RESEARCH ARTICLE

Advanced Science Letters
Vol. 24, 4511–4514, 2018

Knowledge Environment Architecture Students Architecture Civil Engineering Education Engineering Faculty Universitas Negeri Makassar Involved in Vocational Education

Mithen* and Armiati

Department of Civil Engineering Education, Universitas Negeri Makassar, Jl. Dg. Tata Kampus, UNM Parang Tambung Makassar

This study aimed to determine the cognitive knowledge of Architectural students to understand environmental discovery. The subject of the research is the students of architecture Civil Engineering Education Engineering Faculty in Negeri Makassar Makassar. The population in this study consisted of 84 architecture students were in the academic year 2015/2016. The sample consisted of 36 students was selected using the probability proportionate stratified random sampling technique. Instrument to collect the data is the tests were conducted to determine student knowledge of environmental architecture. The data were Analyzed to obtain descriptive statistics and multiple regression analysis results, using SPSS version 20 software. The results showed that the cognitive understanding of the architecture students about the environment was moderate. The results of multiple linear regression analysis showed that thinking ($X1$), knowledge ($X2$), understanding ($X3$), and problem-solving ($X4$) ability of the students significantly affected Reviews their cognitive understanding (Y) with a contribution of 98.5%. The implications of this research are expected to improve the learning environment architecture curriculum that has been taught by integration approach and is expected to be taught a monolithic order can be further increased student knowledge to prepare themselves as future teachers of Vocational High Schools (SMK). School administrators carry the responsibility to match professional development with novice CTE teacher needs.

Keywords: Knowledge Integration, Architectural Environment, Vocational Education.

1. INTRODUCTION

The Engineering Faculty of Universitas Negeri Makassar (FT-UNM) is an institution of higher education that has the task of preparing teachers who will teach in various Vocational High Schools (SMK). One of the areas of expertise of the Engineering Faculty is to prepare students to teach science building techniques in Vocational High Schools, as the schools were given the task of preparing secondary employment in the field of construction engineering. The building technique program, taught by student teachers in Civil Engineering Education of FT-UNM is divided into two groups, namely the fields of Civil Engineering and Architecture.

Engineering is a science that can alter the natural landscape of the original environment into a natural environment of man-made or built environment. Therefore, the students as prospective teachers who will teach the science of engineering equipped with the science related to environmental preservation will manipulate nature wisely so as not to destroy nature but create sustainable engineering results. In addition, the Education for Sustainable Development can be synergized with the issue of sustainable development, in a curriculum involving global issues of sustainable development that may be implemented in a monolithic approach or an integrated approach. In an integrated approach, researchers believe that environment architecture has been taught, in the course on the landscape, land classification, city morphology, building physics, building construction, and so forth. This study aimed to measure the students understanding of the environment architecture.

Theoretically, the cognitive perspective indicates how the intellectual ability, thinking ability, and intelligence will be achieved. In the context of education, Benjamin Bloom[1] suggested three variables (domains) related to the behavior of individuals, namely: (1) cognitive variables; (2) affective variables; and (3) psychomotor variables. Other theory,[2] cites the opinion of Lev Vygotsky (1896–1934) argued that cognitive is one realm in the taxonomy of education. In general cognitive intellectual

*Author to whom correspondence should be addressed.

potential is defined as consisting of stages: knowledge, comprehension, application, analysis, synthesis, and evaluation. Jean Piaget[3] discusses the emergence and obtaining schematics of how one perceives the environment in the developmental stages when a person obtains a new way of mentally representing information. Piaget argues that we build our cognitive abilities through self-motivated actions on the environment.

A research explains that cognitively comes from the Latin "Cogitate" means thinking.[4] Therefore, cognitive psychology acknowledges the brain runs its main function, namely that cognitive thinking is the thinking process. The theories mentioned above, explain the meaning of cognitive and variable which is a step to develop the intellectual potential arising out of or motivated through the environment, including the learning environment. Therefore, student-related cognitive environment architecture can also be formed through a process of thinking or learning through the material taught architectural environment either integrated approach or monolithic approach. Poedjowibowo[5] explained that "Environmental Architecture synergizes material and cross-disciplinary sub-architecture to support the achievement of optimal design and sustainable by minimizing nuanced: pollution, destruction and wasted resources." He explained that basically, the architecture of the environment is the science of architecture developed and synergized with other sciences, especially meaningful environmental protection so as to produce an environmentally friendly architectural design, for example, that does not cause pollution, does not damage the environment and uses natural resources economically. Another opinion, expressed by Abdilah[6] who argued that the concept of environmentally friendly building or green building is a world trend, especially for the development of current properties. Environmentally friendly architecture, which is also a green architecture, includes harmony between man and his natural environment. The green architecture also contains other dimensions like time, the natural environment, socio-cultural aspects, space, and building techniques. Frick[7] argued that "biological architecture is the science link between man and the environment as a whole. Biological architecture is the knowledge of the integral relationship between humans and the environment."

Likewise, Frick[8] explains that there are two currents that affect human life: the techniques and nature. The technique is a tool that can quickly be applied if biological processes are deemed too slow. This technique makes people's lives more prosperous in the present industrial age than in previous centuries. However, application of the technique can cause side effects, whether biological, psychological or ecological. The technique can cause pollution and destruction of the life cycle and plunder of natural resources, which in turn will endanger life. Architecture and the environment remind us of the need to change direction, to think in a new way.

Rizkifachurohman[9] argues, "Green Architecture is an architectural concept that is trying to minimize impacts on the natural environment and people and generate a better and healthier life, which is done by utilizing a source of energy and natural resources efficiently and optimally." Furthermore, he says that the concept of this architecture is more environmentally responsible, has a high level of alignment between the structure with the environment, and the use of an excellent utility system. Mithen[10] explains that: If the architecture and the environment are connected, they will form a new understanding of "environment architecture as a fusion of two disciplines, and give birth to a new science that focuses on the art and science of designing the environment or certain regions, including the region of the environment and the unity of space and objects that are inside, which facilitate humans and behavior in their everyday lives. Based on some of the opinions, it can be concluded that environmental architecture is the science of architecture that focuses on the design and development of the environment, both macro and micro in order to facilitate the activity or govern human life in the region, so as to create an area or environment that is functional, aesthetic, and sustainable. Another opinion, expressed by Saraswati[11] who said that the planning of eco-architecture is a process with a beginning point. If we design without any attention to the ecology it will be suicide given the magnitude of the impact that occurs due to ecological climate itself.

2. METHODOLOGY

This study is quantitative research conducted in June 2016. The subject of the research is the student of architecture Civil Engineering Education FT-UNM. The population consisting of 84 students. Sample Consist of 36 was selected using stratified random sampling. Instrument to collect the data is the tests were conducted to determine student knowledge of environmental architecture. The data analysis technique is descriptive statistics and a correlation technique to calculate the direct influence of variables thought, thinking ($X1$), knowledge ($X2$), understanding ($X3$), and problem solving ($X4$) of the cognitive variables (Y) as independent variables.

3. RESULTS AND DISCUSSION

From the cognitive intellectual ability or intelligence is achieved by the students who formed out of ideas, knowledge, understanding and solve problems after learning about the architecture of the neighborhood. To measure the ability of the students the results of tests were analyzed with descriptive statistics and the results of the analysis can be seen in Table I.

According to Table I below the minimum values obtained by the students in the variable, Y is 33 and the maximum value was 73. The descriptive analysis of the students' scores was measured by four categories, namely very low, low, medium and high. The results can be seen in the frequency table (Table II) below.

From Table II below, it can be seen that the cognitive value of students in this study, the number of students who receive a very low score as many as five people (14%), which scored a low 12 people (33%), obtaining a value being as many as 11 people (31%) and the high value of 7 people (22%) then the mean value/category = 55.22. The conclusion of the study is that

Table I. Descriptive cognitive architecture student environmental architecture concentration civil engineering education FT-UNM 2016.

Variables	*N*	Minimum	Maximum	Mean	Std. deviation
Y	36	33, 00	73, 00	55, 2222	11, 04823
*X*1	36	40, 00	100, 00	64, 4444	13, 61605
*X*2	36	33, 00	78, 00	57, 2500	14, 23552
*X*3	36	20, 00	83, 00	62, 7222	16, 82619
*X*4	36	10, 00	83, 00	43, 9722	18, 23417
Valid *N* (listwise)	36				

Source: Results analysis (SPSS output), 2016.

Table II. **The distribution frequency of student based cognitive value.**

Num	Scale score	Category	Frequency (*F*)	Percentage (%)	Mean/ category
1	33–34	Very low	5	14	55,22 (Moderate)
2	44–54	Low	12	33	
3	55–65	Moderate	11	31	
4	66–73	High	7	22	

Source: Results analysis.

Table III. **SPSS output to know results significance of the multiple linear regression testing.**

ANOVA						
	Model	Sum of square	df	Mean square	*F*	Sig.
1	Regression	4206, 812	4	1051, 703	498,432	,000[b]
	Residual	65, 411	31	2, 110		
	Total	4272, 222	35			

Note: Dependent variable: *Y*, Predictors: (constant), *X*4, *X*1, *X*3, *X*2.

cognitive understanding of the architecture students about the environment is moderate. The results of this analysis illustrate the lack of effective learning systems that were taught about the environment.

Furthermore, multiple linear regression analysis was used to see the effect of each independent variable on the dependent variable. In this study, the independent variables are variables $X1$, $X2$, $X3$, and $X4$ is the dependent variable Y. In this analysis, researchers used SPSS 20 and the result of the analysis are shown in Table III.

Based on Table III above, the results of the analysis in this study proved to be significant ($0.000 < 0.01$). That is, thinking ($X1$), knowledge ($X2$), comprehension ($X3$) and problem-solving ($X4$) of the environmental architecture students was influential and highly significant to Cognitive (Y) understanding of the students. To find out how large the contribution of the independent variables ($X1$, $X2$, $X3$, and $X4$) to the dependent variable (Y), the result of the analysis are shown in Table IV.

From SPSS output in Table IV below, the obtained value of R Square ($R2$) shows the contribution of $X1$, $X2$, $X3$, and $X4$ amounted to 98.5% while the remaining 1.5% was influenced by other variables. Furthermore, to see which variable had the most powerful influence on the variable Y (cognitive), the result is shown in Table V.

Based on the analysis in Table V above, it can be seen in the standardized column that the beta coefficient, among the 4 variables turned out that the variable $X4$ (Troubleshooting) has a Beta value greater than (0,531). That is, the variable $X4$ has a stronger effect on Y. Or in other words, aspects of problem-solving in environmental architecture suggest that students have a greater influence on their cognitive understanding. Therefore,

Table IV. **SPSS output to know big *R* square and autocorrelation (Durbin Watson).**

Model summary				
Model	*R*	*R* square	Adjust *R* square	Std. error of the estimate
1	,992[a]	,985	,983	1,45259

Note: Predictors: (Constant), *X*4, *X*1, *X*3, *X*2.

Table V. **SPSS output for beta value and knowing multicolinearity.**

Coefficients[a]					
	Unstandardized coefficients		Adjust *R* square beta		
Model	*B*	std. error		*t*	Sig.
(Constant)	−, 785	1, 690		−, 465	,646
*X*1	, 185	, 019	,229	9, 758	,000
*X*2	, 295	, 021	,380	13, 910	,000
*X*3	, 208	, 015	,317	13, 467	,000
*X*4	, 322	, 016	,531	19, 566	,000

Note: Dependent variable: *Y*.

through the results of multiple linear regression, the thought, knowledge, understanding, and problem solving of the environment architecture students proved to be significantly affected by the cognitive understanding of students with a contribution of 98, 5%; $R2 = 0.985$; $F = 498.432$; $p < 0.01$. Results of regression analysis also showed that the value of β ($X1$, $X2$, $X3$, and $X4$) i.e., β (0.229, 0.380, 0.317 and 0.531); $p < 0.01$.

4. DISCUSSION

Sugihartono, et al.,[12] revealing a cognitive psychology approach emphasizes the importance of internal mental processes of man. The human behaviour appears cannot be measured and explained without involving the mental process. All forms of behaviour including learning have always been based on cognition, which is the action to know or think of a situation in which the behaviour occurs. In conjunction with this study, to measure the cognitive level of students about the architecture of the neighbourhood did not temples of mental processes students themselves, namely the act of knowing the scope of the lecture material environment architecture is taught in an integrated manner with other subjects, then carry out evaluation through a written test to get the data.

Therefore, in this study, the cognitive level of students about the architecture of the environment was determined in order to improve the curriculum at the Civil Engineering Education FT-UNM, while at the same time show that cognitive level is formed by the variables of thought, knowledge, understanding and problem-solving.[1]

Research shows that the cognitive level of students majoring in Mechanical Building architecture concentration Civil Engineering Education FT-UNM, are at moderate levels. The results show that the variables of thought, understanding, and problem-solving were in the middle category, but the knowledge variables that are in the poor category. It shows that the learning environment architecture is taught in an integrated manner with other subjects, it is evident that it has not shown satisfactory results. There is a possibility, the students do not realize that in fact the material presented in the courses they follow, is the material environment architecture professors taught in an integrated manner. Therefore, it is better if the professor who teaches explained to students how the linkage of lecture material delivered by the architecture of the environment, especially to explain how the importance of planning to engineer of environmentally friendly architecture. One thing that also needs to be considered is how to ensure that the policy makers at the Department realize the importance of preserving the environment, particularly those related to engineering architecture that can damage the environment if not done by considering aspects of preservation. Therefore, if the policy makers

are aware of it, it's worth considering a policy to improve the curriculum, for example, the subject of environment architecture is no longer taught in an integrated manner but can be taught in a monolithic so that the order of the lecture can be better-understood students, and the students' better understanding of the architecture of the environment, as well as understanding the importance of their role to preserve nature for the sake of human life today, and the lives of generations to come.

As a comparison, Riyanto, et al.[13] conducted a study to determine the relationship between environmental knowledge with the attitude of students in conservation programs Semarang State University Department of Geography, The results showed the level of environmental knowledge students of Department of Geography a large part (over 73%) in the high criteria and only 3.8% in low criteria. This means that approximately 23% of the criteria were.

Based on the results of multiple linear regression analysis, it proved that the four variables influence positively and significantly related to cognitive understanding. The value of *R* Square ($R2$) shows that the contribution of $X1$, $X2$, $X3$, and $X4$ amounted to 98.5%. Thus, the results of this analysis strengthen earlier theories, so that although the theory put forward by Bloom (Bloom et al. 1956) about 60 years ago, proved to still be used despite many new theories that complement the theory.

5. CONCLUSION

Based on the analysis of data and discussion conducted in this study, it can be concluded that: Cognitive architecture student concentration Civil Engineering Education FT-UNM on the architectural environment, is in the moderate category. Cognitive variables, which consists of ideas, knowledge, understanding, and problem solving proved to be positively and significantly related to cognitive understanding, with a contribution of 98.5%.

The implications of this research are expected to improve the learning environment architecture curriculum that has been taught integrated manner and is expected to be taught a monolithic order can be further increased student knowledge to prepare themselves as future teachers of Vocational High Schools (SMK).

References and Notes

1. B. Bloom, Taksonomi Bloombloom's Taxonomy-Learning Domains **(1956)**, www.businessballs.com human resources, Accessed on January 17, 2016.
2. Nur Azizah Fadhillah, Social Cognitive Development Theory Kognitif, Lev Vygotsky **(2011)**, Online. http://edukasi. kompasiana.com /2011/03/03/, Accessed on January 17, 2016.
3. J. Piaget, Kognitif **(1896–1980)**, http://edukasi.kompasiana.com/2011/01/01/teori-piaget-dan-vygotsky/, Accessed on January 17, 2016.
4. Fauziah Nasution, General Psychology, Fakultas Tarbiyah, IAIN SU **(2011)**.
5. D. Poerdjowibowo, The Cornerstone of Understanding Green Architecture for Architectural Education **(2011)**, e-journal.unsrat.ac.id.
6. 8(1), Accessed on January 17, 2016.
7. Abdilah and Sandy Muhammad, Environmental Architecture **(2012)**, sukmasandy02012/10/arsitektur-lingkungan.html, Accessed on January 17, 2016.
8. H. Frick, Ecological Architecture, Kanisius, Yogyakarta **(2006)**.
9. H. Frick, Architecture and Environment, Kanisius, Yogyakarta **(1988)**.
10. Riskifachurohman, Green Architecture **(2013)**, rizkifachurohman.blogspot.com/2013/12arsitektur-dan-lingkungan.html, Accessed on January 17, 2016.
11. Mithen, *Journal of Architectural Engineering SULAPA* 3 **(2011)**.
12. Saraswati, Environmental Architecture **(2015)**, https://diniindahsaraswati.wordpress.com/2015/10/Accessed on January 17, 2016.
13. Sugihartono, et al., Educational Psychology, UNY Press, Yogyakarta **(2013)**.
14. Eko Ahmad Riyanto, et al., Edu Geography, [S.l.], June **(2012)**, Vol. 1, ISSN 2252-6684. Available at: http://journal.unnes.ac.id/sju/index.php/edugeo/article/view/922), Accessed on 03 March 2017.

Received: 20 May 2017. Accepted: 22 September 2017.