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INSIGHTS INTO LEARNING STYLES PREFERENCE OF ENGINEERING UNDERGRADUATES: IMPLICATIONS FOR TEACHING AND LEARNING

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ABSTRACT

Background and Purpose: Education at higher institutions prepares graduates for the real world. To develop and maintain quality, the focus must not only be on what institutions can offer but also on the learning needs and styles of learners. Despite many studies on engineering learners' learning styles, limited research has been conducted to compare the learning styles of Engineering and Engineering Education learners. This study was conducted to ascertain the learning style preferences of first-year undergraduates from both groups in a science and technology-driven university in Malaysia.

Methodology: This descriptive study consisted of 40 Engineering and 40 Engineering Education learners who attended an English language course at the university. Perceptual Learning Style Preference Questionnaire was adopted as the survey instrument. The data were analysed using self-scoring sheet and Statistical Package for the Social Sciences.

Findings: While both groups chose Kinaesthetic as a major learning style preference, the Engineering Education learners also chose Group, Tactile, and Auditory learning styles as their other major preferences. Both groups chose Visual and Individual as their minor preferences.

Contributions: The findings extend research demonstrating the significant role of specific disciplines in Engineering to determine the learning style preferences of learners. The findings also provide useful insights that suggest implications for practice and policy.

Keywords: Engineering, engineering education, English language, learning styles, teaching and learning.

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1.0 INTRODUCTION

Education at higher institutions involves a dynamic process that is expected to bring meaningful learning outcomes in preparing future graduates to enter the real world. To develop and maintain a high-quality learning atmosphere, it is crucial to not only focus on what the institutions can offer but also determine favourable learning needs, as well as styles that learners of different domains favour. In the case of Engineering, it is an extremely broad discipline with many specialised fields. Knowing the expected learning outcomes and attributes that learners of different specialised fields should have are important predictors for the learning style preferences of different learners (Hu, Peng, Chen, & Yu, 2021). Generally, engineering learners need to apply mathematics, science, and engineering concepts, systematically solve various engineering problems, and design solutions and structures to help solve different issues such as health and safety, social as well as environmental concerns. These prospects, according to Ictenbas and Eryilmaz (2011), require engineering learners to have certain attributes such as being inquisitive, having good diagnostic aptitude, being attentive to details, having excellent critical thinking skills in mathematics, and possessing strong communication, as well as teamwork skills. As such, it is central to recognise the connection in the needs, attributes, and learning style preferences of learners from the different specific domains.

In the case of Engineering Education learners, apart from having a strong foundation in the Engineering domain, there are several criteria of "good" future vocational educators that are expected. Mohamad (2013) explained that as future educators, these learners will also need to have strong roots in social, cognitive, and constructivist domains. This is important as they would need foundations in the different domains to design, teach and develop effective lessons, as well as activities when they begin teaching future students within their fields of

specialization. In other words, Engineering Education learners need to acquire attributes that are not only vital in the Engineering domain, but also in the Education domain to qualify them to become future-ready vocational educators.

Based on the points mentioned, it is crucial to closely determine the learning style preferences of both specialised Engineering groups. The findings will benefit the instructors from both programmes who are responsible for delivering a sound training ground for future engineering graduates. At the same time, the knowledge would also be relevant for the learners as they may be able to identify and make use of the findings to strategise their efforts in getting the best from the exposure and experience in learning to become future professionals within their specific fields.

Moreover, knowing the specific types of learning style preferences of the Engineering and Engineering Education learners is substantial in preparing service courses like the English language to address the different needs of the two groups (Hu et al., 2021). Ictenbas and Eryilmaz (2011) recommended that service courses, in particular, those offered to engineering departments should include an assessment of the learning styles preferences. Knowing the type of learning style preferences of the Engineering and Engineering Education learners would shed light on designing tailored language tasks, lessons, and assessments suited for the different programmes (Mokhtar, Tholibon, & Ismail, 2021). At the same time, it would be beneficial in monitoring the progress and accomplishments of both groups (Ellington & Benders, 2012). This ensures high-quality teaching and learning processes are delivered at higher institutions of learning.

This study was conducted in a public university in Malaysia that predominantly offers programmes that give emphasis on strong engineering and technology backgrounds. While specific requirements are expected for entrance into the Engineering and Engineering Education programmes, the English language, a compulsory subject for all undergraduates at the university, is set at a minimum of Band 2 for entrance into this university. This is based on the Malaysian University English Test (MUET), a standardised exam taken by all candidates who wish to pursue undergraduate studies in the country. At Band 2, learners are identified as basic users of the language.

To prepare them for the needed language skills that would safeguard their interests and goals as future engineering graduates, it is compulsory for all undergraduate learners to take English language courses. These courses should strengthen their command of the language to support their academic and professional endeavours. Nevertheless, since the English language courses are designed to cater to the general population of undergraduates at the university, both

the Engineering and the Engineering Education learners undergo a generic set of learning experiences before they graduate. The courses may not be able to fully cater to the specific needs and learning style preferences of the two groups.

To illustrate, while oral tasks like group discussions and presentations are not common in engineering classrooms (Siu, 2021), learners in Engineering Education would benefit from lots of speaking activities. This will assist in developing oral competency that is important in becoming future-ready vocational educators. As for the Engineering learners, specific technical writing skills in English should prepare them for academic success, such as in writing laboratory reports (Siu, 2021), and in writing their final year research project or thesis, as well as for their professional endeavours (Chen, Chan, Man, & Tsang, 2021). Having to follow a general set of English language courses throughout their university life would not fully address the different competencies needed by the two groups. Careful planning and designing of lessons, materials, and guidance must be tailor-made (Hu et al., 2021) to address language skills namely reading, writing, listening, and speaking for the different groups.

Despite the wide range of research in learning style preferences of different groups of learners (Masela & Subekti, 2021; Al Khatib & Ghosheh, 2013; Cabual, 2021; Khaled, 2021; Khmakhien, 2012; Gamiao, 2021; Nikoopour & Khoshroudi, 2021; Alonso-Martín, Cruz-Díaz, Granado-Alcón, Lago-Urbano, & Martínez-García, 2021) and learning styles preferences of engineering learners (Mohamad, 2013; Mokhtar et al., 2021; Jamali & Mohamad, 2017; Shinge & Kotabagi, 2021; Siu, 2021), limited research has been conducted to compare the learning styles of Engineering and Engineering Education learners. In fact, there is even a greater limitation in studies conducted that explored how the preferred learning styles of these two groups can be used to determine or design lessons, activities, or assessments for English language courses. While Engineering learners are trained to become professional engineers in different industries, Engineering Education learners are groomed to become future-ready vocational educators within different fields of engineering. Considering the nature of the two programmes is essential to uncover the learning style preferences of the two groups of learners, as there should be distinctive patterns in their preferred learning styles.

Therefore, this study that sought to determine the learning styles of Engineering and Engineering Education learners is necessary as well as timely. The investigation into the preferred learning styles of the two groups of learners would be able to establish the needed findings that are essential in filling the gap in research about learning styles preferences. The findings in general may be of interest to the programme owners, the university, and faculties for efforts in programme evaluation or in designing future specialised engineering programmes

or courses. This ensures a sustainable and marketable class of engineering graduates for the future.

Moreover, knowing the different preferred learning styles would make the learners become aware of their strengths as well as limitations in the way they approach learning. The knowledge should be able to help learners work towards using their preferred learning styles to the fullest and may attract them to discover more about how they can make use of the other learning styles to their advantage (Masela & Subekti, 2021). In particular, the findings of the study would be valuable in equipping English language instructors at the university with information on the preferred learning styles of the two groups. This would support the design and selection of more appropriate and customised lessons, activities, as well as assessments to effectively address the language needs of the two groups of engineering learners.

2.0 LITERATURE REVIEW

Gilakjani (2012) explained that learning styles can be defined in various ways depending on one's perception. Reid (1987) defined learning styles as internal aspects that are frequently not recognised or consciously used by learners for the intake and comprehension of new knowledge. There are many categories of perceptual learning styles. Reid (1987) divided learning styles into Auditory (hearing), Visual (seeing), Tactile (practical), Kinaesthetic (whole-body movement), Group (prefer to work with others), and Individual (prefer to work alone). According to Mulalic, Mohd. Shah, and Ahmad (2009), learning is determined by learning styles, where learners who are able to employ multiple learning styles acquire a greater learning outcome.

At the international level, numerous studies have been conducted comparing learning style preferences with different variables such as gender, the field of study, and learning experiences (Khmakhien, 2012) in Thailand; gender, education performance, and field of study (Al Khatib & Ghosheh, 2013) as well as proficiency levels (Nikoopour & Khoshroudi, 2021) in Iran; second language acquisition (Masela & Subekti, 2021) and preferred learning modalities (Cabual, 2021) in Indonesia. Other studies compared learning styles with user personalisation of learning management systems practices (Khaled, 2021) in Sweden; cognitive ability and academic performance (Gamiao, 2021) in the Philippines; and gender, programme, and institutional context (Alonso-Martín et al., 2021) in Spain. Based on the studies mentioned, different researchers have gained diverse insights into the learning style preferences of different groups of learners.

For example, Khmakhien (2012) conducted a study on 262 Thai university learners aged between 18 to 20 years old. Perceptual Learning Style Preferences Questionnaire (PLSPQ) was administered to know the impact of gender, field of study, and learning experiences on preferred learning styles. The findings revealed that the major learning style preference of Thai English as a Foreign Language learners was Auditory, followed by Kinaesthetic, Group, Tactile, Visual, and Individual learning. A substantial finding of the study showed that the field of study is the most important factor that influenced the learning styles selection. However, the findings revealed that there was no significant difference between gender and learning experiences.

In addition, Al Khatib and Ghosheh (2013) also used PLSPQ to identify the preferred learning styles of 210 learners (91 males and 119 females) of Al Ain University of Science and Technology (AU) in the United Arab Emirates. They examined the differences in learning styles preferences according to gender, education performance, and field of study. The findings of the study showed that AU learners had major preferences towards Auditory, Visual, and Group learning styles. Kinaesthetic, Tactile, and Individual were classified as their minor learning styles. The learners did not have any negligible learning style. Moreover, there were major significant differences in learning styles due to gender. The female participants were found to work better in groups compared to the males. It was assumed that females tend to build consistent relationships and social networks compared to males. In terms of academic performance, the learners' learning style preferences did not vary by academic performance, except for Group learning style preference. The results of the study also showed that Education learners chose the Tactile learning style compared to learners from the other fields of study. Whereas Law learners chose Group learning style and Pharmacy learners chose Individual learning style compared to the learners from Business, Engineering, and Law.

Studies that explored learning styles at the international level have demonstrated a variety of efforts to associate learning styles to other variables. In fact, based on those mentioned in this section, a couple of studies have begun to examine learning styles beyond qualities or aspects of learners into areas in multimodality and learning management systems. While these research efforts are beginning to fill in new gaps and dimensions to research in learning styles, the need to examine specific patterns like the one done in this study is fundamental.

In specific, studies relevant to this study that compared learning style preferences of Engineering learners within the local context show similar as well as different findings. For instance, Mohamad (2013) investigated the learning style preferences of 48 learners from an

Engineering Education programme using PLSPQ. The findings revealed that Engineering Education pre-service teachers chose Visual as their most preferred learning style. However, the score of Visual and Kinaesthetic learning styles for male learners was higher compared to females. Female learners had a high score in the Auditory learning style. In addition, Civil Engineering learners scored higher in Visual and Kinaesthetic learning styles while Electrical Engineering chose Auditory as their ideal learning style.

Similarly, Jamali and Mohamad (2017) who investigated 46 third year Engineering learners from a technical and vocational education programme in another local university found that majority of the participants who were from the Electrical, Civil, and Mechanical areas were Visual (76.87%) and Kinaesthetic (57.11%) learners. The study suggested that the choice of classroom materials should cater to the major learning preferences of learners. This is said to enhance academic achievements and skills required by engineering learners in general. This is comparable to the results of the study done by Mohamad (2013) as both studies found that Visual and Kinaesthetic learning styles are preferred by engineering learners within the local context. While this study examined the learning style preferences of engineering learners from three specific areas in technical and vocational engineering, it did not attempt to compare the groups like the study done by Mohamad (2013).

In another local study done recently by Mokhtar et al. (2021) comparing learning style preferences among male and female learners in a local higher institution of learning, 60 first-year Civil Engineering diploma learners were investigated. It was found that half of the learners regarded themselves as Visual learners. Of this amount, 80% came from female participants. At the same time, the study also revealed that the male participants preferred Kinaesthetic learning style and enjoyed learning activities that require them to participate actively in the learning process. This recent study concurs with the results of the earlier two studies. The study claimed that Visual learners are good at memorising objects, shapes, and pictures. It was also suggested that this type of learners learn better when they get to watch videos or movies and observe life demonstrations as well as through reading. The suggestions on the activities for Visual and Kinaesthetic learners are indeed beneficial not just for subject-specific instructors but also for English language instructors for both engineering groups in this study.

As for local studies that examined the learning style preferences of English language learners, different groups of learners were identified as the participants for the studies. A study by Muniandy and Shuib (2016) was done to investigate preferred learning styles and language learning strategies of 50 learners from the Management and Mass Communication fields. The majority of the participants from both groups chose Kinaesthetic and Auditory as their most

preferred learning styles. There was also a significant match between learner's preferred learning styles and learning strategies related to the participants' field of study. The study also found that Auditory learners preferred activities like group discussion, PowerPoint/video/audio presentation, role play, speaking, and listening games. Meanwhile, Kinaesthetic learners favoured role play, writing, diagramming, and field trips to be conducted. It was suggested that Auditory learners be exposed to oral practices such as impromptu/rehearsed speeches, interviews, and negotiation activities. However, it was suggested that Kinaesthetic learners be given the opportunity to conduct research outside the classroom and prepare the report based on the research conducted. In addition, question and answer sessions after the audio and video clips presentation were also suggested to attract this type of learner.

In another study conducted by Dhillon (2017), 137 Malay learners who participated came from the Business Management (42), Secretarial Science (54), and Computer Science (41) fields. While the participants from all three groups chose Kinaesthetic, Tactile, Group, and Auditory as their major learning styles, all three groups of learners chose Kinaesthetic and Group as their most preferred learning styles. As the targeted participants from both studies (Muniandy & Shuib, 2016; Dhillon, 2017) were from the social science fields, it is interesting to see that these participants preferred activities that gave them the opportunity to participate in activities involving communication that would require the use of both Kinaesthetic and Auditory learning styles.

In contrast, Ismail and Omar (2018) conducted a study involving participants from the Sciences, Social Sciences, and Arts programmes in another local university. From 329 participants, 120 were those from the Agro-based Industry, Earth Sciences, and Bioengineering and Technology faculties. The Social Science group consisted of 103 participants from the Hospitality, Tourism, and Wellness as well as the Entrepreneurship and Business faculties. While 106 participants from the Arts programmes came from the Creative Technology and Heritage as well as Architecture and Ekistics faculties. Based on the Multiple Intelligence Theory questionnaire, the study found that in learning the English language, the majority across disciplines preferred Musical Intelligence which prominently reflects Auditory learning style.

Generally, different groups of learners will have different learning style preferences. According to Fesol, Salam, Osman, Bakar, and Salim (2016) and Jamali and Mohamad (2017), while some learners prefer to focus on utilising a set of learning styles, others may opt to make use of different learning styles for different purposes. There are many factors that may contribute to the outcomes of a study. The field of study has been established to be a dominant factor of the learning style preference of many learners. This study that specifically examines

the learning style preferences of two groups of engineering learners that are the Engineering and Engineering Education learners helps to extend the research findings related to the learning style preferences of this specific domain. With the establishment of the patterns in learning style preferences of the two groups, the findings are valuable in providing a clear understanding for the engineering instructors of the patterns of learning style preferences of both the Engineering and Engineering Education learners. Simultaneously, the findings should be able to provide the instructors of the English language courses with the needed information that would support the development of more effective tailor-made English language courses, lessons, activities as well as assessments suitable for the two groups of engineering learners.

3.0 METHODOLOGY

This descriptive study involved 80 learners comprising of 40 Engineering and 40 Engineering Education learners. The participants were chosen based on purposive sampling. All of them were first-year undergraduates who underwent an English language course upon joining the specific engineering programme at the university. Determining their learning style preferences early at the start of their programme of study at the university would be very useful for later use in their programme of study at the university. The instrument used in this study was a set of questionnaire adopted from PLSPQ that was developed by Joy Reid in 1987.

According to Mulalic et al. (2009), this instrument can easily be administered and interpreted. It is based on a simple reported scale and is designed for self-scoring. It could also be quickly administered and completed by the participants themselves. PLSPQ has been proven to have high reliability and validity through its use in past research. Thus, this questionnaire was adopted for the study as it was suitable to be used to achieve the desired research objective.

The questionnaire contained two sections. Section A covered the demographic data related to the background of the participants. The findings collected in this section were related to their area of specialisation. Section B consisted of thirty items regarding perceptual learning style preferences. All items were divided into five statements for each type of learning style preference and were randomly arranged in the questionnaire. This instrument was used to collect the descriptive data from the two groups of participants in the study. There were six types of perceptual learning style preferences included in this questionnaire which were Visual, Auditory, Tactile, Kinaesthetic, Group, and Individual. The items were examined using a 5-point Likert Scale ranging from ‘strongly agree’, ‘agree’, ‘undecided’, ‘disagree’, and ‘strongly disagree.’ The following table shows the Likert Scale used for all 30 items in the questionnaire.

Table 1: Numerical value for each subscale

SA Strongly Agree	**A** Agree	**U** Undecided	**D** Disagree	**SD** Strongly Disagree
1	2	3	4	5

All questions were organised in table form and the participants were required to tick in the column based on their preferred response. Table 2 lists the number of items for each subscale.

Table 2: Items for each subscale

Subscale	**Item Number**
Visual	6, 10, 12, 24, 29
Auditory	1, 7, 9, 17, 20
Kinaesthetic	2, 8, 15, 19, 26
Tactile	11, 14, 16, 22, 25
Group	3, 4, 5, 21, 23
Individual	13, 18, 27, 28, 30

In relation to that, Table 3 shows how the scores from all the items in the PLSPQ questionnaire were interpreted. A score sheet was used to help interpret the learning styles. In the score sheet, the questions were grouped according to each learning style (refer to Table 2) and each question could be referred to the numerical value in Table 1. When the participants had completed all the numerical items for each learning style, they were required to add the numbers and multiply by 2. The total scores should give answers whether they have major, minor or negligible learning styles by referring to the score scales given in Table 3.

Table 3: The interpretations of the score scales of the PLSPQ

Major learning style preference	Score: 38-50
Minor learning style preference	Score: 25-37
Negligible learning style preference	Score: 0-24

The questionnaire was distributed online to reach all 80 participants of the study. The adopted PLSPQ questionnaire was distributed using the Google Forms template and the link to the form was shared with the participants of the study via the English language WhatsApp group created.

Google Forms is an efficient, effective, and time-saving method for data collection as most learners at the university would usually have access to WhatsApp groups and that can be the easiest and fastest means of disseminating the questionnaire for the study. Prior to that, the questionnaire was piloted to 40 Engineering and Engineering Education learners who were also from the first year to test for the validity of the items used and the reliability of the questionnaire as the instrument used in the study. Based on the reliability statistics test via Cronbach's Alpha analysis, it is shown that the value is 0.868. This value is considered as reliable as the value indicates a high level of internal consistency.

4.0 RESULTS

As this study focused on investigating the learning style preferences of two groups of learners, the Engineering and the Engineering Education first-year undergraduate learners from an engineering and technology-driven university, this section presents the overall results of the two groups of learners based on the adopted PLSPQ (Reid, 1987) questionnaire. In order to determine the major, minor, and neglect learning styles of the two groups of participants in the study, the mean score and standard deviation scores were obtained based on the score scales of PLSPQ.

Table 4: Learners' means and standard deviations of learning style preference of engineering learners

		Visual	Auditory	Kinaesthetic	Tactile	Group	Individual
N	**Valid**	40	40	40	40	40	40
	Missing	0	0	0	0	0	0
Mean		35.30	35.65	38.55	36.30	36.15	28.15
Std. Deviation		5.845	7.591	6.469	7.667	8.868	8.307

According to Table 4, from a total of 40 participants from the Engineering group, the majority of them had a major preference towards Kinaesthetic learning style with a mean score of 38.55 and SD of 6.469. Meanwhile, for the rest of the learning style categories, the Engineering group classified them as their minor learning style preferences with a mean score of 36.30 (SD 7.667) for Tactile, 36.15 (SD 8.868) for Group, 35.65 (SD 7.591) for Auditory, 35.30 (SD 5.845) for Visual and finally, 28.15 (SD 8.307) for Individual.

Table 5: Learners' means and standard deviations of learning style preference of engineering education learners

		Visual	Auditory	Kinaesthetic	Tactile	Group	Individual
N	**Valid**	40	40	40	40	40	40
	Missing	0	0	0	0	0	0
Mean		35.25	39.20	40.90	39.55	41.05	29.80
Std. Deviation		4.453	4.456	4.618	5.114	5.491	7.522

Table 5 shows the findings from the Engineering Education group. This group had a different set of learning style preferences. This group of learners chose four types of learning styles as their major preferences. The top major learning style preference was Group with a high mean score of 41.05 (SD 5.491), followed by Kinaesthetic with a mean score of 40.90 (SD 4.618). Tactile learning style came as third preferred with a mean score of 39.55 (SD 5.114) and finally Auditory was selected as the last major learning style preference with a mean score of 39.20 (SD 4.456). Visual with a mean score of 35.25 (SD 4.453) and Individual with a mean score of 29.80 (SD 7.552) learning styles were chosen as minor learning styles.

5.0 DISCUSSION

Based on the overall findings obtained, it is interesting to note that both groups of participants, the Engineering and Engineering Education learners chose Kinaesthetic as a major learning style preference. This demonstrates a common learning style preference pattern not exclusively discovered among the engineering learners in this study but is prevalent in the findings of numerous studies conducted in other higher institutions of learning both within the Malaysian context and at the international level (Shafqat & Saqlain, 2019; Yeoh, 2019; Mohamad, 2013; Mulalic et al., 2009). For instance, the finding of this study concurs with the study by Mulalic et al. (2009) who found that ESL learners from Universiti Tenaga Nasional Malaysia (UNITEN) also chose Kinaesthetic as their major learning style preference. Apart from that, Gilakjani (2012) had a similar finding where 50% of 100 learners from Islamic Azad University of Lahijan, Iran chose Kinaesthetic as the most preferred learning style.

Within the engineering domain, the finding is significant as it strengthens the awareness that engineering learners should be given the opportunity to explore and advance technical knowledge and skills through learning by doing. This is obviously promoted through many learning theories which support the current movements in 21st century education that encourages the active participation of learners in the teaching and learning processes. While

learning objectives in the engineering fields would necessitate the promotion of up-to-date knowledge advancement, further application of it is necessary through practical hands-on learning opportunities. Ictenbas and Eryilmaz (2011) described that learners tend to participate actively in the learning process where they can share and contribute in the classroom. This means that more multimodal modes of learning opportunities combined with the need to provide prospects for exposure to sensory items like learning through simulations, role-plays, and applications need to be embraced (Cabual, 2021). This may possibly help engineering learners to understand and be able to apply advanced concepts, values, and theories in engineering.

In identifying learning style preferences for the advancement of English language skills, the finding suggests notable evidence for English language instructors as they would be able to choose from a variety of possible learner-centred language learning approaches and techniques when designing lessons, activities, or assessments for the two groups of engineering learners. This should be able to support the selection and use of customised instructional practices that support the advancement of effective communication skills among engineering graduates (Sanmugam & Shamsudin, 2017; Mokhtar et al., 2021). To be precise, the finding is especially relevant in inculcating and promoting language activities that strongly support the active participation of learners in the teaching and learning processes such as using different language games in order to advance learners' language skills. Yaccob and Md Yunus (2019) promoted the use of language games in learning the English language. The approach would develop grammar understanding and acquisition of the language among English as a Second Language learners as it may support the development of their interest, fluency as well as motivation in the teaching and learning processes (Yaccob & Md Yunus, 2019).

In other words, customising lessons and activities to create more opportunities for practice would improve motivation and attitudes towards learning the English language (Shinge & Kotabagi, 2021; Siu, 2021), the general academic achievement (Fesol et al., 2016; Jamali & Mohamad, 2017), as well as the behaviour of the two groups of engineering learners (Zhou, 2011). Based on the finding of this research, instructors should design specific lessons and activities that match their Kinaesthetic learners to benefit the use of their physical bodies and sense of touch as they learn. Activities like charades, oral presentations of Lego or block building, and map drawing are some of the examples that can be expended to cater for these Kinaesthetic learners.

While the findings revealed that the Engineering group chose Kinaesthetic as their only major preferred learning style, they chose the other five learning style categories as their minor

preferences. On the contrary, the findings from the Engineering Education group show that apart from Kinaesthetic, this group also chose Group, Tactile, and Auditory as their other preferred major learning styles. While the group also shared the same minor preference towards the Visual and Individual learning styles, this additional difference in their major learning style preference presents a very substantial discovery that is useful in addressing the different set of domains that this group of learners need to secure. In becoming future vocational educators in the specific fields of Engineering Education, they would not only need to be trained to become well versed in the engineering field but are also expected to become skilled at teaching.

Good teachers need to know how to adapt their lesson plans to cater to the learners' needs in order to ensure optimal learning opportunities (Jamali & Mohamad, 2017). Great teachers would constantly look for innovative ways to improve and upgrade themselves with current teaching and learning trends. These include the use of technological devices, the sources on the Internet as well as the incorporation of different learner-centred teaching approaches (Ismail et al., 2018). This is done to meet expected teaching objectives coupled with the learning outcomes. As future vocational educators, Engineering Education learners need to be trained with strong roots to use the social, cognitive, and constructivist approaches to generate a better understanding of how to adapt the learning styles of their future students with their own teaching patterns (Mohamad, 2013). In order to secure these expectations, future engineering educators should be given the opportunity to explore and be able to apply different learning styles when they undergo training to become engineering educators at the university. This is to ensure that they would get ample training from both the engineering and education domains.

Apart from the major learning styles, both groups of learners chose the Individual learning style as their minor preference. They may feel more comfortable, productive, and relaxed working in pairs or groups as they work together to carry out activities. Ictenbas and Eryilmaz, (2011) explained that one of the common traits of engineering learners is being a significant contributor to a team. In fact, learning style preference is commonly used for team formations within the Engineering disciplines as it secures an effective collaborative learning environment (Kittur & Salunke, 2020). In particular, an important criterion of a "good" teacher is the ability to work together in a group (International Labour Organization, 2010). This shows that the learners should be given sufficient opportunity to become involved in group activities in the classroom to build their teamwork skills.

In designing activities to promote group or teamwork, both the Engineering and English language instructors should opt for activities that enable learners to compete among their peers

(Dhillon, 2017). For instance, the incorporation of problem-based learning encourages not just participation (Jamali, Md Zain, Samsudin, & Ale Ebrahim, 2017) but also the advancement of communication skills among learners (Awang & Daud, 2015). When they get the opportunity to utilise their preferred learning styles through the group activities assigned in the classroom, they may optimise and develop different skills that would be beneficial in their careers as future Engineering graduates. When multi-sensory activities using more than two modalities are utilised, the activities may facilitate their development in mastering the engineering areas. At the same time, the activities would also be beneficial for the development of their command of the target language (Nakamura & Chu, 2010). In other words, the opportunity to venture into different activities that support the use of different learning styles may encourage the advancement of multiple learning styles and enhance learning for all learners.

Finally, the findings of this study also show that both the participants from the Engineering and Engineering Education groups did not have any negligible learning style. This generally reveals that while Kinaesthetic is popularly recognised as a learning style preference across the specific fields in the engineering domain, engineering learners, in general, have the capacity of making full use of all the different learning styles to their advantage. This not only establishes the strength of the learners in exploiting different learning styles but also demonstrates their versatility in acquiring greater learning outcomes (Mulalic et al., 2009). For that matter, to ensure that learners get the most out of their learning styles, teaching and learning would need to be tailored so that the process becomes not only engaging but also effective (Tulsi, Poonia, & Priya, 2016; Jamali & Mohamad, 2017). In the case of the two groups in this study, both the Engineering and English language instructors need to capitalise on the nature of the engineering domain and possible attributes of learners from Engineering and Engineering Education in designing customised lessons, activities as well as assessments to suit their learning style preferences.

6.0 CONCLUSION

This study shed light on the learning style preferences of two groups of learners, the Engineering and Engineering Education from a science and technology-driven university. The findings were able to point towards two important discoveries. First, Kinaesthetic was a major learning style preference for both engineering groups of learners in this study. While the Engineering group of learners chose Kinaesthetic as their only major learning style preference, the Engineering Education learners chose Kinaesthetic and three other learning styles as their major learning style preferences that were Group, Tactile, and Auditory. This may have been

due to the nature of the specific areas in engineering. Moreover, it could have been attributed to the training within their specific areas that prepared them to explore and develop different learning style preferences to become future engineers and vocational educators.

Based on the findings of this study, there are two forms of implications. First is the implications for practice. Instructors from both the Engineering and English language disciplines could use the findings of this study to improve classroom practice. Specific lessons, activities, as well as assessments could be designed to cater to the learning style preferences of the two groups of engineering learners. This would ensure an optimal match between the activities as well as lessons designed based on the learning style preferences of the two groups of learners. Apart from that, Engineering and English language instructors should consider collaborating or team teaching to reach optimal training in the use of the preferred learning styles for the two groups of learners. Instructors of the two groups could work together to identify and design a customised instructional framework to include the learners' preferred learning styles in certain courses in order to advance learners' engagement in the teaching and learning processes. The instructors should make full use of the learning style preferences of both groups of Engineering and Engineering Education learners for both subject-specific and English language courses. Also, the instructors could train the two groups of learners to develop consciousness of their different preferred learning styles. Both Engineering and English language instructors could design specific projects involving the same learning style preferences of learners for Engineering and English language courses. Through the projects, learners could make full use of their preferred learning styles. Apart from that, instructors should also introduce activities based on other learning styles to encourage these learners to explore their potentials.

As for implications on policy for programmes offered by the higher institution of learning, specific authorities should be given the responsibility to support efforts to develop awareness, training, and research in learning styles. The programme owners can initiate collaborations and research with service course owners and the industries to explore relationships and potentials of learning styles and skills or attributes needed to prepare learners based on their specialised areas. The library or student affairs division could be given the duty to create awareness campaigns and training programmes to promote the use of learning styles to support academic success among learners at the higher institution of learning. Specific promotions about the importance of exploiting learning styles for academic success can be done through social media and in online talks or workshops for learners. Finally, special research funding should be provided to explore learning styles preferences through action

research in the classroom. As this study focused only on two engineering programmes from one university, future studies could be conducted to include other variables or other specific groups of learners. Investigations could also be done to discover patterns of learning style preferences among successful learners. To improve validity and address the generalisation of findings, a greater sample size and other instruments may also be utilised. These implications should not only support excellence and advancement in the learning environment at local higher institutions of learning, but it could also be of value to guarantee that the higher institutions of learnings in Malaysia can work towards quality in education comparable at the international level.

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