Undergraduates Learning Preferences: A Comparison of Science, Technology and Social Science Academic Disciplines in Relations to Teaching Designs and Strategies

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Abstract—Students learn effectively in a learning environment with a suitable teaching approach that matches their learning preferences. The main objective of the study is to examine the learning preferences amongst the students in the Science and Technology (S&T), and Social Science (SS) fields of study at the Universiti Teknologi Mara (UiTM), Pulau Pinang. The measurement instrument is based on the Dunn and Dunn Learning Styles which measure five elements of learning styles; environmental, sociological, emotional, physiological and psychological. Questionnaires are distributed amongst undergraduates in the Faculty of Mechanical Engineering and Faculty of Business Management. The respondents comprise of 131 diploma students of the Faculty of Mechanical Engineering and 111 degree students of the Faculty of Business Management. The results indicate that, both S&T and SS students share a similar learning preferences on the environmental aspect, emotional preferences, motivational level, learning responsibility, persistent level in learning and learning structure. Most of the S&T students are concluded as analytical learners and the majority of SS students are global learners. Both S&T and SS students are concluded as visual learners, preferred to be in an active mobility in a relaxing and enjoying mode with some light of refreshments during the learning process and exhibited reflective characteristics in learning. Obviously, the S&T students are considered as left brain dominant, whereas the SS students are right brain dominant. The findings highlighted that both categories of students exhibited similar learning preferences except on psychological preferences.

Keywords—Learning preferences, Dunn and Dunn learning style, teaching approach, science and technology, social science.

I. INTRODUCTION

AT higher learning institutions, programs are commonly divided into two different fields; S&T and SS. S&T covers medical, pharmaceutical, health science, engineering, applied sciences, computer science & etc. whereas SS covers management, accountancy, finance, banking, arts, humanities, retailing, marketing, interior design, psychologist, architecture, consultant, law, human resources, hospitality and hotel management and etc.

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In general, SS students may focus on facts and data, and dealing with a number of case studies involving survey or questionnaire, interview, observation, comparative studies, dialogue section, graphic organizers, cooperative learning, essay writing, oral or visual activities, writing and presenting information, business games and etc. whereas S&T students are more contented with theories and mathematical models and exposed with various workshops activities, laboratory work, experimental projects, computer design and simulation.

With such differences in the program curriculum, course content and teaching methodology, it is assumed that the students from S&T and SS may learn differently, thus exhibit different learning preferences.

Learning preferences are about the ways that people want to interchange information, and it includes auditory (learning by hearing), visual (learning by seeing) and kinesthetic (learning by doing). Dunn [1] defines learning style as the way in which each student begins to concentrate on, process, absorb and retain new and difficult information. This leads us to the fact that different people learn different things in different ways. Some students used to process experiences and knowledge sequentially, others are used to do it randomly; some students are highly analytical in decision making, while others use their feelings for deciding; some students are oriented visually; others are oriented verbally; some students prefer to learn in groups; others prefer to learn alone and at home, etc. [2]. The broad diversity of the student population in term of age, experiences, level of preparedness, culture, gender, etc., created various learning styles and preferences among them. Consequently, increase the demands on academicians or academic boards or learning providers to fulfil students' needs and preferences to enhance the students' understanding level in the learning process.

Many works concerning on learning preferences have been conducted and wide range of student learning preferences are reported [3]-[9]. Most of the works are focusing on examining the learning styles based on various factors such as age, gender, field of study, academic performance, culture, teaching method and etc. However, the findings are still questionable. No style is found to be inferior to another. In addition, as concluded by [10], students are not adapting similar learning styles at all times because they usually choose the style based on the context of learning. Kazu [11] noted that, most individuals usually have other learning preferences

besides their dominant learning preferences. He also claimed that the preferences can be changed. Thus, lecturers are hardly to adapt suitable teaching methods that will suit to each student learning styles. In fact, in some situations, lecturers are found to apply teaching methods which suit to their own preferences. Consequently, students are not able to learn effectively.

Effective learning is closely associated to transfer of learning. The goal of transfer of learning is basically to leverage previous learning and experience to more efficiently learn novel that is the application knowledge and skills gained in learning activities. In this condition, the ability to transfer knowledge and skills gained from previous learning can potentially benefit a wide-range of real-world applications [12]. The transfer of learning is closely associated with learning preferences. Simons [13] highlighted three kinds of transfer; from prior knowledge to learn, from learning to new learning, and from learning to application. These three conditions of learning are significantly related to instructional situations applied during the teaching and learning process in order to maximize learning and to facilitate transfer from one situation (learning) to another situation (an application).

II. LITERATURE REVIEW

One of the most well-known methods that help in acquiring information about students' learning styles is learning preferences questionnaire that is called "Dunn and Dunn Learning Style Model". The Dunn and Dunn Learning Styles model illustrates a range of significant variables that may affect a person's ability and concentration in the learning process. Some variables are believed to be biologically influenced and incline towards change as a person grows and becoming more matured along the progress.

The elements of the Dunn and Dunn model are grouped according to five key stimuli [14], [1] comprising of environmental (where we learn best), sociological (with whom we concentrate best), emotional (what motivates us to learn and influences our feelings about learning), physiological (when and how we physically engage most in learning) and psychological (how we process and respond to information and ideas).

Environmental Stimuli

In terms of the environment stimuli, the Dunns noted that students differ in terms of their definitions of an ideal place to learn. Some wanted a warm, brightly light place with desks, many people around, and involve much verbal interaction, while others are preferred cooler, more subdued lighting with a quieter and more informal environment. Though many lecturers believe that they have little control over these elements, Dunn and Dunn describe how the standard square box of a classroom can be partitioned into separate areas with different environmental climates. Thus, by knowing the learning styles of students, lecturers can organize the classroom setting in responding to their students' needs either for a quiet place, bright or soft illumination, warm or cool

room temperatures, different types of seating arrangement, mobility or group preference [15].

The importance of environmental aspects is also highlighted by [16] in conducting a patient education to stress urinary incontinence (SUI) patients. This type of learners is more sensitive to discomfort. Thus, the physical setting, room temperature, lighting, and noise level should be as comfortable as possible. In other work, [17] has concluded that seating arrangement in a classroom directly affects the flow of interactions between facilitator and students, the quality of learning, and thus requires further research. From his personal experiences, he was suggesting a u-shaped seating which is more proper for authentic discussions and able to increase students' engagement during classes.

Emotional Stimuli

The emotional stimuli center on the extent to which students are self-directed learners. At one end of the continuum are self-starters who can be given a long term project and who monitor and pace themselves until finishing the job. At the other end are students who need considerable support and prefer to have their assignments in small chunks with periodic due dates. Semester-long projects without periodic checks would be disastrous for these students. Understanding the students' apparent needs for learning support allows the lecturers to design learning experiences that help students succeed and learn more effectively.

Past research has consistently reported positive and robust correlations between the student's motivational level and his or her academic achievement [18]. Esposito [19] stated that students', who credit themselves for success, tend to have a higher motivational level and persist longer at task as they believe they control over their success or failure. Similarly, [20] concluded that, motivated participants learn more and perform better than unmotivated participants. In other work, [21] indicated that, students need to be encouraged throughout the learning process so that they can become more self-regulated and autonomous. With such finding, beside deliver information and knowledge, lecturers have to include motivational and self-directed elements in their lectures. One of the approaches to improve the students' motivation is through the effective learning preferences. Daouk [22] has reported that, the students' motivation or attitudinal levels increased significantly when the teaching and learning instructions applied match with their preferred learning styles.

Sociological Stimuli

Students are also differed in how they react to peer interactions. Some dislike group projects, preferring instead to learn by themselves; others thrive on the companionship and support provided by group work. Still others prefer the more traditional approach of learning from an adult. These preferences can be satisfied by varying teaching techniques based on different learning configurations.

The successful of group work have been well acknowledged. However, in certain situation, some learners may be learned better in "alone" environment. In work

conducted by Joseph [23], the results show a majority of the respondents (49%) indicated their preferences for working in groups, while 27% preferred to work alone. Only 6% of the respondents indicated interest in working with the whole class. Naserieh and Sarab [24] have investigated the sociological preferences between technical and SS students. The finding shows that technical students prefer working in a group while SS students favor of working alone.

Physiological Stimuli

Another important stimulus identified by the Dunns [1] is related to individual differences in terms of physiological preferences. Probably the most important element here is learning perceptual. Many studies of perceptual preferences had been conducted in the field of higher learning education involving SS students. Uzun et al. [3] conducted a survey to determine learning styles of students in the Faculty of Education at Uludag University which involved ten different departments. The result showed that, most of the students in all departments were more visual rather than auditory. In other work, [4] carried out a survey to validate the learning styles of students enrolled in the course of Economics and similar results were reported. Tabatabaei and Mashayekhi [25] conducted the Productivity Environmental Preference Survey (PEPS) by Dunn and Dunn Learning-Style Model to examine the significant differences in learning styles of Iranian pre-university English Foreign Language (EFL) learners across different levels of proficiency, majors and genders. The results showed that participants preferred visual style the most, followed by auditory, tactile and the least preferred learning style was kinesthetic. Though the tendencies were different, but the academic achievements of these students showed no significant differences. It has also observed that field of studies and gender have no effect on the learning style preferences. Similar work was conducted by Bidabadi and Yamat [26] on EFL students. The findings show that the majority of the students considered themselves as communicative learners. Other work done by Mehrdad and Ahghar [27] also concludes that EFL students at Islamic Azad University are auditory and visual learner. In contrast, Tulbure [7] has conducted a comparison study between two groups of pre-service teachers in the Educational Sciences and Economic Sciences fields in order to identify their learning style preferences and academic performance. It is noted that, the Educational Sciences students with predominant converger learning style seem to achieve higher results than the students in the Economic Sciences where the diverger strategy being applied. The converger prefers to be guided through an experiment rather than receiving oral instruction, abstract conceptualization and active experimentation whereas diverger is involved concrete experimentation and reflective observation. On the other hand, a number of works reporting on learning preferences amongst S&T students in terms of perceptual preferences have also been aggressively published. Zywno and Waalen [28] have reported that, 80% of the engineering students prefer kinesthetic learning. In other work, [5] investigated the learning styles or preferences of a group of

occupational therapy students at an Australian university. The remarkable findings revealed that, the majority of the occupational therapy students prefers either experimenting with new ideas through case studies and practical classes ('converging'), or brainstorming through learning activities and receiving personal feedback ('diverging'). Similarly, [6] investigated the learning style preferences amongst undergraduate and graduates of therapy students in Taiwan, which is related to academic performance. The findings show, the most commonly occurring style of the learner was assimilator (44%), followed by diverger (23%), accommodator (15%), and converger (17%). No significant difference in the academic performance among the four different styles of learners. It was also found that, assimilator learners prefer abstract conceptualization and reflective observation.

In other works, [26], [29] and [30] have studied learning preferences among the medical students using VARK questionnaires. The findings show that more than half prefer a multimodal mode of learning styles which involved visual, auditory, read-write and kinesthetic. However, among those who preferred single mode, kinesthetic scored the highest percentage. Similar results were reported by [9] and [31] which conducted similar study among undergraduate physiology students.

Naserieh and Anani Sarab [24] investigated the learning preferences between technical and SS students. The result shows that, students in technical fields were significantly more tactile than those in SS. In addition, [8] has applied the Index of Learning Style tool that was developed by Felder and Silverman to measure optometry students and found that the majority of them have balance learning styles.

Perceptual, intake, time and mobility are aspects in the physiological stimuli. Some students may require snacks or light refreshment to keep their learning momentum. In time aspect, some of them are morning people, while others do not function fully until later in the day. As for the mobility, teachers or lectures are able to accommodate these stimuli by setting up learning centre that allow students' movement during the learning process. These stimuli may be one of the challenges for teachers or lecturers to accommodate.

Psychological Stimuli

The fifth and final learning style stimuli is psychological. This stimulus refers to the general strategies used by students when dealing or resolving learning problems. Some dealt with the issues globally, looking at the big picture, while others prefer to address individual elements of a problem separately. The learning which is related to brain hemisphere suggests that left-brain (sequential or analytic) thinkers deal more easily with grammatical structure and contrastive analysis, while right-brain (global) thinkers are better at learning language intonation and rhythms. And finally, impulsive learners draw conclusions and make decisions quickly unlike the reflective ones who think about various alternatives and evaluate each before making a decision [32].

Based on variety findings and conclusions from previous research works, it is challenging to finalize the learning preferences of the students. As noted by [4], individual's learning styles are influenced by the individual learning process, experience and culture. Thus, it can be concluded that lecturers will face different learning styles in every cohorts of students' intake. Hence, it will be important for the lecturers to examine the variations of the students' learning styles before the class started. The information about student's preferences can help lecturers become more sensitive to the differences and make a necessary adjustment to accommodate the students' different needs in learning.

The other critical dilemma is how to transfer learning of knowledge and skills to new learning situations. In addressing the issues, the effectiveness of instructional systems to facilitate learning is crucial [13]. Moreover, organizations should consider transfer of motivation as well as transfer of learning cognitions in order to understand the transfer of learning in educational situations. Transfer of learning is not only involving cognitive skills but also motivation. The motivational theories generally involve an interaction of person and situation variables and it is also incorporated individual difference variables which characterize individuals. These motivational variables needed for achievement, self-competence, and internal locus control in facilitating the development of important transferable human characteristics which increase the transfer of cognitive skills [33]. In order to deal with the complexity of transfer of learning, instructors or lecturers should focus on teaching learners on how to generalize their knowledge from one situation to a similar situation [34].

The purpose of this work is to offer better insight into the different learning preferences among the undergraduates from the Faculty of Mechanical Engineering and Faculty of Business Management at UiTM Pulau Pinang in order to improve the educational practices especially for university compulsory courses such as language, entrepreneur and humanities courses. Information about learning styles and preferences can help lecturers to become more sensitive to the differences between students from different field, which in turn might help in designing learning experiences that match students' learning styles. Thus, most students may benefit from active learning strategies over the traditional lecture format which assumes that all students are auditory learners. More specifically, by considering learning preferences it can help individuals to understand their needs and rationalize their choice of learning strategies suitable for themselves. It can help in designing academic curriculum, learning and teaching activities that address the aspect of the diverse backgrounds of students, which in turn might improve the transfer of learning, enhance their knowledge, skills and abilities and develop their competencies. This teaching and learning process would produce competent, confident and highly skillful graduates with an appropriate knowledge according to their disciplines.

III. OBJECTIVE

This study aims to compare the learning preferences amongst the students in the S&T and SS fields of study at the UiTM, Pulau Pinang, Malaysia.

IV. METHODOLOGY

The sample of this study was derived from the UiTM Pulau Pinang undergraduates. The survey is based on data collected from 131 diploma students from the Faculty of Mechanical Engineering and 111 degree students from the Faculty of Business Management at UiTM Pulau Pinang, Malaysia. The researchers used simple random sampling technique to select the sample from different groups of students. The present study employs "Dunn and Dunn Learning Style Model" survey approach to collect data for testing the research objectives. The questionnaires consist of 21 elements as illustrated in Table I.

The variables used in this study were taken from Dunn and Dunn published and validated instruments. The Dunn model is a comprehensive model that considers learner's strengths and preferences across the five categories i.e. environmental, emotional, sociological, physiological and psychological. Each stimulus consists of a few elements. For the noise level element, learners either prefer to learn with sounds present or in silence. Some people prefer bright and subdued lighting in a warm or cool environment. Some students would prefer a formal learning environment while others are towards informal arrangement. On the emotional predispositions, they involve learner's self-motivational level, the desire to achieve better performance academically whereas those who are unmotivated, they need motivators, feedback, frequently be monitored and peer encouragement to succeed in the learning process. The element of persistent involves a person's inclination either to complete a task immediately or need periodic breaks. It involves learners' desires to do what they think they ought to do and highly related to the level of conformance or responsibility in learning and, structures or specific directions or explanations prior to undertaking or completing tasks. Some might learn alone or prefer peers present and feel better or more comfortable when someone with authority or recognized special knowledge is present which falls under the sociological preferences. Physiological characteristics cover learners' perceptual strengths (auditory, visual, tactile or kinesthetic modality), time-of-day preferences to learn better either morning, afternoon or evening, intake requirements (snacking or sipping during the process of learning) or mobility versus passivity needs (stay put or moving around) while engaged in learning. Last but not least is the processing style that refers how learners take on and internalize information. Learners process the information either sequentially (analytically) or holistically (globally through stories, drama, humor, illustrations or games).

TABLE I
DUNN AND DUNN QUESTIONNAIRE

Dear students,
Kindly tick your preferable learning styles (in shaded boxes)

Stimuli	Element			
Environmental (4 elements)	**Sound**		**Light**	
	Quiet	Music/ Sound	Bright	Softer/ Focused
	Temperature		**Seating Design**	
	Warmth	Cooler	Formal	Informal
Emotional (4 elements)	**Motivation**		**Responsibility**	
	Self	Assisted	Conformists	Non-conformists
	Persistent		**Structure**	
	Focus	Reminded	Self	Assisted
Sociological (6 elements)	Self	Pair	Peers	
	Team	Adult	Variation	
Physiological (4 elements)	**Perceptual**			
	Auditory	Visual	Tactile	Kinesthetic
	Intake		**Time**	
	Required	Not required	Morning	Afternoon	Evening
	Mobility			
	Passive	Active		
Psychological (3 elements)	**Global-Analytical**		**Hemisphere**	
	Global	Analytical	Right-Brain	Left-Brain
	Impulsive-Reflective			
	Impulsive	Reflective		

V. RESULTS AND DISCUSSION

Environmental Stimuli

Results for environmental stimuli are summarized in histogram as shown in Fig. 1. In general, both S&T and SS students share almost similar learning preferences in the environmental aspect. It is obviously seen that half of the students from both areas prefer to learn in a quiet environment, whereas half prefer to be equipped with music background. The findings revealed that current teaching style needs to be improved, especially on the aspect of sound background. Introducing a music background in the learning and teaching activities such as classroom exercise works, lab works and video demonstration could probably create the learning environment in matching up the students learning preferences.

For lighting element, S&T students are still in a balanced distribution between bright and focused. As for SS students, 60% of them prefer focused lighting. Similar distribution was shown by SS students in term of temperature element, where

60% of them prefer a cooler environment similar to the S&T students. From the viewpoint of learning environment, providing an ambient room temperature is specifically important for older students who may chill more easily. If the students have hearing or vision impairments, this can impact on the educational process and possibly make the students appear insecure or unable to comprehend the information.

For the last element; seating design, both S&T and SS students are distributed likewise. More than 80% of students prefer informal seating design. In most of higher learning institution, the classes are normally formally arranged. With such findings, reconstruction of the classroom seating arrangement is strongly encouraged.

Emotional Stimuli

Comparison between S&T and SS students in Emotional stimuli is plotted in Fig. 2. The result shows that there is no significant difference in emotional preferences between S&T and SS students. The students are similarly distributed based

on percentage in term of motivational level, responsibility, persistent and structure aspects for both S&T and SS cluster.
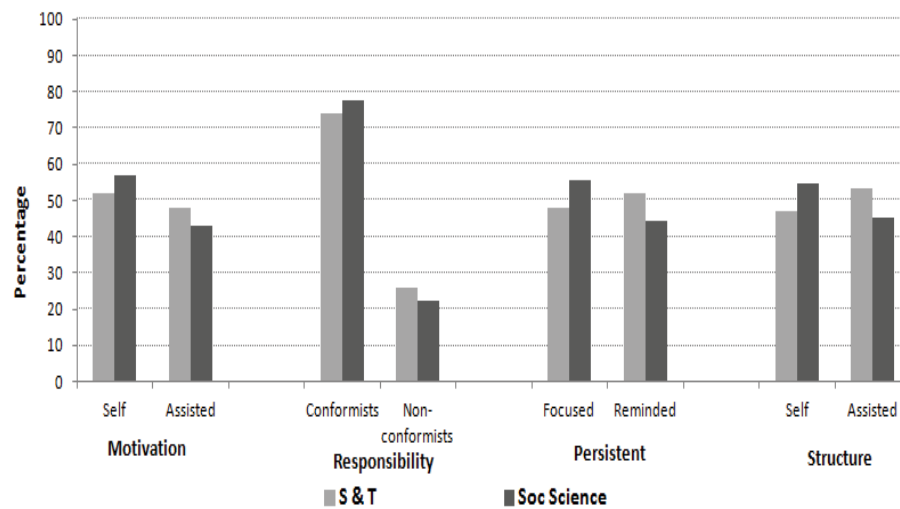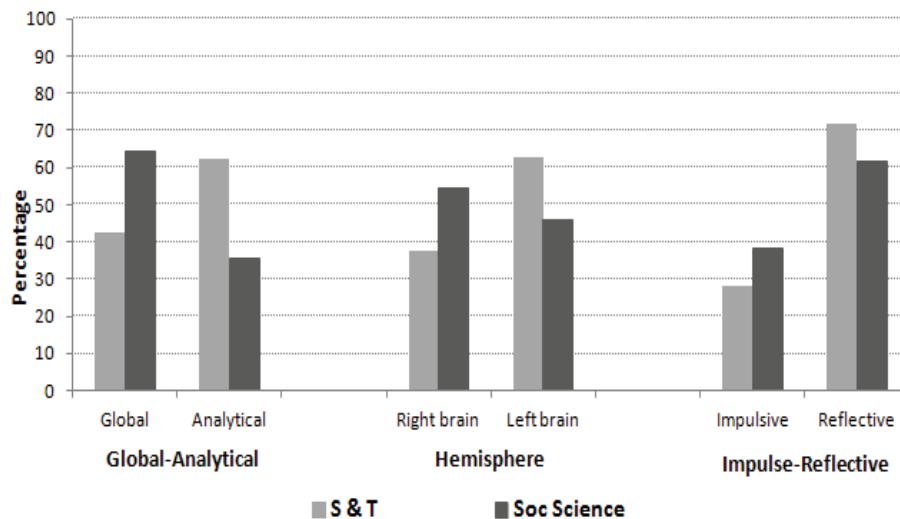

Fig. 1 Environmental Elements distribution

Fig. 2 Emotional Elements distribution

For motivation, persistent and structure elements, the students are in balance of distribution. The findings indicate that only half of the undergraduate students from Mechanical Engineering and Business Management are self-directed learners' and responsible for their own educational process whereas the remaining requires guidance and continuous motivational driven. The results reveal negative indicator because in order to achieve excellent academic performance, students must possess a high self-directed and motivational level to learn. Thus, the lecturers have to play a big role in enhancing students' motivation and guiding them to be more independent. Research works conducted by [35] proven that, the students expect their lecturers to continuously guide and motivate them along their educational period.

As for responsibility element, the result shows positive trend with almost 80% of the students from both clusters are responsible for their own learning.

Sociological Elements

Form sociological aspect, it is noted that the majority of the S&T and SS students vary in their ways of learning. They sometimes prefer to study alone or in another time in pairs. In certain situation, they may have to work in a team and collaborate with peers. The finding on the sociological aspect between S&T and SS student are summarized in Fig. 3.

The findings contradict with the work reported by [24], which claimed that technical students prefer to work in group while SS students prefer to work alone.
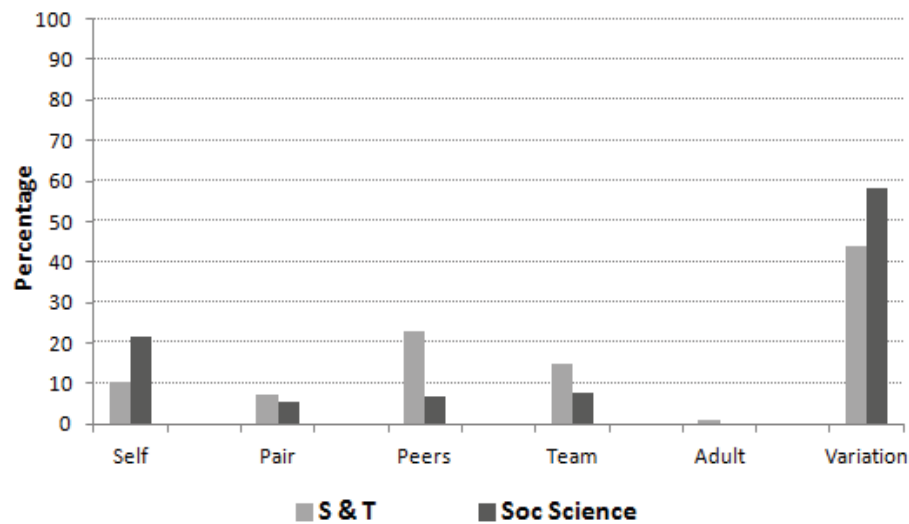
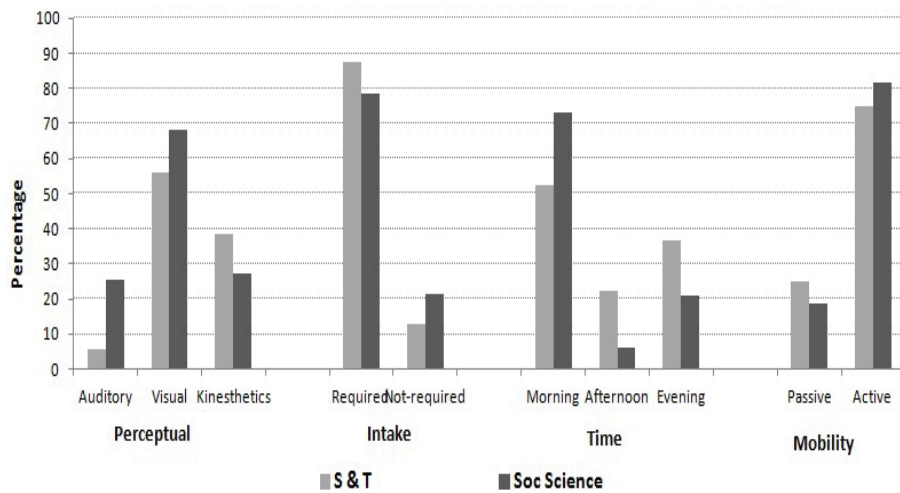Fig. 3 Sociological Elements distribution

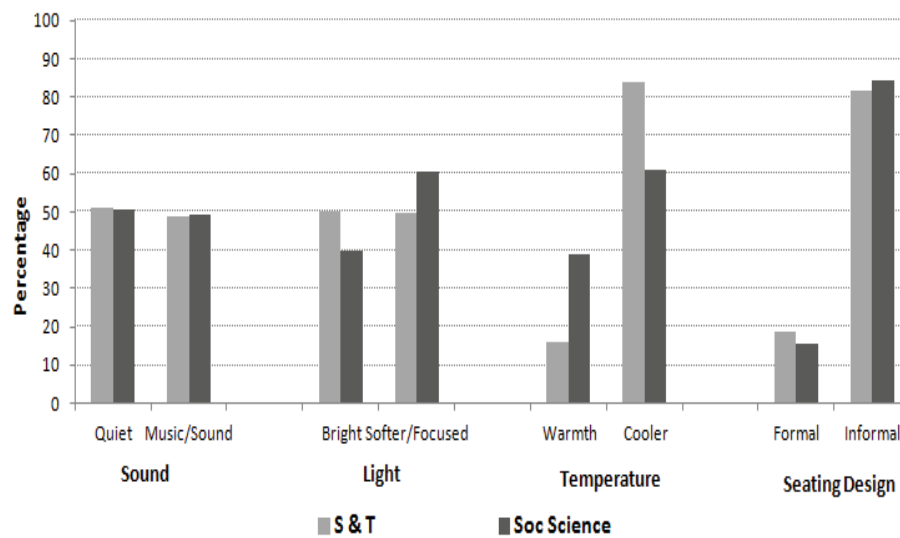Fig. 4 Physiological Elements distribution

Fig. 5 Psychological Elements distribution

From the viewpoint of in-practice teaching strategies, the results are relevant. The current curriculum which is developed with multiple teaching methodologies and varying individual and group tasks has developed a good interpersonal skill among the students. With such practice, the students are familiar with a variety of sociological preferences and able to work successfully individual, pair, peer or team. They are also able to work and learn effectively as an adult.

Physiological Elements

For the physiological elements, the responses from the survey shows majority of S&T and SS students are visual learners with a score of 56% and 68%, respectively, followed by kinesthetic with a score of 38% and 27%. The least learning style is auditory which only scores 6% of S&T students and 25% for SS students. The finding is summarized in Fig. 4. These findings contradict with previous works [3], [4] and [25] which reported that SS students are visual and auditory learners. As for S&T students, many works have been reported that they prefer kinesthetic style [28], [29], [24].

For the intake elements, regardless of group of students, it is obviously proven that, the students prefer to be in a relaxing and enjoying mode with some light of refreshments. Thus, by allowing the consumption of light snacks, especially in the early morning slot should be considered. On the time aspect, morning and evening periods are seen to be more favorable by both groups of student as well. These findings provide a clue to the lecturers on suitable times for introducing or discussing heavy topics or conducting tests or quizzes.

Similar trends are seen in terms of mobility, where the majority of the students from S&T and SS cluster prefers to be in active mobility instead of passive mobility. Although it is understood that students are hardly remain seated for a long period of time but allowing active mobility without well controlling during classes may be a disturbance to other students to focus during the learning process. Thus, lecturers need to arrange some break sessions for those long session classes to avoid physical fatigue.

Psychological Elements

For global-analytical aspect, and hemispherical elements, contradictory results are seen between S&T and SS students as illustrated in Fig. 5. Majority of S&T students is found to be more analytical learners whereas the majority of SS students is global learners. The finding is consistent with current curriculum practice where S&T curriculum usually begin with theory and the concept before extended to real application. While SS curriculums are developed based on an introduction of theoretical perspectives and broaden into applications by providing examples of application cases. The teaching strategies are associated with case studies, role plays, behavioral modeling, discussions and presentation, idea generation for problem solving, fault-finding analysis & etc.

It is also noted that S&T and SS students are also differed in hemispherical element. S&T students are noticed to be left brain dominant and SS students are right brain dominant. The finding is consistent which ancient thought which claim that left brain dominant would be thought to be a stronger mathematician or scientist which focused on logical thinking, analysis and accuracy. Whilst right brain dominant would be an entrepreneur or a musician who carries special characteristics such as creative, artistic, intuitive and stronger communication and verbal skills and focused on aesthetics, feeling, and creativity.

For final element in psychological stimuli, i.e., impulse-reflective, the majority of students from both S&T and SS exhibit reflective characteristic which indicate that they are very detailed and particular individual. They would think alternatives and evaluate each alternative before making a decision.

In summarizing, it can be concluded that each student possesses their own learning preferences. As noted by [36], individuals react differently to identical learning experiences which reflect differences in registrars' (the respondents) learning styles. It was reported that an interactive learning with feedback is preferred by them, but more passive learning formats are remaining valid. There is a wide range of learning style scores noted. There is positive evidence on the correlations between learning preferences and learning styles. The findings also concluded that interactive learning with feedback provides mostly positive experiences as to encourage independent critical thinking in relation to problems solving. There is a high number of interactions with the trainer. The majority of respondents preferred a self-directed activity with less supervision. Nevertheless, more passive learning is more valuable. The second finding concluded respondents' learning style scores fall within the reflector–theorist quadrant. There are correlations exist between 29 learning preferences and six styles and show wide ranges of learning preferences and styles amongst respondents.

As a lecturer, knowing the learning strengths and weaknesses of the students will help them in designing suitable teaching methods and activities that match with the students' strengths, and therefore it would improve the students' understanding level and academic performance. Lecturers can also motivate and guide students to extend their learning styles to all situations so that they could deal with any kind of situations. Mismatched learning styles over time, usually lead to frustration and learning problems. Everyone has a unique style in which they prefer to learn and students learning preferences should be matched with the overall learning conditions and study environment. This will improve academic performance and lead to permanent learning success and transfer of learning could be improved.

A study [34] supported this argument where the faculty and students do have expectations about the transfer of learning. It was reported by the students; transfers were not explicitly part of the given course. Alternatively, the faculty might assume that it is the students' responsibility to transfer knowledge and make the necessary connections. In this study, students believed that transfer within and across disciplines are still lagged behind faculty views and idiosyncratic faculty requirements are considered barriers to transfer. Thus, this survey shows a clear need for faculty to be explicit about their

expectations for transfer of learning. Thus, transfer of learning is an important issue for faculty to consider. Future studies could analyze actual course assignments across disciplines in order to identify required elements of transfer as an indication of transfer expectations. Another issue is the fit of transfer as an indication of transfer expectations as many transfer theorists failed to show how courses fit together in the larger curriculum. Bates and Khasawneh [37] claimed that creating a culture of transfer is crucial. Organizations also need to actively create climates that encouraged the transfer of learning

It is un-rationale for the lecturers to design lesson plans to accommodate the diversity of learning preferences among the students. Thus, the university needs to frame the teaching and learning policy and procedures which can both intrinsically and extrinsically contribute to the learners' satisfaction in learning. One of the realistic approaches to make the effective learning process is by enhancing the lecturers or educators competencies and abilities. Montemayor et al. [15] have recommended a seminar and training for lecturers on various learning styles so that lecturers are able to design various teaching plans and strategies to suit student learning preferences. Besides, by grounding lecturers with sufficient educational knowledge, lecturers are able to help students to move from a less successful learning style to another by using effective teaching styles, thus enhancing students' imagination, creativity and exploration of new possibilities.

VI. Conclusions

The results from this study describe learning preferences of undergraduates from the Mechanical Engineering and Business Management of UiTM Pulau Pinang. Based on the findings, the researchers finally disclosed the preferred learning styles or preferences amongst S&T students and SS students. The results revealed that both groups of students are exhibiting similar learning preferences. From 21 elements listed in Dunn and Dunn Learning Style questionnaire, only two elements drawn with different conclusions. Majority of S&T students is found to be more analytical learners whereas the majority of SS students are global learners. It is also noted that S&T and SS students are also differed in hemispherical element. The S&T students are proven as left brain dominant and SS students are right brain dominant. For final element in psychological stimuli, i.e. impulse-reflective, the majority of students from both S&T and SS exhibit reflective characteristic which indicate that they are very detailed and particulars individual. They would think about various alternatives and evaluate each alternative before making a decision. As a conclusion, it can be drawn that S&T and SS students are having similar learning preferences except on psychological preferences.

The result gained in this work is also not consistent with previous works that have been reported. This pointed that learning preferences are widely diverse among students or learners around the world. Students with similar age, gender, field of studies and culture may exhibit different learning styles at different place or different university. This indicated that many other unforeseen factors may affect the students' learning preferences. The final solution in understanding students learning preferences remains unknown. Thus, lecturers are strongly suggested to first determine their students' learning preferences every time the new classes started. Getting to understand the students learning preferences, including their personality, ability and intelligence will create a close relationship between lecturers and students thus boost up student engagement and motivation. These findings will also benefit the lecturers in designing learning strategies effectively, especially to those lecturers who taught compulsory university subject courses which involved both S&T and SS students. Lecturers are also encouraged to balance the variety of learning preferences and styles to encounter the learning preferences for minority groups. In other words, a 'one size fits all' approach is no longer practical in the current educational environment. Hence, the university academics should be equipped with teaching skills or techniques adequately prepared for the teaching all the disciplines which are aligned with appropriate philosophies and methodologies of teaching. Such abilities and exercises can only be developed through deliberate training programs where their teaching competencies should be tested and certified to be deemed professionals. This would ensure the effectiveness of the teaching and learning activities. It is also benefited and helped teachers or lecturers to plan and create friendly and conducive teaching and learning environments that will enhance the student's learning interests, concentration and motivational level during the learning process. Thus, the transfer of learning would be improved.

Further studies may also be directed in confirming whether students' attested styles fit with the types of strategies they apply in their learning's focusing into different fields of study and also to examine whether teaching styles fit with the attested students' learning styles. These findings will be able to increase lecturer's awareness on how to develop comprehensible lessons more effectively and captivate their teaching strategies successfully. It would also contribute to conducive learner-friendly environments and thus maximize the transfer of learning's.

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