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STEM Integration Module In Teaching And Learning with Visual Arts Education: A Needs Of Analysis

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ABSTRACT
Analysis needs to be done to ensure that products in the development of the module can meet the needs of users. This study uses 10 primary school teachers to identify the requirements and specifications of the module-based science, technology, engineering and mathematics (STEM) for teaching and learning approaches in Visual Arts Education among elementary school students. Data were collected using semi-structured interviews with selected respondents participation through purposive sampling method aims. The qualitative data from this interviews, categorized and analyzed to identify themes. Three main themes have been identified. (1) The STEM suitable for the development of teaching and learning among elementary school students, (2) The existing teaching methods do not focus on the approach of intergated studies, (3) Teachers need resources and effective material for a multidisciplinary approach or easy integration for the content of teaching art education. These findings will be used to establish and develop modules in the next stage. This study discusses the concept of modular design, implementation strategies and outcomes.

Keywords: Module Development, Need Analysis, Visual Art, The integrated learning, integration of STEM, STEAM.

INTRODUCTION

STEM is an acronym for Science, Technology, Engineering, and Mathematics. Even so, Sneideman (2013) believe that STEM is a philosophy or way of thinking in which some subjects of Science, Mathematics, Engineering and Technology is integrated into the education sector which is considered more appropriate and relevant to be taught in schools in particular, because it emphasizes practicality and reality. In this way children learn science and mathematics in the real context, realistic and meaningful through the application of technology and invention. Learning this way is more fun, engaging hands-on experience and to continue to stimulate children to think and solve problems.

However, one area that received attention in the debate over global education movement now is STEM to STEAM, which include the artistic impulse (A) (STEM) = (STEAM) to study science, technology, engineering and mathematics (Maeda 2013). The emergence of the movement STEM to STEAM based on an effort to involve the arts into STEM as an equally important aspect

and not just an additional subject (Bequette & Bequette 2011; Artworks 2012). STEAM education based on the statement that the STEM and artistic works more effectively when combined with each other than if used alone. STEAM is a new term, but the collaboration between art and STEM is not a new idea. Since the days of thinkers such as da Vinci, the link between art and science since generations is a field of study and practice that can be traced throughout history (Atalay & Wamsley 2008). Eisner and Powell (2002) also challenged the view of art and science are in a different world, and stressed the similarities that can be seen across a range of disciplines. Movement STEM to STEAM provide a new language to establish cross-disciplinary thinking.

The National Endowment of the Arts (NEA) and the National Science Foundation (NSF) also joined forces to produce a new way of linking art and design with science and engineering (Malina 2012). Using this momentum, this study aims to produce scholars contributed to the development of STEM education in our country. Thus a study of the needs analysis should be undertaken to build a module that integrates with Visual Art Education and STEM education to evaluate the process of teaching and learning in subjects Visual Arts Education for Year 4 that combines with the STEM disciplines.

Needs Analysis

This study was conducted to obtain information from the Visual Arts Education teacher in primary schools on a module needs to be developed to solve the existing teachers problems. In conducting the study module development, requirements analysis is one of the study design and module development. According to Richey and Klein (2007), the strength of the study design and the development of the study module is used to solve the problem in a specific context. In a study of the development of the module, the analysis phase is the initial phase of the study in context and environmental information to be studied were collected (Saedah Siraj, Norlidah Alias, Dorothy DeWitt, & Zaharah Hussin 2013). Therefore, before the module is developed, needs analysis must be done to get the probability of the occurrence of the problem.

The purpose of the needs analysis phase is to identify why the likelihood of problems (Gagne, Wager, Golas, & Keller 2005) and do what is necessary to solve the problem (Reinbold 2013). This needs analysis phase provides vital information in determining the design and construction of the next phase of instruction (Gagne et al., 2005). In this study, a needs analysis study was conducted in the initial phase of the study module is to know how appropriate teaching conducted by teachers so that teaching and learning of visual arts education in primary schools to be more effective, enjoyable and interactive. To solve this problem, this study was conducted to determine what are the requirement needs for visual art teacher to teach based approach for integration of STEM in teaching and learning of Visual Arts Education in year 4.

For the purposes of this analysis, there are some aspects of the target groups that need to be identified to ensure that the resulting module can be used. Rashidah (2013) says the analysis

phase is the first phase of the study was to identify some aspects related to the target group. Target groups can provide information that is useful to develop a module that can meet the needs of users. During the process of design and development of modules, the findings of the needs analysis is analyzed and used to develop teaching and learning activities. In this research, needs analysis was conducted after the issues or problems identified and information on the specifications obtained from the teacher module. According to Richey and Klein (2007) is a needs analysis to determine the product specifications. Thus, the needs analysis is very important in determining the success of a product suitable for teachers so that existing problems can be solved for teaching more effective and attractive. The findings and recommendations in the requirements analysis phase is used in the design phase and construction of modules (DeWitt 2010). This needs analysis phase provides vital information to be used in the design phase and construction of the next module (Gagne et al., 2005). Information needs analysis used to determine the optimal content of instruction and instructional delivery methods (Richey & Klein 2007).

STATEMENT OF PROBLEM

Art and design education in the 21st century generation has been much said and written a lot of material to review the education that is able to meet the expectations and needs of education today and the future. The average education experts agree that teaching and learning methods should be changed in accordance with the development of increasingly advanced technology. Conventional teaching methods and shaped solely monodisplin less successfully attract students instead requires a more dynamic and creative, with a multi-disciplinary teaching content that is relevant to the current situation. This is in line with the Blueprint 2013-2025 which requires students to master the field of choice, able to tap, connect and apply the knowledge learned, and able to appreciate art, culture, and science, technology, engineering and mathematics (STEM). But the fact that this situation does not happen in traditional learning process in our country, teachers only using monodisiplin approach. In previous studies, which found that teachers are mostly unaware, uninformed and unskilled in using this multidisciplinary approach or combination whenever instruction with other subjects are among the factors contributing to learning monodisiplin. This is in line with Iberahim (2000) also stated that teachers are less experienced, knowledgeable and have not acquired subject Visual Arts Education. Monodisiplin learning will be faced with a variety of disadvantages, including by Soffie (2013), students are not able to develop visual perception and imagination in producing innovative and creative work, students become unholistic.

In terms of research, studies in STEM integration approach at school level is still lacking. This is acknowledged in studies Jayarajah, Saat, and Rauf (2014) who found that the integration of STEM studies in Malaysia concentrated in the higher education and less emphasis on the school level. That is not surprising because in universities and colleges, the Malaysian students are offered courses in engineering and related courses that other STEM fields. However, at school level, Engineering Design approach does not extend to all schools. It is hoped that a needs analysis conducted for the development of a learning module integrated 'STEM' by the

researchers that will be developed using a study design and development will help improve the practice of teaching the connection in Visual and make students more holistic and competitive in the current century education 21st.

RESEARCH OBJECTIVE

The objective of this study conducted by researchers needs for data integration module for generating STEM teaching and learning in visual art. Needs analysis carried out to identify the needs of the module before the module was developed and evaluated in the next phase (Saedah et al., 2013). Therefore, the objective needs analysis survey was conducted to obtain data on the needs of modules and module specifications to be developed. The objective of the study for requirements analysis phase is as follows:

- Identifying the appropriate module that visual art teachers needs to carry out to integrate the integration STEM approach with teaching and learning Visual Arts Education in elementary school

Based on the objectives of this study, this research is also carried out for answers to the following questions:

- What are needed to produce the corresponding module used by Visual Arts Education teachers to carry out the integration STEM approach with teaching and learning Visual Arts Education elementary school?

METHODOLOGY

This research uses a method of semi-structured interview to 10 teachers of Visual Art Education Ministry of Education (MOE) of different schools. Selection was done for the purpose of selecting respondents who can provide in-depth information. The respondents were selected based on criteria that teachers implement the Primary School Standard Curriculum (KSSR) and academic qualifications at degree level in the field of art education. For questions that can provide better information and satisfying, protocol piloted interview before the actual interview was taken into account. The researchers chose a respondent who has characteristics similar to the actual sample to be interviewed for suitability questions. After the interview process and collecting data in real studies conducted, researchers completed the re-transcribing and provide transcript was ready respondent to be revised. Having reviewed the transcript, were required to sign a confirmation form to confirm the information interview interview is true. Transcript of an interview which was approved analyzed using the index. Transcript indexing process carried out by placing its own code labels on each respondent. Next interview data also indicates, subcategories and analyzed using a coding method for generating a theme (Miles & Huberman 2014).

FINDINGS

Results from the analysis of the interview data, research findings out of ten respondents gave three themes as follows:

Theme 1: STEM approach is suitable for the development of teaching and learning activities among primary school students

Eight respondents agreed with the use of STEM integration approach when asked about the use of this approach on the subjects of Visual Art. Seven respondents said, STEM integration approach bring excitement to the students to learn. While six respondents believes pupils are more motivated and able to learn better with the combination whenever approach. For example respondent 3 (R3) says that:

R3: *"I think this STEM approach is ideal. The pupils did like it when asked to do little different activity than usual. Usually they always study everything related about art only. They can learn better through STEM integration."*

While respondents 7 (R7) and respondent 9 (R9) said STEM integration approach will make students are more motivated to master the learning in intergrated STEM approach . For example responder 7 (R7) adds that:

R7: *"This approach is relaxed their students excited and want to conduct a science experiment. Students are more motivated and more happy with STEM learning activities through the integration like this."*

R9: *"Very convenient with children and I agree with this approach. Children of primary school should be taught through activities, hands on and do group activities and let them outside the classroom. Children are happy with this approach. They can master the learning more faster than if using chalk and talk approach. "*

Theme 2: Lessons from existing teachers do not focus on the integrated approaches of the other subjects.

When questioned about how the teachers to teach a visual arts education in schools, most teachers are not focused on the combination whenever approach. A total of five respondents said that they did not approach intergrated learning for the factor of time, materials, class control and lesson planning. Based on interviews found their way existing teaching approach rarely do intergrated learning in school. Four respondents stated that difficulties in obtaining materials and teaching aids in accordance with the concept of intergrated teaching and learning other subjects. This is plaited join complicate the implementation approach. While two respondents expressed the time factor becomes a constraint for implementing this approach. One respondent said integrated learning approach requires teachers to conduct careful planning and orderly. For example, according to respondents 5 (R5) Material, time and control causes him rarely use this approach in schools.

R5: *"I made it, but seldom. The material is not enough, difficult to find the suitable one. Time was not enough, no time to do the activities, the children are difficult to control in group activities."*

While 10 respondents (R10) say the time factor and cause most of the teachers do not plan to implement this approach.

R10: *"I did it, but most teachers do not use this approach because there is not enough time. They have a problem with that plan because not enough time."*

Theme 3: Teachers need resources and effective material for a multidisciplinary approach or easy integration of content teaching Art Education

All ten respondents said they need resources and teaching materials appropriate to join intergrated STEM approach to learning and teaching Visual Arts Education. They propose a module that explains how to teach the subjects Visual Art Education with STEM integration approach. Among the suggestions are the steps of the project, methods, techniques, provision the appropriate time, the proposed activities and the proposed materials that are appropriate for the project. Six respondents suggested that this module details the steps of the project and explains how this implementation can be done.
Three respondents suggested teaching and learning activities that can stimulate students interest in STEM education. Two respondents suggested that this module contains a lesson plan. Three respondents suggested that there was provision for a flexible time and two others suggested that the student worksheet attached. For example, respondent 2 (R2), respondents 5 (R5) and respondents 6 (R6) said there should be a module that suggests how to approach Integrated STEM in teaching and learning for Visual Arts Education.

R2: *"Suggestions on how to do this teaching. Such as material preparation. I suggest that there are module slots teaching, example projects, measures of clear project."*

R5: *"Guidelines and recommendations of the project activities may help. Must be a lot of examples of pictures of projects already completed. The project should be a stimulating teaching and learning of STEM."*

R6: *"I suggest the modules comprising the simple steps and effective. There is a clear explanation of what, why and how teachers can make the appropriate teaching primary school children. There are many examples of lesson plans to help teachers teach. Materials to produce projects that use must be in accordance with the development of children. Nice and easy to find. "*

FINDINGS

Studies in needs analysis requires collection of information about the context and situation where the research done from teacher who is also a target of the user module. In this study researcher collecting information about current practices and needs of teachers so that the information obtained will help researcher produce a module that attempts to solve the existing problems of teachers. Results for needs analysis module integration in Visual Art Education and

STEM fair developed to help teachers make the combination whenever STEM teaching and learning in visual art better. The findings show that most teachers agreed with the importance of combining the intergrated approaches and benefits of this approach to pupils. However teachers found rarely used this approach in schools. In connection with this, the positive response of teachers does not mean they doing the intergrated approaches practice in schools. Studies Wen et al. (2011) found that most teachers do not adopt a student-centered learning but agree with this approach because they have been exposed to and taught with this philosophy in education. In the context of this study shows that most teachers do not doing intergrated approach in teaching even though they know the benefits of this approach to learning students. Factors such as lack of resources for teachers, lack of knowledge, planning and time constraints causing them rarely use this approach. To solve the problems of teachers, materials in the form of modules need to be developed to enhance knowledge and skills in planning and conducting intergrated STEM with teaching and learning Visual Arts Education approaches to be more efficient and based on the needs of pupils. Branch (2009) says that good teaching material is a material that can sharpen a person's ability to improve their knowledge and skills.

Based on a needs analysis, process module development should take into account aspects that can improve the knowledge and skills of teachers. The findings also showed that teachers need resources and teaching materials in the form of a module which details how teaching and learning integrated approaches. This instructional guide should contain teaching and learning activities in STEM intergrated which is full of fun and take into account the cognitive and psychomotor abilities of students. In summary module developed should take into account the recommendations and specifications such as easy to understand, explain how to prepare materials for the project and describe the procedure to carry out the project. Teachers also suggested that this module contains an example of the daily lesson plan and the proposed project activities.

The study analyzes the essential requirements in obtaining information about the content and the specifications of the modules to be developed. The analysis showed that integration module STEM teaching and learning should be developed in Visual Arts Education. In the Module development, the researcher should take into account the problems existing among the teachers and teachers needs to be generated module that suitable for them. According to Gagne et al. (2005), in the analysis phase of the cause of the problem and the solution of problems related to teaching problems identified. So, once completed needs analysis process, researchers should be able to determine the lessons that can solve problems and propose strategies based on empirical data so that teaching can be done well (Branch 2009). The findings of this needs analysis will be used as a guide researchers to design and develop modules in the next phase of development modules. The findings indicate the need analysis module STEM integration in teaching and learning of Education Visual Arts potentially be developed for primary school teachers.

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