

## An Analysis of Diploma Civil Engineering Students' Learning Style

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**Abstract:** Learning styles demands a growing need for the incorporation of several theoretical perspectives on academic achievements. Learning styles are methods applied to assist students to be successful in schools and excellent in examinations. The purpose of this study is to determine the preferred learning styles of Civil Engineering Diploma Students. The effects of gender on types of learning styles were also investigated. The sample groups used in this study consists of 60 Civil Engineering (EC110) Diploma students taking UED102. To determine their learning styles, data was collected using the "Learning Styles Inventory" developed by Leonard (2005). The significant differences in EC110 undergraduates' learning styles based on gender were determined and the statistical analysis was conducted. The results were able to provide the important roles of learning styles in the process of teaching and learning. Therefore, the best strategy for EC110 undergraduates is to integrate visual, kinesthetics, and auditory learning styles in their teaching and learning methods. This combination strengthens the talent of undergraduates to retain information and knowledge.

**Keywords:** diploma engineering students, civil engineering, gender, learning style

### Introduction

Learning styles expresses to the understanding that every student learns differently. Everyone uses learning styles to process data every day. Brown, Zogni, Williams, and Sim (2009) stated that the purpose of learning in individuals is to manage and adopt the situation which results in different learning styles. Thus, learning styles for every person may vary. 'Learning Styles' is defined as preferred methods by individuals to cope with new knowledges and approaches that they practise for active learning (Brown et. al., 2009). In other words, learning styles are cognitive, conceptual, and behavioural patterns which are exposed to time and duties (Ballone and Czerniak, 2001). Meanwhile, an individual's learning styles refer to the way students absorb, process, comprehend and retain information based on their preferential manner. A learning style is "an individual's mode of gaining knowledge" (Dictionary.com, 2012). Among many examples of a situation in the engineering field is when students learn to build a wall. A number of students understand the process by simply following verbal instructions, while others need to physically manipulate the wall themselves. This concept of individualized learning styles has gained well-known recognition in classroom management as well as education theories. An individual's learning style depends on former experiences related to cognitive, emotional and environmental factors. Thus, it is essential for lecturers to understand the variations in their students' learning style for them to be able to implement the best practises in their curriculum, delivery, and assessment. Recently, most lecturers integrated different learning styles and education obstacles directly into their curriculum. This study aims to determine the three categories of students based on their learning style: auditory learners, visual learners and kinesthetic learners. The visual learning style is defined as using visual tools in a process where students gain understanding and knowledge, while the kinesthetic learning style refers to students who learn best using sensory of touch and feeling (Lewis, 2012). Lastly, students who can listen and understand instructions clearly are the group of auditory learners (Fleming, 2012).

### Learning Styles

Kolb's theories had commonly shown the impression of learning styles (Kolb et. al., 2005). The theories introduce the concept of learning space as a framework for understanding the interface between student

learning styles and the institutional learning environment. According to Kolb, learning is viewed as circular process which involves a sequence of experiences with cognitive terms such as abstract concept, active experimentation, observation, and reflection. Versatile learning style refers to a student's ability to cope with situations and to successfully adapt his or her learning style to the given task. The five senses should be used by individuals to collect information and then passage it through a representational system of separate routes for interpretation and understanding (Fatt, 2000). This representational system includes visual, auditory, and kinesthetic types of learners (Fatt, 2000). Each individual shows a preference towards one of the representational systems. Thus, learning style enhances communication skills of one individual with others via specific communication (Fatt, 2000).

Learners who prefer the visual learning style observe by remembering and constructing mental images. In addition, reading, observing, and displaying of data and visual aids are the preferred methods of a visual learner (Fatt, 2000). Therefore, for visual students, the recommended methods for teaching and learning are through watching movies, film strips, pictures, and graphs. These methods help visual students integrate information. Undergraduates who are visual learners receive instructions more effectively with visual aids. By providing visual aids, they perform better due to alignment of materials being provided. On the contrary, learners with an auditory learning preference desire and are attracted to sound. They comprehend a subject more effectively after they have heard the instruction compared to reading the subject (Fatt, 2000). Seminars, talks, discussions and voice recordings are some of the ideal methods for auditory learners. The third leaning style is the kinesthetic learning style. Learners of the kinesthetic preference prefer to communicate with the environment by feeling it (Fatt, 2000). Kinesthetic learners choose to learn by doing and getting involved in various activities. This type of learners would also rather learn by visual presentations, explanations, and discussions. A kinesthetic learners successfully learn through hands-on activities which benefits them to develop and create the experience and information (Fatt, 2000).

The current study collected data on EC110 students' learning style preferences to ensure a successful teaching and learning process as well as excellent outcomes in examinations. Understanding learning style creates awareness among students to assists them in acquiring knowledge during their efforts to learn. Moreover, the preferred learning styles can act as motivation for the students to apply or implement their knowledge (Brown et al., 2009). Apart from that, students' strengths and weaknesses can be identified using the learning styles approach. By knowing their strengths and weaknesses, lecturers become more motivated and triggered to teach properly (Coffield et al., 2004). Additionally, among other advantages of observing students' learning styles are knowing students learning problems, finding preferred teaching methods, and assisting students in determining their own suitable learning methods. When students learning styles are attuned with the teaching methods by the lecturers, it is easier to comprehend the subject better, have a positive outlook on the lesson and retain information for a longer period of time (Lohri-Posey, 2003). On the contrary, students are not able to achieve optimum benefits from teaching methods being mismatched to student's styles of learning. This circumstance is similar to Fatt (2000) where students can learn better and be more comfortable in their own learning styles by providing a learning environment that suits their unique learning styles instead of having to adapt themselves to the different teaching styles of lecturers. Similarly, Naimie et al. (2010) revealed that students learn more and enjoy the environment and class experience better when they can apply their preferred learning styles. Lecturers can also enhance problem solving skills based on specific learning styles. By boosting problem solving skills in the classroom, lecturers are preparing students for real life situations.

## **Materials and Method**

The study group consisted of 60 new diploma students (20 female, 40 male) who were taking UED102 from the Faculty of Civil Engineering at Universiti Teknologi MARA (UiTM), Pahang. The mean value of age is 19 years old. The samples were randomly selected. This specific group was selected for the current study since they will begin to embark on their first semester only after completing their interim courses. Thus, it was a great opportunity to observe varying learning strategies.

Learning Strategy Inventory which was adopted from Leonard (2005) was used in this study. The 'Yes' and 'No' scaled inventory form consisted of 30 items. The inventory is made up of three dimensions which are 1. Visual learning style (10 items), 2. Auditory Learning Style (10 items), 3.

Kinesthetic Learning Style (10 items) as shown in Figure 1. The percentage of student for different learning styles were recorded. In addition, the influence of the gender on the learning styles of the students also was determined in this study.

Learning Styles	Visual	Auditory	Kinesthetic
1. I prefer watching a video to reading	YES / NO		
2. When I sing along with my CDs or the radio, I know the words to the songs.		YES / NO	
3. I have athletic ability.			YES / NO
4. I can picture the setting of a story I am reading	YES / NO		
5. I study better with music in the background.		YES / NO	
6. I enjoy hands-on learning.			YES / NO
7. I'd rather play sports than watch someone play them			YES / NO
8. Reading aloud helps me remember		YES / NO	
9. I prefer watching someone perform a skill or a task before I actually try it.	YES / NO		
10. I color-coordinate my clothes.	YES / NO		
11. I'm good at rhyming and rapping		YES / NO	
12. Use phrases like: "I've got a handle on it," "I'm up against the wall," or "I have a feeling that . . ."			YES / NO
13. I need to look at something several times before I understand it.	YES / NO		
14. I prefer having instructors give oral directions than written ones.		YES / NO	
15. I have difficulty being still for long periods of time.			YES / NO
16. I use phrases like "I see what you're saying," "That looks good," or "That's clear to me."	YES / NO		
17. I'm good at figuring out how something works			YES / NO
18. I can understand a taped lecture		YES / NO	
19. It's easy for me to replay scenes from movies in my head.	YES / NO		
20. I enjoy studying foreign languages.		YES / NO	
21. I would rather conduct my own science experiment than watch someone else do it.			YES / NO
22. I would rather paint a house than a picture.			YES / NO
23. I enjoy studying in groups.		YES / NO	
24. I prefer to have written directions to someone's home.	YES / NO		
25. I can look at an object and remember it when I close my eyes.	YES / NO		
26. I have musical ability.		YES / NO	
27. When I study new vocabulary, writing the words several times helps me learn			YES / NO
28. I can imagine myself doing something before I actually do it.	YES / NO		
29. I use phrases like "That rings a bell," "I hear you," or "That sounds good."		YES / NO	
30. I enjoy building things and working with tools.			YES / NO
<b>TOTAL YES</b>			

Fig. 1 The Learning styles inventory

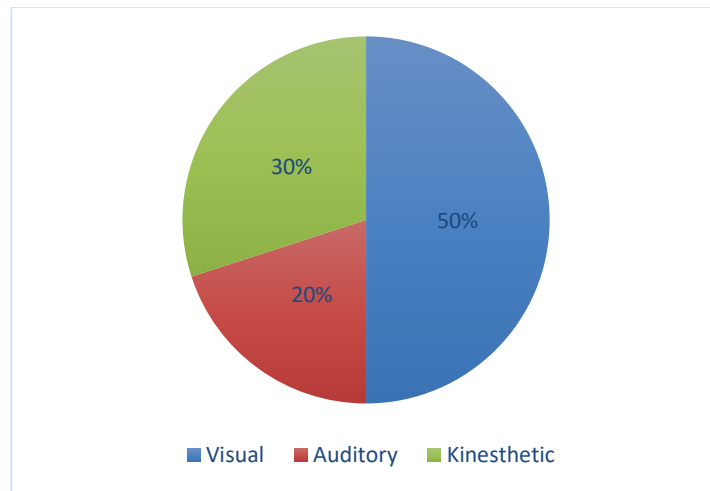
## Results and Discussions

The distribution of data regarding the preference of learning styles by EC110 students are presented in Table 1. According to Table 1, visual learning style is the most common learning style of EC110 students with approximately half of the students (30 out of 60) indicated as having a visual learning preference. The following learning style is Kinesthetic (18 out of 60), while, 18 out of 60 students indicated an auditory preference.

Table 1 The Distribution of Learning Styles of Students

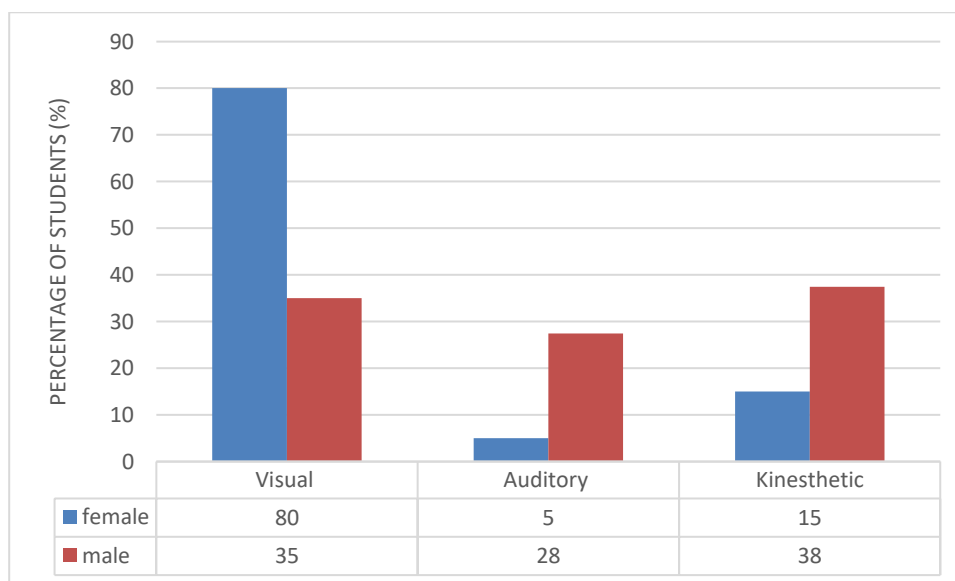
	Visual	Auditory	Kinesthetic	Total
Frequency	30	12	18	60
Percentage (%)	50	20	30	100

Figure 2 shows the percentage of EC110 students based on their preferred learning style. The results show that approximately 50% of the students consider themselves as visual learners. This indicates that this group of EC110 students have visualization skills and are able to memorize objects, shapes, and pictures. This type of students also learns better by viewing movies, recorded videos, and demonstrations as well as through reading. The lowest percentage of students, at 20%, perceive themselves as auditory learners. Students who prefer auditory learning styles should have good hearing where they can hear variances in rhythm and tone. Thus, reading loudly is the most effective method for auditory learners.



**Fig. 2** The percentage of EC110 Students' Learning Style

Fig. 3 shows the effects of gender on learning styles. The figure shows that 80% of female students prefer the visual learning style, while only 35% of the male indicated this preference. This result suggests that more female students can visualise in their minds compared to their male counterpart. A similar outcome was reported by MacCarter (2008) where the preference was dominated by the visual learning style. Visual learners can form images from things that they learn and keep them in their minds (Dunn and Dunn, 2003). Moreover, 38% of the male students are shown to be auditory learners while only 5% of the female students belong in this category. Lastly, 38% of the male students and 15% of the female students are shown to be kinesthetic learners. This result indicates that male students prefer kinesthetic styles where they prefer more activities and collecting information in the classroom for better understanding. Penger and Tekavcic (2009) also revealed that among the three learning styles, two of which are normally prevailing. Hence, matching teaching methods with students' learning preferences which allows students to acquire better understanding of the subject is vital (Kahtz & Kling, 1999). Lecturers should integrate different learning styles in their classroom environment that benefits every student.



**Fig. 3** The Effect of Gender on the Learning Styles

## Conclusions

In conclusion, the most dominant learning style adopted by the EC110 students who participated in this study is visual learning. Some students have a preference among these learning styles because the learning style is a consistent path in which students respond to the stimuli and use it. In addition, the influence of gender is significant on visual learners. It was seen that learning style was more beneficial for female students. By incorporating various learning styles in the classroom, students were able to successfully perform in examinations and excel in their studies. However, further research is needed to provide great impact of learning preferences in education. One of the advantages of the lecturers knowing students' learning preferences is being able to do research and prepare the appropriate teaching methods and setting the right classroom environment. Thus, the investigation on students' learning styles is important and should be conducted at the early stages from the beginning of the semester during the interim classes or orientation week.

## References

- Ballone, L. M. and Czerniak, C. M. (2001). Teacher's Beliefs about Accommodating Students's Styles in Science Classes. *Electronic Journal of Science Education*, Vol. 6, No. 2.
- Brown, T., Zogni, M., Williams, B., Sim, J. vd. (2009). Are learning preferences of health science students predictive of their attitudes towards e-learning?. *Australasian Journal of Educational Technology*, 25(4), 524-543.
- Coffield, F. J., Moseley, D. V., Hall, E., & Ecclestone, K. (2004). Should we be using learning styles? What research has to say to practice? London: *Learning and Skills Research Centre*.
- Dictionary.com. (2012). Learning Style/Definition. Retrieved from Dictionary.com: <http://dictionary.reference.com/browse/learning+style>
- Fatt, J. P. (2000). Understanding the learning styles of students. *International Journal of Sociology and Social Policy*, 20(11), 31-45.
- Fleming, G. (2012). Auditory Learning Style. Retrieved from About.com: <http://homeworktips.about.com/od/homeworkhelp/a/auditory.htm>
- Kahtz, A. W., & Kling, G. J. (1999). Field-dependent and field-independent conceptualisations of various instructional Methods with an Emphasis on CAI: A Qualitative Analysis. *Educational Psychology*, 19(4), 413-428.
- Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of management learning & education*, 4(2), 193-212.
- Leonard, (2005) Enid. College Success Simplified, [tlc@puc.edu](mailto:tlc@puc.edu)
- Lewis, B. (2012). Visual Learning. Retrieved from About.com: <http://k6educators.about.com/od/educationglossary>
- Lohri-Posey, B. (2003). Determining Learning Style Preferences of Students. *Nurse Educator*, 28(2), 54. Retrieved May 26, 2012
- MacCarter, K. M. (2008). The Effect of auditory stimulation on learners with different learning styles. Capella University, Doctor of Philosophy.
- Naimie, Z., Siraj, S., Abuzaid, R. A., & Shagoholi, R. (2010). Hypothesized Learners' Technology Preferences Based on Learning Style Dimensions. *The Turkish Online Journal of Educational Technology*, 9(4), 83-93.
- Penger, S. and Tekavčič, M. (2009). Testing Dunn & Dunn's And Honey & Mumford's Learning Style Theories: The Case of the Slovenian Higher Education System. *Management*, Vol. 14, 2009, 2, pp. 1-20.