A COLLABORATIVE SCIENTIFIC REASONING MODEL FOR TEACHING GEOGRAPHY IN THE MALAYSIAN SECONDARY SCHOOLS

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Abstract
Malaysian educational programme has seen many alterations to address the need to keep pace with the transformation that is taking place nationally and globally. Like many countries in the world, we believe that in order to progress, we have to use science and technology. This paper aims to review the current challenges face the secondary school students in Malaysia, especially in teaching geography. The teaching issues were mostly formulated towards the use of the suitable scientific reasoning model and other learning strategies for teaching scientific subjects. This paper also reviewed a number of studies conducted to provide alternative solutions for enhancing the learning curriculum in different schools. After that, we proposed a new model for teaching geography in the Malaysian secondary schools call collaborative scientific reasoning model based on the principles of reasoning.

Key Words: Scientific reasoning, learning strategies, collaboration learning, Malaysia secondary school.

INTRODUCTION

Scientific Reasoning (SR) has been defined as the way of involving the thinking skills that usually found in inquiry, experimentation, evidence evaluation, inference and argumentation that are done in the service of conceptual change or scientific understanding (Zimmerman, 2005). Traditionally, teaching strategies of Geography especially in the classroom are primarily teacher directed such as in the case of lectures (Lee, 1993; Ten Dam & Volman, 2004). While this is still undoubtedly the most effective approach in disseminating a large amount of information (Kemp, Goodchild, & Dodson, 1992), it also requires the students to be passive learners, which involves primarily listening to lectures (Brazen & Clark, 2005). A passive learning environment presents a great challenge in capturing and maintaining interest from elementary students who characteristically possess a short attention span.

Another major challenge in passive learning is in securing the students’ understanding and retention of lessons learned in school (Gersten, Fuchs, Williams, & Baker, 2001). The mind’s ability to use knowledge gained from school lessons is effectively enhanced by the desire to learn, readiness, active involvement, relevance, feedback, complexity, repetition, emotions, physiologic events and psychomotor ability (Kozier & Erb, 2004). Clearly, expecting the students to be mere passive participants when teaching, fails to incorporate the other factors that enhance learning. A challenging and meaningful learning experience ensures engagement and participation of the students in the learning process by actively participating in learning activities (Spitzer & Roddick, 2007). Many new visualization techniques, technologies and practices in mapping have emerged that extend far beyond conventional cartography (Andrienko, Andrienko, Dykes, Fabrikant, & Wachowicz, 2008). This field has come to be known as geovisualization. Geovisualization includes cartography, but has developed to include other geographic visualization techniques and tools. Examples of these tools include 2D maps, GPS, 3D GIS, mobile GIS, Google Earth, VR and AR (Dodge, McDerby, & Turner, 2008; Peuquet & Kraak, 2002).
ISSUES IN TEACHING GEOGRAPHY

Most students find learning new things to be a difficult and tedious task. Some students may depend on their visual ability to absorb information others may find vocal tutoring more suitable some will need both (Zaman, Sembok, Yusoff, & Abu Bakar, 2000). Earth science teachers have a multitude of teaching methods, curricular tools and learning modalities to choose from when designing curriculum. These include verbal, oral, and visual presentations, involving static, dynamic or interactive modalities. Examples of verbal message delivery include lectures, reading assignments, equations, and PowerPoint slides narrated by the instructor. Meanwhile, The oral presentations usually accompany and complement verbal or visual aids, the most common being a lecture style delivery of information or verbal dissemination of instructions.

In Malaysian schools, teaching Geography is determined as a different task which needs to provide the appropriate materials such as visual presentations include models, photographs, aerial images, remotely sensed images, drawings, videos, maps, data-based visualizations, graphs, computer animations and computer models. For these schools, it’s important to identify the effectiveness of these tools and method on the students learning performance. However, the secondary school students still facing some issues towards the way of planning and presenting the educational curriculum especially for the Geography subject, which mostly consists on the lack of using technology, learning strategies, motivational tools, etc… that would help to increase the students’ performance then their achievement to learn Geography.

Such issues were highlighted by Osman, Halim and Meerah (2006), they introduced the current teaching situation in the Malaysian secondary school, which found to be does not only call for the need to equip teachers with the essential knowledge and skills, but includes other communication issues pertaining to the quality of teaching and learning science.

While Akinnuoye and Abd (2011) described the difficulties of teaching the geography subject for the secondary school students due to the lack of or insufficient facilities and encouraging environment, in the way impacting its performance unconstructively.

RELATED RESEARCHES

Study was conducted by Buang and Halim (2007) to indicate the effectiveness of the current learning curriculum in the Malaysian schools and how technological development is involved. They identified the needs of developing a science and technology curriculum based on entrepreneurial science thinking skills based on reviewing of literature and interview study with various groups. They found that the teachers from different schools in Malaysia has agreed on the need of inculcating such thinking skills and provide insights on ways of developing and implementing the curriculum. Based on that, they concluded that such result gives a strong basis for developing an alternative science and technology curriculum that deals with technology, entrepreneurial and science process skills.

Another study by Jeeraporn, Adisak and Penkae (2012) addressed the needs of adapting a new teaching model to enhance the student learning skills based on the utilization of new technology. However, they also aimed to develop science curriculum on environmental conservation, with an emphasis on the promotion of critical thinking skills for Mathayomsuksa 1 students. As well, they intends to evaluate the students’ learning achievement outcomes, basic science process skills, environmental conservation attitude and critical thinking skills before and after the application of this developed curriculum. And finally, they measure the differences from the obtained scores in the areas of students’ learning achievement outcomes, basic science process skills, environmental conservation attitude and critical thinking skills. They administrated a questionnaire among 30 Mathayomsuksa 1 students, from Mathayomsuksa 1/3, Ban Wang Pikul school, Sam Pan district, Petchaboon province. The finding revealed that the developed science curriculum on environmental conservation, with an emphasis on the promotion of critical thinking skills for Mathayomsuksa 1 students had the effectiveness index level.
Meanwhile, Reading and Reid (2004) described the importance of addressing the curriculum needs for reflecting the educational trends among students. They developed a new model for an integrated approach to curriculum development where consideration of variation is used as the linking thread. They introduced the process of the proposed model to a tertiary introductory service statistics courses, which developed from students’ responses to “minute papers” and typical responses in the various levels of the hierarchy are discussed. They found that the model has implications for teachers of statistics, in the development of curriculum, and for researchers in the growing field of students’ understanding of statistics.

Finally, Zimmerman (2005) provide an integrative review of research that has been conducted on the development of children’s scientific reasoning. He conduces his study on the thinking and reasoning skills that support the formation and modification of concepts and theories about the natural and social world. Furthermore, he discussed several empirical findings using the SDDS model as an organizing framework. He also estimated that current researchers must put in consideration the reasoning principles while developing a definite thinking model for the dual purposes of understanding cognitive development and the subsequent application of findings to formal and informal educational settings.

**PROPOSED MODEL**

To be termed scientific, a method of inquiry must be based on gathering observable, empirical and measurable evidence subject to specific principles of reasoning (Bauer, 1992). Based Bauer recommendations, we propose a scientific reasoning model that offers collaboration for the teaching geography subject among the secondary students in Malaysia as shown in Figure 1. The model consists on the following:

i) **Instructional Resources:** this part includes the learning materials, analysis, curriculum selection, ICT resources, and other training activities. Usually, teachers use lesson plans to guide daily instruction; multiple lesson plans can make up a chapter or unit of instruction if those lesson plans are designed to be used in sequence.

ii) **Engage students into small groups:** this part consists on obtaining a better engagement, motivation, and learning manner among the secondary students while teaching Geography.

iii) **Offer additional resources:** This category includes materials the textbooks, units, other learning modules, collaborative lesson plans, and corporate image for teaching geography. Curriculum can be in the form of textbooks, stand-alone units or modules, or other packaged materials designed for use in formal or informal educational settings.

iv) **Competitive advantages:** performance and achievement along with the students’ attitude will be gained as an outcome.
Figure 1: A Collaborative Scientific Reasoning model for Teaching Geography in the Malaysian Secondary Schools
EXPECTED BENEFITS

The enhanced versions of learning material provide the students with a more friendly, interactive and motivating tools for that purpose. Thus, secondary school students in Malaysia will have no problems with their learning process and the process will be more efficient, effectiveness, cost-effectiveness and user friendly. In addition, the propose model will offer an interactive and motivating teaching flow of Geography in the way that offers:
- Suitability to the secondary school teachers;
- Enhance student learning performance;
- Adapt additional learning resources;
- Enable teachers to control learner achievement while learning geography.

CONCLUSION

This paper demonstrated the current issues and challenges faces by the Malaysian secondary school students in the term of teaching geography and adapts technology into the learning process. Several studies were addressed in terms of the current curriculum used by these schools in teaching students. Finally, a collaborative reasoning model has proposed based on the recommendations summarized from the previous researches, as well, an expected benefits has been reported as the outcome of the proposed model.

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