ENVIRONMENTAL DESIGN CRITERIA TO STIMULATE CREATIVE THINKING A CASE STUDY OF POLYTECHNIC CAMPUS IN MERLIMAU MELAKA

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ABSTRACT

Outdoor learning environment (OLE) is one of the important factors that can affect students' well- being. Besides the formal classroom-based learning, research has proven that the layout of OLE and its physical setting can influence students' attitude, mood, behaviour and their academic achievement (Samsudin, 2007). The same notion stated by Johnson (2000) that OLE can be the place or "facility" that can support the learning process. OLE is also known as refuge spaces for the students to escape from the demanding university's life, thus it is not surprising that most of the current campus landscape planning are focusing more on achieving highest level of students' comfort and safety. Unfortunately, even with all these studies to improve student's well being, there is lack of understanding on how OLE can be a place that helps to stimulate students' creative thinking. This is a major concern due to the fact that higher learning institution should also provide the students with environments that can nurture their creativity. According to Samsudin (2007), high-quality campus environment can also generate 'self- questioning' or new discovery and able to encourage critical discussion among the students. Therefore, this study attempt to identify significant environmental design criteria associated with higher learning institution OLE that can be used to promote and enhance students' creative thinking particularly from the students' perspectives. Using survey questionnaires, a total of 90 students' respondents from Civil Engineering, Architecture, and Land Survey programs from Merlimau Polytechnic in Melaka were involved in the study. Result of this study shows that environmental condition, activities provided and landscape elements are the important factors that can shape students' behavior and their attitudes. It was also found that OLE with fun activities and colourful landscape can also enhance the process of developing ideas and improving students' excellence.

Keywords: Creative thinking, outdoor learning environment (OLE), activities, landscape elements.

1. INTRODUCTION

Currently there are 30 Polytechnic campuses in Malaysia which offer various diploma programs and serve as one of the alternative platforms for high schools graduates to pursue their higher education. Generally, each of these campuses can accommodate between 4000-5000 students within an area of 100 acres. Recently, the Polytechnic Director General of Malaysia announced his intention to improve the polytechnic standards by upgrading the existing academic programs and facilities of University Polytechnic by 2015 (Yusof, 2011). This plan has not only gives more challenges to improve the academic programs but also to the existing infrastructures which is currently manage by each of these polytechnics. Without doubt, this will also involves redesigning new OLE that is conducive to support and carry significant impacts towards students' creative thinking. The importance of having students that are able to think creatively can also be reflected in the job market survey. For instance, failure to think creatively and poor analytical skills has been reported to be among the main reason that cost universities' graduates failed to gain their employment (Zainal, 2007). He further added that graduates with outstanding creative thinking and analytical skills are among the outstanding qualities for individual that can compete in the global market. This problem, according to Kassim (2005) was also contributed by poor education system in addition to physical environment that is not driven by stimulant of creative qualities.

However the existing polytechnic OLE failed to bring significant impact towards enhancing students' creativity. Besides, there is lack of understanding regarding students' needs for OLE particularly factors that can attract their interest to use the spaces or promote positive discussion among them. The urge to have polytechnic that is creative and innovative required physical planning that would be able to promote happiness, pleasure, and enjoyment learning environment for the students. According to the National Landscape Department Guidelines (2012), it is recommended for the higher institution landscape planning to include new approach and technology that can

stimulate students' creativity. This can be achieved by understanding and fulfilling students' learning needs outside the typical-classroom setting. Rusni (2005) and Sabariah (2006) agree to this notion that good quality outdoor environment plays an important role that is important for students' cognitive development, psychomotor, affective and socialization. This effort hopefully will also increase the students' productivity as well as driving the polytechnic excellence.

Figure 1: Typical outdoor campus environment that failed to enhance students' creative thinking

2. LITERATURE REVIEWS

2.1 Creative, Creativity and Ceative Thinking.

According to the Time Lingua Dictionary (2000), creative can be generally defined as ""clever at making thing" or become imaginative (p.99). Meanwhile creativity can be associated with human ability to invent, to experiment, taking risks, breaking rules, making mistakes and to have fun (Cook, 2011). On the other hand creative thinking is the process of sensing "difficulties, problems, gap in information, missing elements, something new, making guesses and hypotheses about the solution of these deficiencies; evaluating and testing these hypotheses; possibly revising and restating them; and finally communicating the result" (Keong, 2011, p.24). It is also related to the human ability to bring something new to existence (Hamid, 2006). Creative thinking also involves the use of right brain (Ainon, 2003; Jaafar, 2011). As noted by Jaafar (2011), outdoor activities can stimulate the use of right brain to produce creativity.

2.2 The environment for creative thinking

The campus outdoor environment plays an important role to inculcate creative thinking and it should be designed in such a way that they provide many learning opportunities. The environment can be a potential place to experiment, discover, and formulate students' understanding about nature, sciences and arts. Power (2001) for example suggests that "the geometry of the built environment and structure can be used as a teaching tool for mathematic". Meanwhile, the arts can be taught by "observing the effect of light and shadow and by interactive sculptures"(p.164).

Students' can be more explorative in building their experience in through outdoor environment. Eaton (2000), found that outdoor learning experiences were more effective for developing cognitive skills than classroom based learning. His findings strengthen the needs to have good quality landscapes for outdoor learning environment. However, rather than simply beautifying the campus area, designed landscape can also be more meaningful if they are properly plan for the students (Razak 2008). Different shapes and colors can be a dazzling visual experience and thinking simulation (Keong, 2011). The same idea can be reflected at the Ngee Ann Polytechnic at Bukit Timah Singapore. The polytechnic outdoor environment was designed as a retreat to the students by allowing them to experience panoramic view after the class hours.

2.3 The outdoor activities stimulate the thinking for student learning

To be creative somehow required human being to be adventurous, have strong sense of curiosity and become risk-takers. It also involves human basic senses such as hearing, sight, taste, smell and touch. The activities designed within the outdoor learning environment can be more meaningful if the use of these senses is maximized. Activities planned should also consider appropriate spaces to ensure its effectiveness to stimulate students' creative thinking. The impact of these activities, hopefully will also enhance student senses, encourage development of new ideas, opinion and become a place for social interaction.

2.4 The landscape element and composition for stimulating students learning

Types of element and composition in landscapes could also encourage students to use OLE as a space to learn. Spaces with shades that are quiet can encourage students' discussion, idea development or become a place for meditation. Water elements may also be used to enhance the learning process. Water is not only acts as cooling effects but also provide a place for the students to explore their creativity. In addition, the landscape elements should also be designed according to specific activities or needs. For example Mean (2008) stated that "seating area should be seated in the shape of 'U' or Circle to facilitate the generation of ideas" (p.23).

3. METHODOLOGY

The study area selected for this study was the Merlimau Polytechnic in Melaka. Using purposive sampling technique, 90 students from three different units at the Department of Civil Engineering were asked to participate in the study. The three units were civil engineering, architecture and the land survey. The survey questionnaires designed for this study consisted of three major sections. The first section contained questions based on existing environment condition related to factors that can stimulate creative thinking. The second part consists of questions that identify different types of outdoor activities for students' learning and the third section assesses students' understanding regarding landscape elements that can attract students' learning. Results from the study were analyzed using SPSS and descriptive statistics based on the department's units were compared based on the overall mean scores. The overall research framework from this study can be generalized as in figure 4.

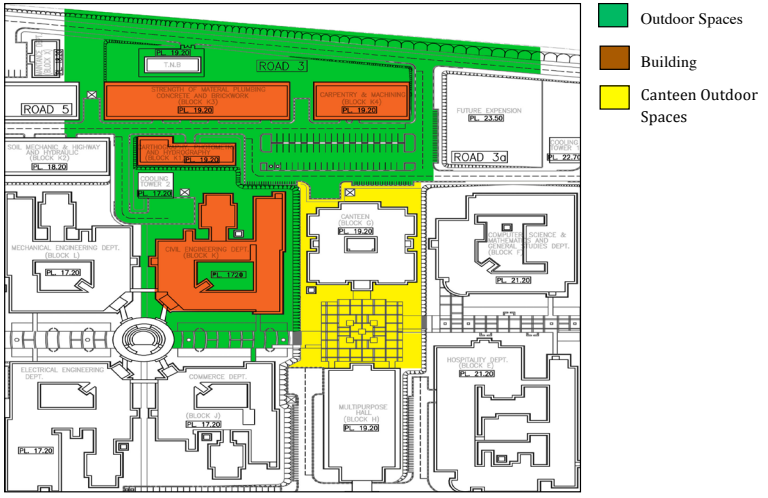


Figure 2: Department of Civil Engineering, Polytechnic Merlimau, Melaka

Figure 3: Example of outdoor spaces at the Civil Engineering Department

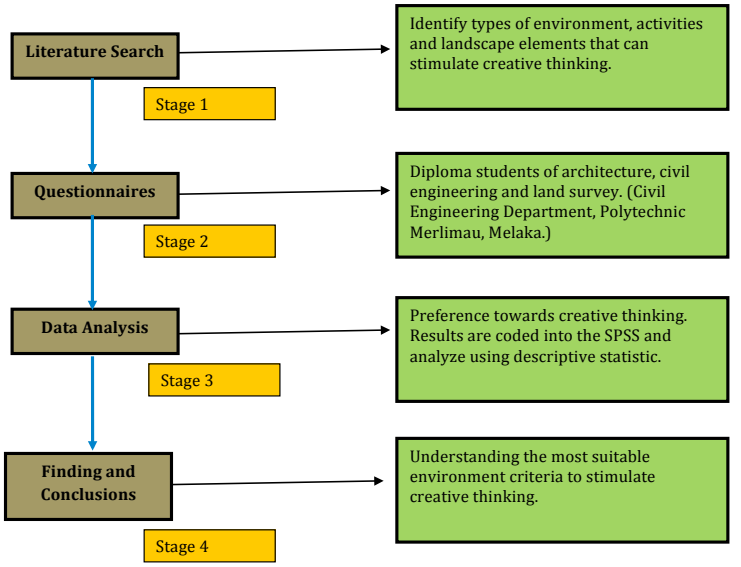


Figure 4: Overall research framework

4. RESULTS

This section presents the results of the data analysis. Data is presented in tabulated form and followed by charts to further illustrate the finding.

4.1 Demographic

The findings are obtained from civil engineering department students consisting of diploma in civil engineering, architecture and land surveying in the age range from 20 to 22 years.

Civil engineering students comprised of 70% male and 30% female, Architecture Students' are 50% male and 50% female while land survey students are 63% male and 37% female.
Majorities of the respondent are male student. Students races are Malay and only one Indian students participated.

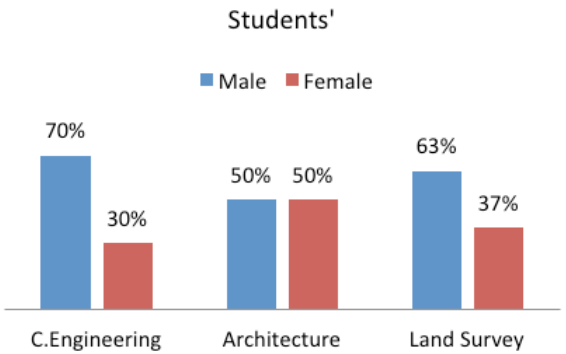
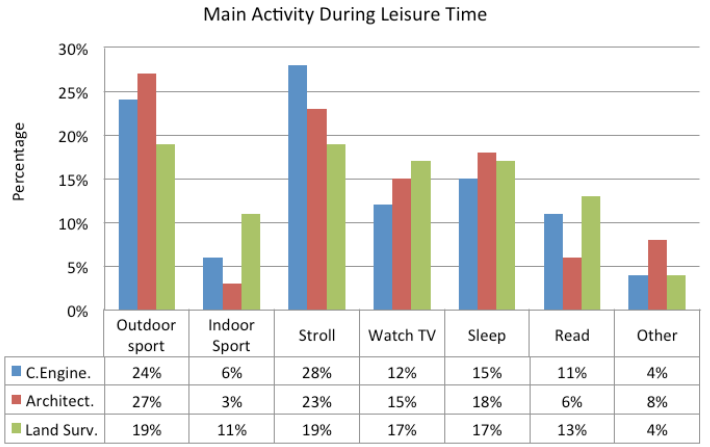


Figure 5: Respondent selection from civil engineering, architecture and land survey.

4.2 Main activities during leisure time

From figure 6, most of the respondent are choosing the stroll and outdoor sport for their main activities during leisure time. 28% respondent from Civil engineering chose to stroll and 24% for the outdoor sport. 27% respondent from Architecture chose the outdoor sport and only 23% for the stroll. Meanwhile for the Land Survey respondent, 19% go for the outdoor sport and stroll. From this data, it shows that all the respondent from civil engineering department have a great feeling for play activities at the outdoor during leisure time.



	Outdoor sport	Indoor Sport	Stroll	Watch TV	Sleep	Read	Other
C.Engine.	24%	6%	28%	12%	15%	11%	4%
Architect.	27%	3%	23%	15%	18%	6%	8%
Land Surv.	19%	11%	19%	17%	17%	13%	4%

Figure 6: Respondent selection of main activities during leisure time.

4.3 Preferred activities

Figure 7 shows that respondent prefer to be as a group rather than alone for outdoor activities. This contributes 80% from the civil engineering student, 70% from land survey and 67% from the architecture student. The figure also shows that most student from the civil engineering department prefer group activities in the campus. This includes social activities, discussion with friend and exchanging ideas.

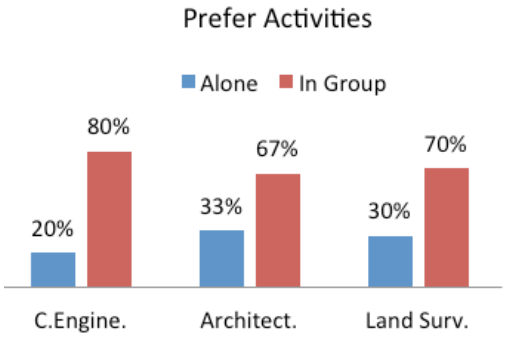


Figure 7: Prefer activities as group or alone

4.4 Well-designed campus environment important for student well being

According to figure 8, all respondent from Civil Engineering, Architecture and Land Survey department strongly agree (100%) that well designed campus outdoor environment is important for students' well-being. This figure reveals that the students are aware that a good designed campus will give huge benefits to them.

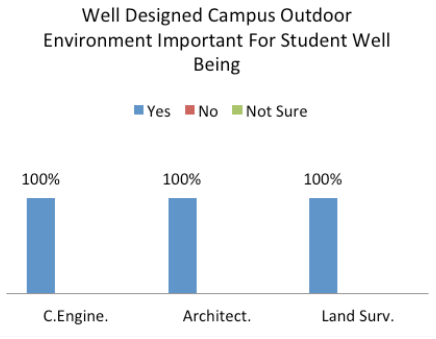


Figure 8 : Well designed campus outdoor environment for student well-being

4.5 Well design campus can stimulate creative thinking

Figure 9 show that most of the respondents agree that a well-designed campus can stimulate creative thinking. Land Survey respondents contributes 90%, Architecture 77% agree and Civil Engineering 73%. These show that awareness on 'thinking creative through campus design' certainly prevail among campus students. Only some students are uncertain. Therefore, consideration on campus design should base on thinking creative too.

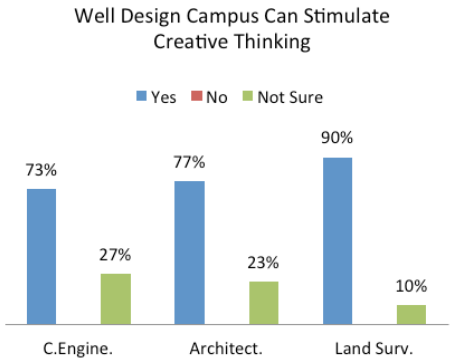
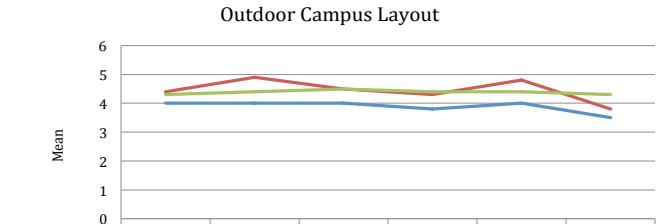


Figure 9: Well design campus can stimulate creative thinking.

4.6 The potential environmental condition for stimulating creative thinking

At the end, the data were compared within the three units comprising of students of civil engineering, architecture students and students of land survey. Figure 10 shows the comparison of the students on campus selection of outdoor campus layout consisting of selected variables i.e. outdoor spaces adjacent to the classroom, outdoor spaces composed of multiform, lawn-multi activities, buffer planting, outdoor space clear hierarchy and create spaces for hand-activities. Outdoor spaces composed of multi form get the highest score (m=4.43), followed by a clear hierarchy (m=4.4) and multi lawn activities (m=4.33). The students' preference for design with multi form and outdoor spaces with clear hierarchy might be influenced by their background (different course). The respondents also need a multi activities lawn because the departments' area has only small spaces for playing games and for resting.



	Oudoor spaces adjacent to the class room	Oudoor spaces composed multi form	Lawn-Multi activities	Buffer planting	Outdoor spaces clear hierarchy	Create spaces for hand-on activities
C.Engine.	4	4	4	3.8	4	3.5
Architect.	4.4	4.9	4.5	4.3	4.8	3.8
Land Surv.	4.3	4.4	4.5	4.4	4.4	4.3
Overall Mean	4.23	4.43	4.33	4.16	4.4	3.86

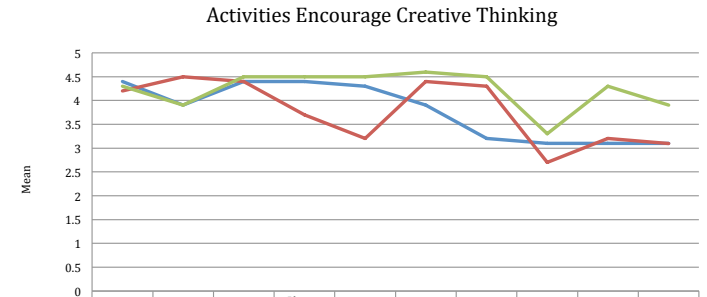
Figure 10: Outdoor Campus Layout

4.7 The potentials outdoor activities stimulate the thinking for student learning

Activities to encourage for creative thinking which consists of 10 variables comprising the students outdoor exhibition, seeing the abstract visual-sculpture, playing with moving water, playing with puzzle/strategy games, playing with construction games, discussion with friends, relaxing under tree shades, gardening, relaxing on the open lawn and walking in nature trail.

The result in figure 11 shows that playing with moving water becomes the main choice for all the respondents (m=4.43) followed by students' outdoor exhibition and discussion with friends (m=4.3), playing with puzzle/strategy games (m=4.2), seeing the abstract visual-sculpture (m=4.1), playing with construction games and relaxing under the shade tree (m=4.0).

This suggests that water element is beneficial as agreed by major respondents. Thus, the emphasis on activities or water elements should be a priority in the future.



	Student outdoor exhibition	Seeing the abstract visual-Sculpture	Playing with moving water	Playing with puzzle/ strategy games	Playing with constructio n games	Discussion with friends	Relaxing under tree shades	Gardening	Relaxing on the open lawn	Walking in nature trail
C.Engine	4.4	3.9	4.4	4.4	4.3	3.9	3.2	3.1	3.1	3.1
Architect	4.2	4.5	4.4	3.7	3.2	4.4	4.3	2.7	3.2	3.1
Land.Surv	4.3	3.9	4.5	4.5	4.5	4.6	4.5	3.3	4.3	3.9

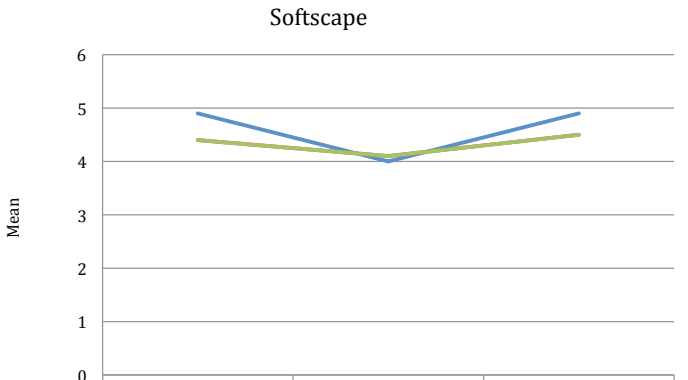
Overall Mean	4.3	4.1	4.43	4.2	4	4.3	4	3.03	3.53	3.36

Figure 11: Activities Encourage Creative Thinking

4.8 The potential landscape elements and composition for stimulating students' learning

a. Softscape elements

Softscape plays an important role to stimulate the students learning environment. Result from Figure 12 shows that respondents choses plants with good shading (m=4.63) and followed by plants that could stimulate the users (m=4.56) and animal and bird attracting plants (m=4.06). This result shows that students of this campus focus on individual benefit rather than giving impact to other people and for their learning from environment situation. All three softscape elements get a high recommendation from the respondents



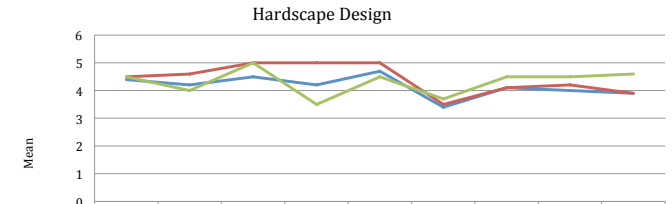
	Plants could stimulate the users'	Bird and animals attracting plants	Choose plants with good shading
C.Engine.	4.9	4	4.9
Architect.	4.4	4.1	4.5
Land Surv.	4.4	4.1	4.5

Overall Mean	4.56	4.06	4.63

Figure 12: Softscape elements

b. Hardscape elements

For hardscape selection, the criteria are unique design, signage and symbol/logo, furniture, artwork, water elements, sound, therapy area, texture, bold and vivid and texture changes the direction. Result from figure 13 shows that furniture become the main choice for respondent (m=4.83) and followed by the water element (m=4.73), unique design (m=4.3), signage and symbol/logo (m=4.26), therapy area (m=4.23), artwork (m=4.23) and texture, bold and vivid colour (m=4.23). The design of public facilities for students should be a priority in the outdoor campus space. Besides providing comfort, it is also a place to meet and exchange ideas. Elements of water gives a fresh and radiant ambience.



	Unique design	Signage and symbol/ logo	Furniture	Artwork	Water elements	Sound	Therapy area	Texture, bold and vivid colour	Texture changes direction
C.Engine	4.4	4.2	4.5	4.2	4.7	3.4	4.1	4	3.9
Architect.	4.5	4.6	5	5	5	3.5	4.1	4.2	3.9
Land Surv.	4.5	4	5	3.5	4.5	3.7	4.5	4.5	4.6

Overall Mean	4.3	4.26	4.83	4.23	4.73	3.53	4.23	4.23	4.13

Figure 13: Hardscape Design

5. CONCLUSION

The results from this study show that campus environment needs strategy to become the students' center not only for learning but to stimulate creative thinking. Creative students' are highly regarded for their ability to think differently and come up with a creative solution to problems. Most of the campus today is insufficient because they focus solely on conducive and safe environment, but not the spaces that can stimulate and provoking the students thinking and learning process.

This study contributed a new knowledge on defining the environmental criteria to stimulate creative thinking in campus. The type of environmental condition, activities and the landscape elements give impact to students' behavior and their attitudes. The campus environment with fun and colourful elements will able to improve the process of developing ideas and thoughts that can drives to students' excellence. The role of water element should be the focus in the design of campus in the future. The facilities and design consideration of the campus impact the students' behaviour and their thinking ability.

Element of plants influence the external activities of students. Spread of trees can provide shades to students' and increase students' outside activities. The campus design with a clear hierarchy will present different ambience, thus giving perceptions to control and will change the bad behaviour of the students.

Obviously environment that can respond to 'self- questioning' of the students are better. Spaces of outdoor activities that can stimulate the thinking process should become a priority, so the students can enjoy the outdoor learning environment.

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