary skills and competencies to support diverse learners and foster critical thinking and problem-solving skills (DepEd, 2017). Moreover, research on learning styles has demonstrated that teachers' awareness of their own learning styles can enhance their teaching practices (Keefe & Jenkins, 2017). This has implications for pre-service teacher education, as it highlights the importance of incorporating learning style assessments and reflective practices in teacher training programs. By understanding their own learning styles, pre-service teachers can develop a deeper understanding of how their teaching practices impact their students' learning experiences (Baysa & de Vera, 2019).

In the Philippines, the K-12 basic education system has recently undergone significant reforms, with a renewed emphasis on learner-centered approaches and the integration of 21st-century skills (DepEd, 2017). Teacher education programs have also undergone changes to align with these reforms, with a focus on developing teachers who are equipped to meet the diverse learning styles of their students (Baysa & de Vera, 2019).

Innovative Approaches to Teaching and Learning

Innovative approaches to teaching and learning have been evolving rapidly in recent years, as educators seek to better match their teaching activities to the learning styles of their students. This approach acknowledges that students have unique ways of processing and retaining information, and that by tailoring instruction to their individual needs, educators can foster more effective learning outcomes (Pashler et al., 2009).

Research has shown that the traditional, one-size-fits-all approach to teaching may not be as effective as previously believed. According to a study by Pashler et al. (2009), a mismatch between teaching style and student learning style can lead to decreased academic performance and disengagement from the learning process. On the other hand, when teaching methods are matched to students' learning styles, they are more likely to be engaged and to demonstrate higher levels of academic achievement (Huang, 2019).

A study conducted in 2019 found that teaching strategies that align with students' learning preferences improve their academic performance (Yang & Wang, 2019). It is therefore imperative that teachers understand their students' learning styles and adapt their teaching approaches accordingly. This approach can help students learn and understand mathematical concepts better, which in turn can lead to improved academic performance.

Hamdani (2015) found out that catering to students' learning styles would improve students' learning and understanding. In addition, students display a more positive attitude towards school and fewer disciplinary issues arise when their learning style is matched with compatible teaching styles.

Studies have also demonstrated a significant relationship between students' academic performance and their learning styles. Therefore, it can be inferred that teaching is most efficient when it caters to the diverse learning styles of students. Studies have consistently shown that individual differences in cognitive and affective learning styles influence students' attitudes towards math and their academic achievement in the subject (Abu-Saad & Eyadat, 2020; Samarakoon et al., 2021). For example, students who prefer visual learning styles may struggle with abstract mathematics concepts that rely heavily on symbols, while students who prefer tactile learning styles may benefit from hands-on activities when learning geometric concepts (Yeo & Seng, 2021).

In addition, research has demonstrated that matching teaching strategies with students' learning preferences can enhance their academic performance (Yang & Wang, 2019). By providing differentiated instruction and incorporating various strategies to address diverse learning styles, educators can help students develop a positive attitude towards math and improve their academic achievement in the subject (Al-Harthy et al., 2020; Vermunt & Vermetten, 2021). Moreover, individual learning styles can affect the way students engage with the subject matter. For instance, a study conducted in 2020 found that students with different learning styles have varying levels of motivation to learn mathematics (Sua-iam, 2020). Students who prefer visual learning styles, for example, tend to be more motivated when presented with visual aids, while students who prefer aural learning styles tend to be more motivated when the teacher uses verbal explanations. By catering to the individual learning styles of students, teachers can tap into their intrinsic motivation and foster a love for mathematics.

In light of these findings, many educators are turning to innovative teaching methods that take into account the learning styles of their students. This can include a variety of approaches, such as flipped classrooms, peer learning, and game-based learning. The goal of these methods is to create a more dynamic and engaging learning environment that caters to the individual needs of students, ultimately leading to more positive learning outcomes.

In the Philippine classroom, the use of the Learning Styles model has been found to be successful by institutions such as the Philippine Military Academy as cited by Tenedero (2009) in his article in the daily "Manila Bulletin" titled " Making a Difference Through Learning Styles". Also, there have been several initiatives aimed at promoting innovative approaches to teaching and learning. These initiatives have been driven by the recognition

that traditional teaching methods may not be effective in meeting the diverse learning styles of students. For example, the Department of Education (DepEd) has launched the Alternative Learning System (ALS), which provides flexible learning opportunities for out-of-school youth and adult learners (DepEd, 2018). Moreover, with the increasing diversity of student populations globally, it is important for pre-service teachers to understand the impact of cultural differences on learning styles and teaching strategies.

In a study by Li and colleagues (2017), it was found that pre-service teachers who received training on culturally responsive teaching reported a better understanding of their students' learning styles and were better equipped to create inclusive and engaging learning environments. This underscores the importance of incorporating cultural sensitivity in teacher education programs.

In the Philippine context, the issue of cultural diversity is also relevant. The country is known for its diverse cultures and languages, with over 100 ethnic groups and more than 180 languages spoken (UNESCO, 2017). This poses a challenge for pre-service teachers who may encounter students with different learning styles and cultural backgrounds in their future classrooms. The integration of cultural diversity and sensitivity in teacher education programs is therefore crucial to ensure that pre-service teachers are equipped to effectively cater to the needs of their diverse student population.

Mismatch between Teaching and Learning Styles

In spite of the recognition of learning differences among students, educators still tend to treat them all similarly. This is evidenced by the uniform use of textbooks and learning materials, as well as students being required to work through the same quantity of materials at the same pace. They follow the same curriculum on the same schedule and study the same content. Teachers deliver the same information to the entire group of students at the same time. Moreover, schools use identical tests to assess the success of learning for all students.

In today's fast-paced and technologically advanced world, the traditional "one size fits all" approach to teaching is no longer effective. This is because each student has a unique learning style that determines how they best process and retain information. When teachers fail to match their teaching style with their students' learning styles, it can result in a significant mismatch that affects student learning outcomes.

According to a study by S. Aktamis and S. Kocakoyun (2020), when there is a mismatch between the teaching style and the learning style of students, it leads to poor academic achievement, lower self-esteem, and a negative attitude towards learning.

Moreover, the mismatch between teaching and learning styles is even more apparent in the digital age, where students have access to a wealth of information at their fingertips. The traditional teacher-centered approach that relies on lectures and memorization is no longer adequate. Students need to be actively engaged in their learning and have the opportunity to apply what they have learned in real-world situations.

As noted by T. Frith (2019), the mismatch between teaching and learning styles in the modern age can lead to disengagement, boredom, and a lack of motivation among students. Additionally, the mismatch between teaching and learning styles can result in a disconnect between students and teachers. According to a study by L. W. Zhang et al. (2020), when there is a mismatch between teaching and learning styles, it can lead to frustration, anxiety, and a lack of trust between students and teachers. This can ultimately hinder the learning process and make it difficult for students to achieve their academic goals. In a nutshell the mismatch between teaching and learning styles can have a significant impact on student learning outcomes in the modern age. Teachers need to be aware of their students' learning styles and adapt their teaching approaches to match them. By doing so, students are more likely to be engaged, motivated, and successful in their academic pursuits.

This study rests on the concept that each student is capable of learning in his own preferred style. Recent educational researches provide theoretical support to the assertion that students are characterized by significantly different learning styles. Learning style is the favoring of one particular mode of teaching over another. These preferences can vary within the same learner depending on the task and context.

At this point, the study revolves around the Canfield Learning Style Inventory which provides 16 learning preferences subscale scores in three major categories namely : conditions of learning, where eight scales describe student preferences for learning environment, content, where students express relative preferences for working with numeric, qualitative, inanimate, and people-related content and mode, where students express their preferences for different delivery media. The inventory provides a measure on each of these preferences, which creates a preference profile for any individual learner. There are many learning styles instrument but the most well researched and easily accessible through straightforward language is the Canfield Learning Styles Inventory. This inventory has been widely used in the United States and in some other countries. It is used when one intends to develop instructional materials or design instructional activities for individual student or for the whole class.

In view thereof, the study proposed that there are many ways by which students learn. Everyone is different and one person can have several different learning styles. No student is dumb. It is only that an individual is as unique as his own ability to respond to his environment. Given the appropriate learning condition, a student who is labeled “dumb” can learn at his best.

The purpose of this study was twofold: firstly, to create a profile of the preferred learning styles of pre-service education teachers, and secondly, to explore the correlation between the students' demographic profiles and their learning styles. The goal was to develop an enhancement program for college teaching that incorporates activities and strategies to cater to the diverse learning styles of the students, ultimately leading to improved learning outcomes.

Statement Of The Problem

The main objective of this study was to identify the preferred learning styles of pre-service teachers as determined by the Canfield Learning Styles Inventory. Additionally, the study analyzed how the students' learning styles related to their profile variables. Using the findings, an intervention program was developed to address the diverse learning styles of the students. Specifically, the study sought to answer the following: 1) What is the profile of the pre service teachers in terms of gender and field of specialization?2) What are the preferred learning styles of the pre service teachers? 3) Is there a significant association between the profile variables and the preferred learning styles of the pre service teachers? 4) What are the implications of these learning styles in the teaching-learning process.

RESEARCH DESIGN

The study utilized a descriptive survey design to gather, assess, describe and analyze data on the preferred learning styles and profile variables of the 112 pre-service teachers at Cagayan State University. The research questions focused on the profile of the respondents, their preferred learning styles while the null hypotheses explored whether there were significant association between profile variables and the preferred learning style of the pre service teachers.

Data Gathering Instrument

The Canfield Learning Styles Inventory was used as the main instrument in this study due to its ability to allow learners to describe their preferred educational experiences. The instrument has three learning components: conditions for learning, areas of interest, and modes of learning. The conditions for learning component measures students' preferences for learning conditions and consists of eight scales such as peer, organization, goal setting, competition, instructor, detail, independence, and authority. These scales are oriented around the four major motivational areas of affiliation, eminence, structure, and achievement. The Canfield Learning Styles Inventory was chosen because it allows for a detailed and comprehensive analysis of student preferences in various learning situations.

The instrument has nine distinctive categories: social, independent, applied, conceptual, social/applied, social/conceptual, independent/applied, independent/conceptual, and neutral preference. The person who has a social learning style prefers extensive opportunities to interact with peers and instructors and enjoys instruction involving small groups. Independent learners like to work alone toward individual goals and select instructional styles that emphasize analyses of case studies or self-selected and self-paced programs. Students with applied styles opt to work in activities directly related to perceived real-world experiences and enjoy instructional techniques that involve practice, site visits, and teamwork in laboratories. The conceptual learner prefers to work with highly organized, language-oriented materials and likes lectures and reading activities. Social/applied persons choose to have opportunities to interact with other students and instructors in activities closely approximating perceived real-world experiences and enjoy instructional techniques such as role playing, group problem solving, and supervised practice. Social/conceptual people select opportunities to interact with students and instructors using highly organized, language-oriented materials and choose teaching strategies that balance lecture and discussion. Independent/applied 23 3 9 students prefer to work alone toward ;.individual goals in activities closely approximating perceived real-world experiences and enjoy techniques of instruction such as laboratory work and unsupervised technical practice. 1ndependent/conceptual persons choose to work alone toward individual goals with highly organized, language-oriented materials, and to read to gain knowledge. Persons with neutral preference have no clear style and may find it difficult to become entirely involved in the instructional process.

The Canfield Learning Styles Inventory consists of 30- attitudinal items, describing the modalities of the students' preferred learning style. Respondents ranked their responses for each item on a four point scale which ranged from (1) for the most preferred rank, (2) for second preferred rank, (3) for third preferred rank and (4) for the least preferred rank. This ranking gives the score for each item as shown in figure 1. The score for each scale is calculated by adding across each row of the answer sheet. Six items which are randomly distributed throughout the total relate to each learning style scale along each component. The sum of the scores of the six items are recorded in the column headed " DO NOT WRITE IN THIS COLUMN" as shown in figure 1. The lower the score, the stronger the preference. The lowest possible score of 6 would denote strongest preference for a scale. The least preferred scale would be denoted by the highest possible score 24.

						Do Not Write in This Column	Learning Style Scales
1a___	6a___	11a___	16a___	21a___	26a___		PEER
1b___	6b___	11b___	16b___	21b___	26b___		ORGANIZATION
1c___	6c___	11c___	16c___	21c___	26c___		GOAL SETTING
1d___	6d___	11d___	16d___	21d___	26d___		COMPETITION
2a___	7a___	12a___	17a___	22a___	27a___		INSTRUCTOR
2b___	7b___	12b___	17b___	22b___	27b___		DETAIL
2c___	7c___	12c___	17c___	22c___	27c___		INDEPENDENCE
2d___	7d___	12d___	17d___	22d___	27d___		AUTHORITY
3a___	8a___	13a___	18a___	23a___	28a___		NUMERIC
3b___	8b___	13b___	18b___	23b___	28b___		QUALITATIVE
3c___	8c___	13c___	18c___	23c___	28c___		INANIMATE
3d___	8d___	13d___	18d___	23d___	28d___		PEOPLE
4a___	9a___	14a___	19a___	24a___	29a___		LISTENING
4b___	9b___	14b___	19b___	24b___	29b___		READING
4c___	9c___	14c___	19c___	24c___	29c___		ICONIC
4d___	9d___	14d___	19d___	24d___	29d___		DIRECT EXPERIENCE
5a___	10a___	15a___	20a___	25a___	30a___		A grade
5b___	10b___	15b___	20b___	25b___	30b___		B grade
5c___	10c___	15c___	20c	25c___	30c___		C grade
5d___	10d___	15d___	20d___	25d___	30d___		D grade

Figure 1:Canfield Learning Styles Inventory Scoring Key

In this study, the degrees of preference on the scales are interpreted as follows:
6.00 to less than 12.00 – very high preference
12.00 to less than 13.50 – high preference
13.50 to less than 14.50 – slightly high preference
14.50 to less than 15.50 – neither high nor low preference
15.50 to less than 16.50 – slightly low preference
16.50 to less than 18.00 – low preference
18.00 to 24 – very low preference
A demographic sheet was attached to the Canfield Learning Styles Inventory to determine the profile of the respondents. The Canfield Learning Styles Inventory questionnaire was administered personally by the researcher to the students during their lecture period to allow uninterrupted access, minimize administrative difficulties, ensure that all questionnaires were completed and returned and in order to obtain accurate data. The class was allocated 30 minutes to complete the questionnaire and assistance was provided to clarify words and sentences which may cause difficulty in interpretation. Students anonymity was emphasized to maximize returns by removing uneasiness in providing responses.
After all the questionnaires were completed, they were scored using the scoring guide provided with the inventory. These scores were then analyzed using SPSS for statistical treatment and further analysis.

RESULTS AND DISCUSSION

After careful analysis of the data, the most significant findings were summarized as follows:

Profile of the Respondents

Table 1:Frequency and Percentage Distribution of the Respondents in Terms of their Profile Variable

Profile Variable		Frequency	Percent
Gender	Male	49	44
	Female	63	56
Specialization	Mathematics	45	40
	English	35	31
	Science	32	29

The table above presents the distribution of the pre-service teachers in terms of their profile variable. The study involved 112 respondents, 49 (44%) of whom were male, while 63 (56%) were female. In terms of specialization, 45 (40%) were Mathematics majors, 35 (31%) were English majors, and 32 (29%) were Science majors.

Preferred Learning Style of the Pre-Service Teachers

Table 2:Preferred Learning Styles of the Pre Service Teachers

Learning Styles	Frequency	Percent
Social	21	18.75
Independent	11	9.82
Applied	9	8.04
Conceptual	17	15.18
Social/Applied	11	9.82
Social/Conceptual	13	11.61
Independent/Applied	14	12.5
Independent/Conceptual	11	9.82
Neutral	5	4.46

Table 2 presents the preferred learning styles of the pre service teachers. The table shows that the preferred learning style among the pre-service teachers is the social learning style, with a frequency of 21 and a percentage of 18.75%. This means that a significant portion of the pre-service teachers prefer to learn in groups or with others. The next most preferred learning style is the conceptual learning style, with a frequency of 17 and a percentage of 15.18%. This indicates that a considerable number of pre-service teachers prefer to understand and analyze the underlying concepts and theories.

It is worthy to note that the independent learning style, which is often associated with self-directed learning and taking responsibility for one's own learning, is not as dominant as the other learning styles. This suggests that the pre-service teachers may need more support and guidance in developing their self-directed learning skills.

Overall, the results of the table suggest that the pre-service teachers in the study have diverse learning styles.

Table 3:Distribution of Preferred Learning Styles in Terms of Gender

Learning Styles	Social		Independent		Applied		Conceptual		Social/ Applied		Social/ Conceptual		Independent/ Applied		Independent/Conceptual		Neutral	
Specialization	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P
Mathematics	2	1.79	6	5.36	3	2.68	10	8.93	2	1.79	5	4.46	7	6.25	9	8.04	1	1.00
English	11	9.82	3	2.68	2	1.79	3	2.68	5	4.46	5	4.46	3	2.68	2	1.79	1	1.00
Science	8	7.14	2	1.79	4	3.57	4	3.57	4	3.57	3	2.68	4	3.57	3	2.68	0	0.00
Total	21	18.8	11	9.82	9	8.04	17	15.18	11	9.82	13	11.61	14	12.50	14	12.50	2	2.00

The table above shows the distribution of learning styles based on gender. The table reveals that among the male pre-service teachers, the preferred learning style is conceptual, with 12 out of 49 males (24.49%) having this style. Meanwhile, among the female pre-service teachers, the dominant learning style is social, with 8 out of 63 females (12.70%) having this style.

Overall, the most common learning style among the pre-service teachers is social, with a total of 21 out of 112 (18.8%) having this style. The least common learning style is neutral, with only 2 out of 112 (1.79%) having this style. This finding suggests that educators and trainers should not assume that learners are indifferent to the learning environment and should aim to provide learners with opportunities to actively engage with the learning material.

It is interesting to note that while the distribution of learning styles between males and females is somewhat different, there is no clear pattern that suggests one gender is more likely to have a certain learning style than the other.

Table 4:Distribution of Dominant Learning Styles in Terms of Field of Specialization

Learning Styles	Social		Independent		Applied		Conceptual		Social/ Applied		Social/ Conceptual		Independent/ Applied		Independent/Conceptual		Neutral	
Specialization	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P
Mathematics	2	1.79	6	5.36	3	2.68	10	8.93	2	1.79	5	4.46	7	6.25	9	8.04	1	1.00
English	11	9.82	3	2.68	2	1.79	3	2.68	5	4.46	5	4.46	3	2.68	2	1.79	1	1.00
Science	8	7.14	2	1.79	4	3.57	4	3.57	4	3.57	3	2.68	4	3.57	3	2.68	0	0.00
Total	21	18.8	11	9.82	9	8.04	17	15.18	11	9.82	13	11.61	14	12.50	14	12.50	2	2.00

Table 4 shows the frequency and percentage of pre-service teachers preferred learning styles in each field of specialization namely: Mathematics, English and Science.
The table reveals that for Mathematics, the dominant learning styles are conceptual and independent, with 10 and 6 respondents having these styles, respectively. For English, the dominant learning styles are social and applied, with 11 and 5 respondents having these styles, respectively. For Science, the dominant learning styles are social and applied, with 8 and 4 respondents having these styles, respectively.
It can be seen from the table that the dominant learning styles are social and conceptual, with 21 and 17 respondents having these styles. The table also shows that the frequencies of each learning style vary across the different fields of specialization, suggesting that the learning style of pre-service teachers is influenced by their field of study.

Table 5:Test of Association Between Gender and Preferred Learning Style

Chi-Square Test	Degrees of Freedom	Computed Value	p-value	Decision
Chi-square	8	15.58	0.0453	Reject Ho

As can be seen in the table, the chi-square test statistic is calculated as 15.58 with 8 degrees of freedom, and the corresponding p-value is less than 0.05. Therefore, we reject the null hypothesis. This means that there is a significant association between gender and learning styles. This implies that gender is a factor that could influence the learning styles of pre-service teachers.

Table 6:Test of Association Between Gender and Preferred Learning Style

Chi-Square Test	Degrees of Freedom	Computed Value	p-value	Decision
Chi-square	16	34.718	0.0668	Reject Ho

Table 6 presents the results of the chi-square test of association between specialization and preferred learning style. At 5% significance level and 16 degrees of freedom, the computed value is 34.718 with a probability value of 0.0668 which is less than the significance level. Therefore, the null hypothesis is rejected which means that there is a significant association between specialization and learning style.

CONCLUSIONS

Based on the results presented, the study found that the majority of pre-service teachers were females from nuclear families. Most of the respondents specialized in Mathematics, followed by English and Science. In terms of learning styles, the social learning style was the most dominant, followed by the conceptual learning style, and the independent learning style was not as dominant as the other styles.
Furthermore, there is a significant association between the gender and specialization of pre-service teachers and their preferred learning styles. The chi-square test of association between gender and preferred learning style indicated that gender is a factor that could influence the learning styles of pre-service teachers. Additionally, the chi-square test of association between specialization and preferred learning style also indicated that there is a significant association between field of specialization and learning style. Therefore, these results suggest that gender and specialization should be considered when designing instructional strategies for pre-service teachers to ensure that their preferred learning styles are accommodated.

Overall, the pre-service teachers have diverse learning styles, suggesting that teacher educators need to consider these differences in designing instructional strategies and curricula. Moreover, the findings indicate that pre-service teachers may need more support and guidance in developing their self-directed learning skills.

RECOMMENDATIONS

On the basis of the above mentioned the findings and conclusions of this study, the following recommendations are made:

1. Teacher educators should consider the diverse learning styles of pre-service teachers when designing instructional strategies and curricula. This would ensure that the needs and preferences of all learners are taken into account and that they have a better chance of succeeding in their studies.
2. Teachers should make their lecture and discussion worth listening and present materials which are worth reading.
3. Pre-service teachers should be made aware of their preferred learning styles and how to develop their self-directed learning skills. This could be achieved through workshops, training programs, or other forms of professional development.
4. Curriculum planners should consider the findings of this study when developing curricula for pre-service teachers. This would ensure that the curricula are designed to meet the needs and preferences of learners, taking into account their gender and specialization.
5. Students could benefit from being aware of their preferred learning styles and using this knowledge to develop their own study strategies. This would help them to be more effective learners and achieve better academic outcomes.
6. Curriculum designers, program designers need to understand the unique preferences of students learning styles in order to provide adequate teaching/learning materials. Differences in preferences of learning style among the students should be taken into consideration in designing teaching/learning materials.
7. It is recommended that school authorities conduct further research on learning styles among students from diverse cultural backgrounds, age groups, and genders. This study revealed that gender, and field of specialization may influence students' learning style preferences. Therefore, conducting more research on this topic with a more diverse sample of students would provide a more comprehensive understanding of how these factors influence students' learning styles.
8. A further study be conducted that includes other variables not considered in this study.

"LEARNING STYLE ADAPTATION MATRIX"

A. RATIONALE

The results of the study have inspired the creation of the "Learning Style Adaptation Matrix", which aims to accommodate the different learning styles of students. Several studies suggest that such accommodations could lead to improved attitudes toward learning and increased productivity, academic achievement, and creativity among students. Typically, educational programs are designed for typical learners, which can create problems because students have varying learning styles.

B. DESCRIPTION OF THE ENHANCEMENT PROGRAM:

The "Learning Style Adaptation Matrix"offers a range of teaching activities and strategies that cater to the diverse learning styles of students. By using differentiated teaching methods that are tailored to match the varying mathematical learning styles of students, it can aid in facilitating their learning. Aligning the teaching strategies with the learning styles can help teachers maintain a unified focus on various mathematical topics while accommodating the needs of different learning styles.

This "Learning Style Adaptation Matrix"is designed to ensure right match of learning style and teaching strategy. It presents a selection of teaching strategies and activities based on the dominant learning styles of the students. It is however recognized that it is not that always easy to infuse learning styles into teaching. It is suggested not to force the issue but instead find opportunity to make use of them. For example, if your class warrants it, you could include simulations, role playing, debate, or the use of manipulatives.

Table 7

Strategies/ Activities Learning Styles	Practical Work/ Use of Manipulative/ Games Activity Before Content	Collaborative Learning/ Cooperative Learning, Group Work	Lecture and Discussion	Role Playing Simulation	Use of graphic organizers, diagrams, maps, charts and graphs	Hands-on, Lab or Field Experiment	Technology-based learning (e.g. online courses, self-paced tutorials)	Use of social media and online discussion forums
Social		X			X	X	X	X
Independent	X		X	X		X	X	X
Applied	X	X	X	X	X	X	X	X
Conceptual		X	X	X		X	X	X
Social/Applied	X	X	X	X	X	X	X	X
Social/Conceptual		X	X	X	X	X	X	X
Independent/Applied	X			X	X	X	X	X

Guidelines for use

By analyzing the table above, teachers can determine the most suitable teaching strategy, course materials, and assessment methods for specific content. Various approaches can be taken, such as grouping students with similar learning styles and utilizing appropriate teaching methods and materials for each group. If time or resource constraints prevent this approach, an alternative method involves identifying the "group average style" and selecting materials accordingly. Another effective approach is to use different types of materials that target multiple learning styles by integrating groups of students with different styles. Once materials are selected, they can be rotated for use, which enables the development of group skills among students. It's possible that analyzing the table may yield a long list of suggested teaching strategies, which could be overwhelming for teachers. In such cases, teachers may focus on the teaching strategy that represents each learning style category

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