

Learning Style Approaches for Gen Y: An Assessment Conducted in a Malaysian Technical University

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ABSTRACT

In teaching and learning, the same content can be delivered differently and accepted differently by each student. This also reflects that the same teaching style presented in class is accepted differently by each student. Thus, it is very important for educators to choose the most effective teaching method in order to cater for differences in students' learning styles. Understanding learning styles will help educators maximise teaching materials to suit students' preferred learning styles in order to achieve high quality in the teaching and learning process. The purpose of this study was to identify the preferred learning style among technical students from different faculties in a public university in Malaysia. Neil Fleming's learning style model was the chosen learning style instrument for this study. An online 24-statement questionnaire using 'Yes' or 'No' option was chosen and distributed to 184 respondents. The findings of this study showed that 72.28% of the respondents possessed Visual and Visual-related learning styles. The outcome of the study successfully proved the hypothesis.

Keywords: Learning style, visual, technical students

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INTRODUCTION

The learning process is the process through which learners acquire required knowledge and use different approaches and skills to understand information. These differences are known as learning style (Alharbi et al., 2011). Different learners possess different learning styles in order to help them to learn and understand information

effectively. The emergence of numerous learning style models over the past 26 years has contributed to the perception that the learning process can occur in diverse ways. Some learners might carry a dominant style of learning, with far less use of the other types of learning styles while another group of learners may find that they prefer to use different learning styles in different situations. There is no specific mix of learning styles to determine this. Everyone can develop a skill in less dominant learning styles, as well as further develop the required skills for most preferred learning styles.

There are many advantages to understanding the suitable learning style that matches each person. Some of these benefits include academic advantages, personal advantages and professional advantages. A learning style inventory can be used in order to determine the preferred learning style among students. There are many learning style inventories available, with each consisting of various questions to test on different types of learning style. A few of the most well-known learning style models are briefly introduced in this study.

The teaching and learning of technical courses or subjects is a challenging task for both educators and learners. Listed below are the most common problems faced by most students and educators in conjunction with learning styles and education.

- Misunderstanding between teachers' expectations of the way students learn and the students' preferred learning styles. Thus, it is a must for educators

to identify the suitable learning style that matches their students' background (Alharbi et al., 2011; Koh & Yaw, 2012; Ganesh, 2014).

- Students' are less motivated when the learning materials do not match their learning style (Alharbi et al., 2011; Baeten et al., 2013).

Underpinning these findings, the main purpose of this study was (1) to investigate the students' learning styles in a public technical university and (2) to validate that visual and visual-related learning styles are the preferred learning styles of most technical students. It is important to note that identifying students' preferred learning styles helps lecturers or educators to align their overall curriculum with the preferred learning styles, and this facilitates an increase in students' levels of comprehension, motivation, and engagement throughout the learning process.

RELATED RESEARCH

This section considers the learning style of Generation Y and a few well-known learning style models used to measure students' learning style such as Kolb's learning style models (Kolb, 1981), Dunn and Dunn's (Dunn, 1990) and Neil Fleming's Visual, Auditory, Kinesthetic (VAK) learning style model (Fleming, 2001).

Gen Y Learning Style

Generation Y, Gen Y, refers to the generation of individual born between the 1980s and the year 2000. Another reference to this

generation is the Millennial Generation, or simply Millennials (Waterworth, 2013). Gen Y was born into the age of advancement in technology and used technology throughout their youth. Gen Y is highly visually literate, comfortable in an image-rich environment, equipped with the latest technology and gadgets, such as iPhones, laptops, android-based phones and tablets and are online and connected all the time, 24/7, 365 days a year (Waterworth, 2013).

This group of learners thinks and behaves differently from those of previous generations. They are multi-tasker learners who are easily attracted to ideas from people of their own age and from the Internet rather than to what is taught at school. Research has found that today's learner is less attracted to and less engaged with traditional teaching approaches. Thus, educators must find the best solution to upgrade and realign their teaching materials to suit Gen Y learners (Reilly, 2012). Reilly (2012) also listed useful yet effective teaching methods that bring in technology as a teaching tool to the classroom. Some examples of technology that can be incorporated into teaching and learning are wikis, WebQuests, attractive PowerPoint presentations, video-based activities through the Internet such as YouTube, gamification and the use of social media. Researchers have also highlighted that the Gen Y learner is a skilled multi-tasker and a visual learner (Cekada, 2012; Bhana, 2014; Simpson & Dodigovic, 2014).

A growing body of studies are analysing the preferred learning style in higher institutions across different subject areas

such as mechanical engineering (Koh & Yaw, 2012), computer science (Alharbi et al., 2011; Ocepek et al., 2013) and engineering (Koh, 2008; Hwang et al., 2013; Hill et al., 2014). Although the above studies use different learning style inventories, the final results summarised the same general outcomes. The findings of these studies support that the majority of Gen Y technical students prefer visual-related learning styles the most.

As reported by Social Science Research Network, approximately 65% of the world population is made up of visual learners (Visual Teaching Alliance, 2001; Gutierrez, 2014). Visual Teaching Alliance (2001) also summarised the interesting facts that the human brain can see images that last for just 13 milliseconds; the human eye can register 36,000 visual messages per hour; humans can get the sense of a visual scene in less than 1/10 of a second; 90% of information transmitted to the brain is visual; visuals are processed 60,000 times faster in the brain than text; and 40% of nerve fibres are linked to the retina. All of these interesting facts once again support that the human brain processes visual information more efficiently than it does text (Visual Teaching Alliance, 2001).

These findings should encourage educators to include graphics, images and visual representations, especially interactive video clips from television, movies and YouTube in their teaching. Getting learners to engage with visual-based presentations that combine suitable interactive audio and videos in the teaching and learning process

can motivate them to work towards the desired learning objectives. Thus, knowing the right teaching methods and learning approaches to cater for the different learning styles of Gen Y, educators will create a positive impact throughout the learning process.

Learning Style Models

Kolb's learning styles (1981) are defined as the individual's relative preference of the four modes of the learning cycle described in experiential learning theory (ELT), which are Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualisation (AC) and Active Experimentation (AE). This model outlines two approaches to grasping experience, which is Concrete Experience and Abstract Conceptualisation, and another two related approaches to transforming experience, which is Reflective Observation and Active Experimentation. According to Kolb's model, an ideal learning process must involve all four approaches in order for learning to be effective. When a person attempts to use all four approaches, however, he or she tends to develop strengths in one experience involving a grasping approach and one experience involving a transforming approach. The result of these learning styles is a combination of the individual's preferred learning style approaches.

While Kolb's model focusses on four main elements, Dunn and Dunn's learning style model (1989) highlights a different learning style. This learning style model covers observable improvement in student

learning and behaviour. It is aimed at improving the effectiveness of the learning process and was developed for use across all learning levels. The authors believed that instructors must be able to provide multiple strategies in order to cater for different learning styles possessed by each student. By doing this, the educators were able to maximise the teaching materials for more efficient learning (Dunn, 1990). The authors also believed that the learning process in the classroom occurred differently. Students will respond differently to each and every teaching and learning material. Some students are capable of learning and understanding the knowledge by themselves while others look for some help from their teachers and friends. This leads to the hypothesis that learning achievements are greatly subjective and rest on five fixed characteristics, which are environmental, emotional, sociological, physiological and psychological (Dunn, 1990).

Besides Kolb's and Dunn and Dunn's learning styles, another common and widely-used categorisation of learning style is Neil Fleming's Visual, Auditory, Kinesthetic (VAK or sometimes VARK) model (Fleming, 2001). Fleming defined learning style as an individual's characteristics and preferred ways of gathering, organising and thinking about information (Hawk & Shah, 2007). Three different learning styles are proposed by Fleming, which are visual learning style, auditory learning style and kinesthetic learning style. In Fleming's judgement, most people possess a dominant or preferred learning style; however, some people have

a mixed and some might even possess an evenly balanced blend of the three styles. Fleming's learning style model was chosen as the main learning style model for this study. The reasons for this are outlined in the next section.

RESEARCH METHODOLOGY

This research used the descriptive research method. This is because this study tried to obtain information and to investigate the learning style possessed by technical students in a public technical university. Thus, descriptive research was deemed the best method to be used. Questionnaires were used to collect quantitative data for the study. This section provides details of the random sample chosen, the chosen learning style methods, the adapted learning style inventory and data collection and the response rate.

Research Sample

A total of 184 students (n=184) from four different faculties in a public technical university in Malaysia took part in the survey. The students were from the second and third year of study in a degree programme and therefore, had been exposed to more teaching of technical subjects compared to diploma or first-year degree students. Thus, the bias in the different level of learning understanding was believed avoidable by having the students answer the online questionnaire. This study used the convenience sampling approach. Convenience sampling is useful primarily for documenting a particular characteristic

or phenomenon that occurs within a given group or, alternatively, for demonstrating that not all members of a group manifests a particular trait (Ritchie et al., 2013). Thus, convenience sampling is deemed appropriate for this study. The samples for this study consisted of undergraduate students from two engineering faculties and two computer science faculties as they were studying courses and subjects that dealt with practical-based and laboratory work (Leong, 2011). Table 1 shows the distribution of students from each faculty.

Table 1
Number of Students Who Took Part in the Study from Each Faculty

Faculty	No. of students	Percent
Faculty A	30	16.4
Faculty B	64	34.9
Faculty C	31	16.5
Faculty D	59	32.2
Total	184	100

Chosen Learning Style Model

Fleming's learning style model was chosen for this study. This model focusses on three main elements i.e. the visual, auditory and kinesthetic, and learners are classified accordingly. Fleming claimed that visual learners prefer looking at learning materials. These learners learn fast through visualisation, love picturing the information they receive and are able to create vivid mental images in order to retain the information gathered. Visual learners also possess more visualisation skills compared to auditory and kinesthetic learners. Some of the activities that they

enjoy most are sketching, painting, creating visual metaphors and analogies (perhaps through the visual arts), manipulating images, constructing, fixing, designing practical objects and interpreting visual images. They are also good at puzzle building, reading, writing, understanding charts and graphs (James Cook University, 2013); most of these activities are used by the technical students.

In contrast, auditory learners learn best through listening. This group of learners are equipped with good auditory skills and are commonly good at speaking and presenting. They prefer to think in words rather than to visualise information they receive. This group of learners prefer to learn by listening to verbal lectures, discussions, explanations and what others have to say. Most of the time, their auditory skills are practised through storytelling, explaining, teaching, using humour, understanding the syntax and meaning of words, remembering information, arguing their point of view and analysing language usage (James Cook University, 2013).

The last group of learners is the kinesthetic learners. Tactile or kinesthetic learners prefer to learn through moving, doing and touching. This group of learners prefers to express themselves through movement and they possess a good sense of balance and hand-eye coordination. Kinesthetic learners will find it hard to sit still for long periods and are able to process and remember information by interacting with the space around them. Most of the time, their skills are demonstrated through

physical coordination, athletic ability, hands-on experimentation, body language, craft-making, acting, miming, using their hands to create or build, dancing and expressing emotions through the body (James Cook University, 2013).

Learning Style Inventory

The learning style inventory used in this study was the VAK learning style inventory. This cognitive inventory was used as a medium to process, analyse and store information received from the respondents. There was a lot of available online inventory that could be used as a tool to conduct the survey. For this study, an online 24-statement questionnaire using the 'Yes' or 'No' option was chosen as the implemented VAK learning style inventory. This type of inventory option allows the respondents to complete the questionnaire in a shorter time, making it convenient for the respondents to take part in the survey.

The learning styles among the students were analysed into seven respective categories (Koh & Yaw, 2012):

- Visual (V), where the students' learning was mainly through visualisation. This included the use of a mind map, note taking, visualisation of the concept in the mind and information gathering through reading.
- Auditory (A), where the student's learning was mainly based on hearing. This included listening to podcasts and information gathering through listening.

- Kinesthetic (K), where the students' learning was mainly based on touch. This included laboratory work, prototype building, model construction and information gathering through physical involvement.
- Visual and Auditory (V+A), where the students' learning was achieved through visual and auditory means equally.
- Visual and Kinesthetic (V+K), where the students' learning was achieved through visual and kinesthetic means equally.
- Auditory and Kinesthetic (A+K), where the students' learning was achieved through auditory and kinesthetic equally.
- Visual, Auditory, and Kinesthetic (V+A+K), where the students' learning was achieved through all the three types of basic learning styles.

RESULTS AND FINDINGS

Table 2 summarises the results of the information gathered on the students' learning style by faculty. The detailed analysis is given later.

Figure 1 shows the learning style of students from Faculty A. The results are plotted based on 30 students with a background in computer science. It can be seen that 50% or 15 students possessed visual learning style, 16.67% or five students were auditory learners, and only 10% or three students were categorised as kinesthetic learners. The rest, a total of 23.33% or seven students, preferred a combination of any two or three learning styles. It is worth mentioning that 6.67% of the students in this group possessed a learning style of V+A+K, which suggests that they would be able to adapt to any of the learning styles to ensure that they are able to obtain the information they need.

Students from Faculty B showed quite a similar result with those from Faculty A, as depicted in Figure 2. The results were plotted based on 64 students, whose education background was in engineering. From the Figure, it can be seen that 60.94% or 39 students possessed the visual learning style, 12.5% or eight students were auditory learners, while only 10.94% or seven students were categorised as kinesthetic

Table 2
Result of the Students' Learning Style by Faculty

Learning Style	Faculty A	Faculty B	Faculty C	Faculty D	Total
Visual (V)	15	39	14	39	107
Auditory (A)	5	8	1	1	15
Kinesthetic (K)	3	7	8	5	23
V + A	2	2	3	6	13
V + K	3	6	3	6	18
A + K	0	2	0	1	3
V + A + K	2	0	2	1	5
Total	30	64	31	59	184

learners. The rest, about 15.62% or 10 students, possessed a combination of any two or three learning styles. Interestingly, none out of 64 students from Faculty B possessed the mixed learning style of V+A+K; this result differed from the results drawn from the information provided by students from Faculty A, Faculty C and Faculty D.

Figure 3 presented a rather different, yet interesting learning style among students of Faculty C when compared with those of Faculty A and B. Students from

Faculty C have a background in computer science. The figure shows that 45.16% or 14 students possessed the visual learning style, 25.81% or eight students were kinesthetic learners and only 3.23% or one student was categorised as an auditory learner. The rest, about 25.8% or eight students, had a combination of any two or three learning styles. None of the students possessed a mixture of A+K learning styles. The result also revealed that 6.45% or at least two students from Faculty C possessed a mixed learning style of V+A+K, which suggests

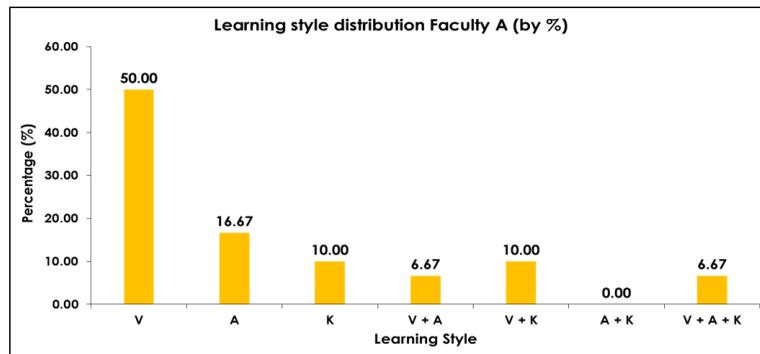


Figure 1. Learning style distribution among 3rd year students in Faculty A. The results were plotted based on 30 students, whose learning styles were categorised into seven learning style categories.

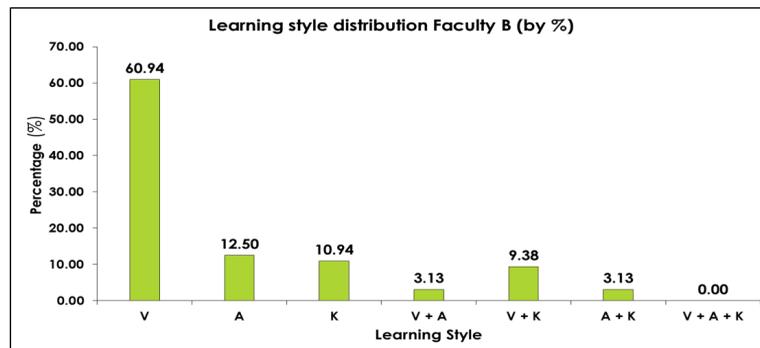


Figure 2. Learning style distribution among 2nd year students in Faculty B. The results were plotted based on 64 students, whose learning styles were categorised into seven learning style categories.

that they would be able to adapt to any of the learning styles to ensure that the learning process can be achieved effectively and efficiently.

Figure 4 shows the learning style of students from Faculty D, who had a background in engineering. As predicted, the majority of the students from Faculty D also possessed the visual learning style. A total of 39 out of 59 students or 66.10% of the students, making the majority group, from this faculty possessed the visual learning style. Another 8.47% or five out

of the 59 students possessed the kinesthetic learning style whereas only 1.69% or one of the students possessed the auditory learning style, making this the minority group for this faculty. It is worth mentioning that there was only 1.69% or one out of 59 students from Faculty D who possessed the mixed learning style of V+A+K.

In terms of the overall sample study, out of the total of 184 students, 107 students or approximately 58.15% of the students were categorised as visual learners; this was the majority group. The second highest

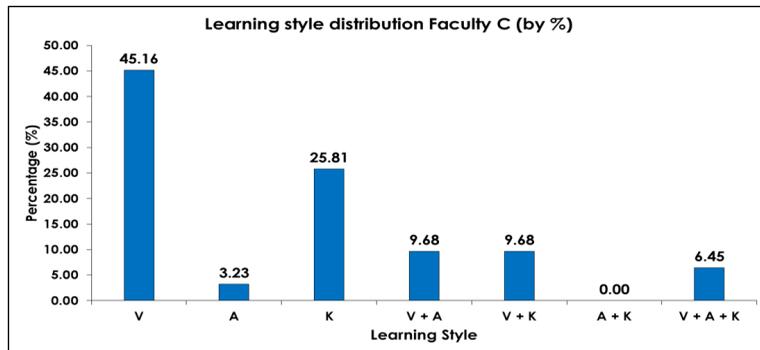


Figure 3. Learning style distribution among 3rd year students in Faculty C. The results were plotted based on 31 students, whose learning styles were categorised into seven learning style categories.

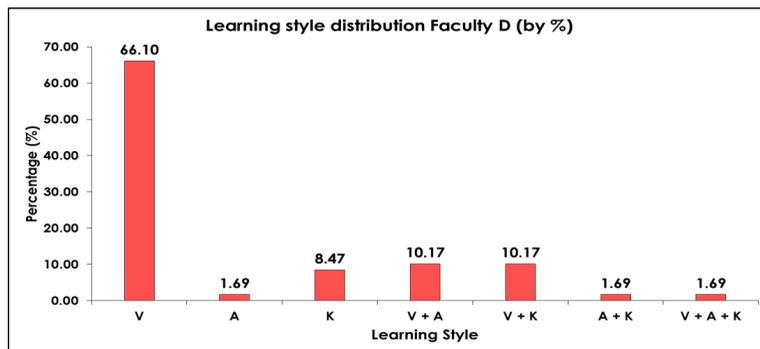


Figure 4. Learning style distribution among 2nd year students in Faculty D. The results were plotted based on 59 students, whose learning styles were categorised into seven learning style categories.

was the group of kinesthetic learners, who comprised about 12.5% or 23 students, while approximately 8% or 15 students possessed the auditory learning style. As for the combination of two or three learning styles, 7% or 13 students preferred the combination of V+A style of learning, 9.8% or 18 students preferred the V+K type, approximately 2% or three preferred A+K, and lastly, approximately 3% or five preferred the V+A+K style. Figure 5 illustrates the overall learning styles distribution as mentioned above.

From the analysis gathered, it can be concluded that the most preferred learning style was the visual or visual-related learning styles; this result is supported by several other studies in this field (Koh Y., 2008; Alharbi et al., 2011; Koh & Yaw, 2012). The second highest preferred learning style was the kinesthetic-related learning styles and the least preferred was the auditory-related learning style. This

is valid as the total sample covering the four faculties was comprised of students doing courses and subjects that dealt with practical and laboratory work, which involved visualisation and hands-on or the kinesthetic approach. This also proved that most of these technical students learnt best through the visualisation and kinesthetic learning styles.

DISCUSSION

This section provides more information on the three main learning styles, which are the visual-related (V, V+A, V + K, V + A + K); auditory-related (A, V+A, A + K, V + A + K); and kinesthetic-related (K, V+K, A + K, V + A + K) learning styles. The results of this study allow the following propositional statements to be made about the students who took part in the study:

- About 73.34 % or 22 out of 30 students from Faculty A possessed a visual-related learning style; this was the

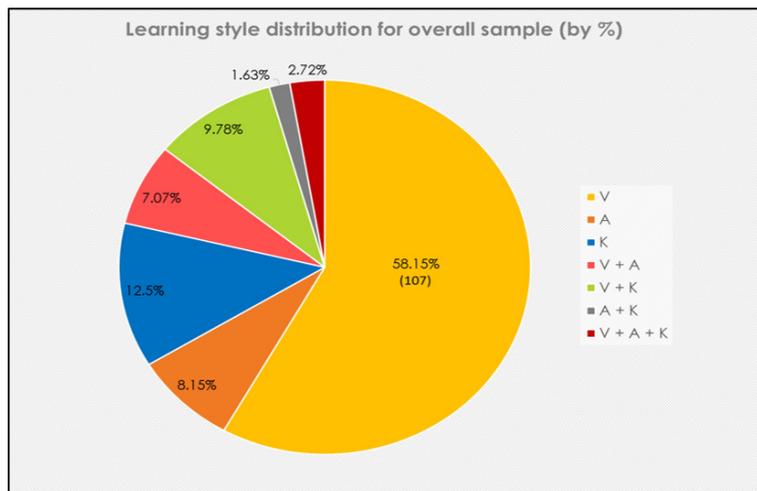


Figure 5. Summary of the overall learning style distribution by percentage (%).

majority group for this faculty. This result was similar to that obtained from the other three faculties, where 73.45% or 47 out of 64 students from Faculty B chose this style, 70.97% or 22 out of 31 students from Faculty C chose it and 88.13% or 52 out of 59 students from Faculty D preferred it.

- The majority of the students in a public university in Malaysia, numbering about 77.72% or 143 students from the overall sample, possessed visual-related learning styles, with 58.15% or 107 students possessing the visual learning style alone. The results revealed that most technical students preferred visualisation as one of their most effective learning style methods. This provided the answer to the first research objective, which was to find out the preferred learning style among technical students. The results also proved the second research objective, as the visual and visual-related learning styles were the preferred learning styles possessed by most technical students.
- The kinesthetic-related learning style was the second highly preferred learning style. About 26.63% or 49 students from the overall sample preferred this learning style. This leads to the proposal that technical students learn best through visualisation and the hands-on or kinesthetic approach.
- Only 19.57% or 36 students from the overall sample possessed auditory-related learning styles, with only 8.15%

or 15 students possessing the auditory learning style alone. This result placed students who preferred the auditory-related learning style in the minority group in this study.

- The distribution of learning styles among the four faculties were rather similar, which suggests that trend of overall distribution of learning styles among technical students in a public technical university in Malaysia.

In addition to the above-mentioned results, one outcome of this study is that it provides an opportunity for educators to look into the learning style distribution of their students from various disciplines in technical fields or even from various other education fields. This would provide educators with an understanding of the suitable teaching styles and methods that can be adopted among students from various backgrounds.

IMPLICATIONS AND FUTURE WORK

The results of this study offer some suggestions on using suitable teaching styles to support students' learning preferences. Firstly, by identifying the students' preferred learning style, educators may align their overall curriculum and teaching materials with the most appropriate and suitable learning styles. This will increase students' understanding, motivation and engagement throughout the learning process. Secondly, this study revealed that most Gen Y technical students preferred the visual-

related learning style approach. Thus, there is a need for the development of a specific framework which is able to enhance the learning experience of technical students; specifically, visualisation-based learning approaches should be supported. Further study in this area can compare the relationship between preferred learning styles among Gen Y technical students and other attributes such as between gender and learning style differences among first-year and final-year technical students. The findings would not only be interesting, they would contribute hugely to technical education.

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