Categorizing Polytechnic Engineering Learning Activities Based on Students' Learning Style

Mengkategorikan Aktiviti Pembelajaran Kejuruteraan Politeknik berasaskan Stail Pembelajaran Pelajar

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Abstract

Learning style is expressed as the way a learner approaches a process of learning and how he accrues the content of learning. This normally involves interactions between teachers, students and teaching materials. Knowing appropriate students' learning style can improve students' performance and increase student involvement in teaching and learning. A case study was conducted involving 30 first year students from the Department of Mechanical Engineering in an AutoCAD course at Sultan Abdul Halim Mu'adzam Shah Polytechnic (POLIMAS), Kedah. An analysis was conducted on a set of questionnaire to obtain the mean value, standard deviation and percentages. Based on Honey and Mumford's model, the findings revealed that the students' learning style was inclined towards activist and pragmatist typology. This study provides information necessary to help in the process of deciding the suitable learning strategy to be applied to students at the polytechnic. In general, these findings help the instructor at the polytechnic to plan, prepare and apply appropriate materials for meaningful teaching and learning.

Keywords AutoCAD; engineering student; Honey and Munford model; learning activities; learning style; polytechnic

Abstrak

Gaya pembelajaran dinyatakan sebagai cara seseorang pelajar menghampiri sesuatu proses pembelajaran dan bagaimana ia mengumpul kandungan pembelajaran. Ini biasanya melibatkan interaksi antara guru, pelajar dan bahan pengajaran. Mengetahui gaya pembelajaran yang bersesuaian dengan pelajar boleh meningkatkan prestasi pelajar dan meningkatkan penglibatan pelajar dalam pengajaran dan pembelajaran. Satu kajian kes telah dijalankan melibatkan 30 orang pelajar tahun pertama Jabatan Kejuruteraan Mekanikal dalam kursus AutoCAD di Politeknik Sultan Abdul Halim Mu'adzam Shah (POLIMAS), Kedah. Satu analisis telah dijalankan ke atas satu set soal selidik bagi mendapatkan nilai-nilai min, sisihan piawai dan peratusan. Berdasarkan Model Honey dan Mumford, dapatan kajian menunjukkan bahawa gaya pembelajaran pelajar cenderung ke arah tipologi aktivis dan pragmatis. Kajian ini memberikan maklumat yang perlu bagi

membantu dalam proses memutuskan strategi pembelajaran yang sesuai digunakan untuk pelajar politeknik. Secara amnya, penemuan ini membantu pengajar di politeknik untuk merancang, menyedia dan menggunakan bahan-bahan yang sesuai untuk pengajaran dan pembelajaran yang bermakna.

Kata kunci   AutoCAD; pelajar kejuruteraan; model Honey and Munford; aktiviti pembelajaran; gaya pembelajaran; politeknik

Introduction

Learning style could be expressed as how a learner approaches a process of learning. It is also a way of looking at how students accrue the content of learning which normally involves interaction between teachers, students and teaching materials. According to Dunn & Dunn (1979) and Henson & Borthwick (1984), knowing the appropriate students' learning style and matched with appropriate material, one can improves students' performance and increase student involvement in teaching and learning. Meaningful learning takes place when the students' affective filter is low and the process takes place as what they claim to be aligned to what their needs are (Korten, 1980). What more effective ways to bring students into the learning process if not by matching their preferred learning style and the material used to gauge them.

Learning Styles

Much has been debated among academicians, teachers and practitioners recently on the existence of learning styles or whether it gives real impact in the learning process or whether it is just a waste of time and resources (Singh & Reed, 2001; Barmeyer, 2004; Alfonseca *et al*., 2006). Despite of having such assertions, this paper does not scholarly argue on its existence, but the bigger picture is to provide the best learning platform and to inject meaningful learning to students as what was asserted by Felder & Brent (2005) that teaching practices should meet the needs of students with the full spectrum of styles.

Learning styles are diverse in manners of learning or differences among individuals when they are involved in a learning process (Kolb, 1981; Ehrman *et al*., 2003). When an individual prefers some manners of information and a specific way of action over others in attaining quality learning, and these processes happen subconsciously, this situation is regarded as the division of learning styles (Kanninen, 2008). According to Felder & Silverman (1988), learning styles are the preferred characteristics for a person to understand and process the information. Whilst Kang (1999) and Liu & Reed (1995) defined learning styles as the personal characteristics which sometimes are not perceived or used consciously by students and form the basis for the processing and understanding of the information. Learning styles are purportedly based on research results of cognitive psychology about processing information, active learning and the structure of information (Eveland Jr. & Dunwoody, 2000; Curry, 1999; De Bello, 1990).

The study of individual preference and learning styles began in the 50's, but it was not applied in education until the 70's. Looking at the allowance of time, some the descriptions of the learning styles could have been changed, modified and stabilized over the years (Franzoni *et al*., 2008; Liu & Reed, 1995).

Honey & Mumford Learning Styles

People in general have their own preference in doing things; study, work and even play; and is referred to as individual learning styles. Individuals are much affected by learning styles in terms of gaining a particular experience and information at its best. No doubt there is no specific learning styles but in normal circumstances, an individual possesses or has the tendency to have more than one learning styles depending on the subject matter and situation. Dunn (1990) affirmed that the approaches and techniques, materials and instructions have to match the characteristics of students' learning styles. Having to match the instructions and materials with preferred learning style, the intended outcome would be greater whilst attitudes towards learning would logically and positively increase. According to Mumford (1996), the terms used to describe the attitudes and behaviours that determine individual learning styles of practice are embraced in the Honey & Mumford model based on experiential learning. The model classifies four learning styles grounded from Kolb' Learning Styles (Kolb, 1981). Table 1 shows Honey & Mumford Learning Styles.

Table 1   Honey & Mumford Learning Styles

Learning Styles	Attitudes
Activists	Students who fall into this group likes to look for new experiences. They are very open minded and want to know about new things. They prefer to engage in such discussions or brainstorming sessions buzz. Their philosophy is "I really want to try it."
Reflective	The students learn through observation and thinking of what had happened. They like to collect and analyze data and think carefully before making an appropriate conclusion. Their philosophy is "Be careful."
Theorist	The students learn through models, concepts and statements. They are objective, namely to see an idea from all angles so that the situation can be seen more clearly. Conclusions made are based on evidence, data analysis and logic. Their philosophy is "If it is logical then it is good."
Pragmatist	The practical nature of these students. They love to try out ideas, theories and techniques to determine whether it is useful in real situations. They like to use tools to solve concrete problems. Their philosophy is "a better way always exists."

Source: D. Mumford (1999)

Research aims

This preliminary study focused on the learning styles among students enrolled in an AutoCAD course in the Department of Mechanical at the Polytechnic Sultan Abdul Halim Mu'adzam Shah with mixed abilities and varying demographic backgrounds. Having acquired the information on students' learning style, various activities/materials were then provided to suit the students' needs and preferences.

Research limitations

This is a preliminary study on the learning styles, as such it is only limited to the students in the Department of Mechanical, Polytechnic Sultan Abdul Halim Mu'adzam Shah.

Methodology

Participants

Thirty (30) students attending Computer Aided Design (CAD) course in the Department of Mechanical at the Polytechnic Sultan Abdul Halim Mu'adzam Shah, Kedah with various demographic backgrounds were selected.

Instrument

This is a case study using a set of questionnaire adapted from Honey and Mumford learning styles (1996) to determine the students preferred learning styles.

Result and Discussion

From the total number of samples (n=30), the dispersion of the learning preferences could be viewed in Figure 1. The highest preference of learning style by the students was *activist* (42%) followed by *pragmatist* (53%), *theorist* (21%), and *reflector* (2%).
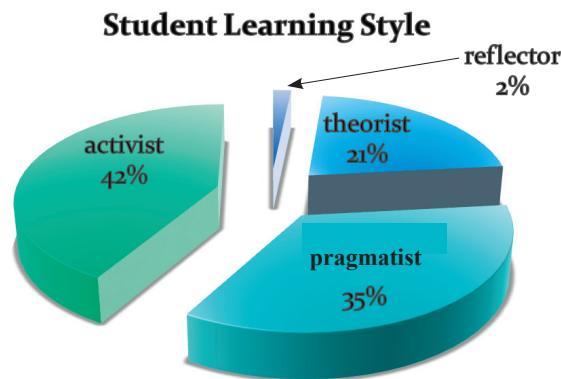

Figure 1 Student Learning Style

Based on learning style preferences result, it could be safely concluded that majority of the polytechnic students were activist (42%) and pragmatist (35%). Teachers and researchers must consider activities that cater both domains. By doing this, it would ensure that the student of polytechnic could learn to their maximum ability because the material was developed based on their learning styles and preferences.

Taking into consideration of Honey & Mumford Learning Styles, Mumford (1996, 1999) and the proposed activities suggested by Mumford (1995) as in Table 2 and to make

sure that the activities suit with polytechnic; a few activities were suggested to complement the dominant domains, which in this case are Activist domain and Pragmatist domain shown in Table 3.

Table 2   Learning style and Proposed Activities

Learning Styles	Attitudes	Proposed Activities
Activist	Activists are those people who learn by doing. Activists need to get their hands dirty, to dive in with both feet first. Have an open-minded approach to learning, involving them fully and without bias in new experiences.	Brainstorming Problem solving Group discussion Puzzles Competition Role-play
Theorist	These learners like to understand the theory behind the actions. They need models, concepts and facts in order to engage in the learning process. Prefer to analyse and synthesise, drawing new information into a systematic and logical 'theory'.	Models Statistics Stories Quotes Background information Applying theories
Pragmatist	These people need to be able to see how to put the learning into practice in the real world. Abstract concepts and games are of limited use unless they can see a way to put the ideas into action in their lives. Experimenters, trying out new ideas, theories and techniques to see if they work.	Learning in reality Case study Problem solving Time to think about how to apply Discussion
Reflector	These people learn by observing and thinking about what happened. They may avoid leaping in and prefer to watch from the sidelines. Prefer to stand back and view experiences from a number of different perspectives, collecting data and taking the time to work towards an appropriate conclusion.	Paired discussions Self-analysis Personality Questionnaires Time out Observing Activities feedback from others coaching Interviews

Source: A. Mumford (1995)

Table 3   Suggested Activities

Activist	Pragmatist	Suggested Activities
Brainstorming	Learning in reality	Problem solving
Problem solving	Case study	Discussion
Group discussion	Problem solving	Role-play
Role-play	Time to think about	Learning in reality
Puzzles	how to apply	
Competition	Discussion	

Conclusion

Students' performance could be increased by providing suitable activities and learning materials according to their preference of learning style. Therefore, this study suggests suitable activities for two dominant domains for polytechnics teachers to be embedded into their teaching and learning. Liu & Reed (1995) also defined that learning styles as the personal characteristics, which sometimes are not perceived or used consciously by the students and which form the basis for the processing and the understanding of information. By implementing the suitable activities for polytechnic enviroment, it would enhance student's focus and give a significant impact to polytechnic student. Futhermore, Dunn & Dunn (1979) affirmed that the approaches and techniques as well as materials and instructions must match the characteristics of students' learning styles. By knowing the appropriate students' learning style and matched with appropriate material, one could improve students' performance and increase student's involvement in teaching and learning.

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