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The Effectiveness of Virtual Learning to Enhance Higher Order Thinking Skills in Year 5 Students

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Abstract

In the 21st century, the education process should emphasize on learning to improve Higher-Order Thinking Skills (HOTS), providing rich and authentic experiences for inquiring, challenging, exploring, developing in-depth knowledge and understanding, and producing imaginative and innovative people. Based on preliminary studies performed over the past five years, information on the problems and needs of primary science education were gathered. The issue found is lack of teaching materials that facilitate the development of the higher-order thinking skills in students, which allow students to learn science independently hence improving their knowledge. This paper will look into the effectiveness of virtual learning to enhance HOTS among the students. Virtual learning, in many ways, have beneficial impacts on learners and communities. To improve the standard of learning according to teachers' qualifications, it is currently essential to create an e-module virtual learning to improve primary school students' higher order thinking skills. This development is based on the view that e-modules are self-contained and self-instructed and can be used in independent learning.

Keywords: E-Module, Primary School Education, Virtual Learning, Higher-Order Thinking Skill.

Introduction

It is now a very daunting challenge in the field of education to face the currents of globalization. On the other hand, globalization demands that educational institutions develop a curriculum that can respond to its challenges. The advancement of information technology is one of the issues of globalization in the field of education. Different aspects of life, including the learning process, are influenced by these developments in the advancement of information and communication technology (ICT). Hence the educational world needs to take advantage on these technological advances now. Education in science consists of theoretical and practical subjects. In order for it to be studied more efficiently, this subject must therefore be presented creatively.

To shape intelligent, successful, and professional generation of the future, science is essential. Therefore, science education should not be seen as passing the exam alone but as

appreciating and practising what is taught. Teachers must be knowledgeable and imaginative in choosing and designing appropriate teaching and learning methods and attracting students to pursue them.

The Importance of Science Education

Scientific and technological advancements have always been associated with developed countries. Part of this progress is due to their continuous assessment and understanding of the science curriculum development. Their aim is to raise the level of mastery in science and mathematics in all age groups, from pre-school to those in higher education. (Razali et al., 2020)

Past researches have placed a great deal of emphasis on the importance of science for employment, especially its global significance (Gottfried et al., 2016), in improving the socio-economic status of the nation (Paige, Zeegers, Llyod, & Roetman, 2016), ensuring the stability of technology (Onyekuru, 2015) and improving the standard of science curriculum development (Fensham, 2016). Nevertheless, several factors must be recognized to produce scientifically literate students that are interested in science to create a workforce of quality professionals. Factors that affect students' interest in science must also be analyzed in terms of their learning criteria.

Issues and Challenges In Science Education

In the world of education, the latest technological advances can create changes. The advancement of multimedia and the internet has opened up more opportunities for teachers and students to gain knowledge and provide facilities to easily and quickly access information and teaching and learning materials (T&L) online (Hazenah, 2014). The obsolete teacher teaching method (Zainudin et al., 2015) and the fact-memorizing phenomenon, however, render many students unable to master High-Level Cognitive Skills (Mat & Yusoff, 2019). As a consequence, mastery of higher-order thinking skills among students is still at low.

In this learning process, teaching materials are required for students to be more inspired to learn and to be educated independently to achieve competence (L. Darling-Hammond et al., 2019). To provide meaningful experiences for students, teachers must create teaching resources that are not based just from one source. This scenario shows a significant need for one such guide as a learning module to concentrate on applying higher-order thinking skills beginning at the primary school level. This is due to many elementary school students whom are still poor in grasping these higher-order thinking skills. To apply higher-order thinking abilities to students, useful lessons and methods should be used by teachers.

Teaching Approach

There are many factors related to student’s success and interest in science subjects. They range from contextual, emotional, and motivational factors, the topics learned, workload, student assignments, personal orientation and skills, teaching design, materials for successful teaching, teacher’s effectiveness, teaching skills, motivation, and student personality, as well as the number of students in a class (Abbasi et al., 2018; Ale, 1989; Armstrong, 2009; Bietenbeck, 2011; Ehrenberg, Brewer, Gamoran, & Willms, 2001; Harris & Sass, 2008; Kirillova et al., 2017; Kwon, 2016; Rus, Radu & Vanvu, 2016; Say & Bag, 2017; Shcherbakov et al., 2017; Wang & Hsieh, 2015). Therefore the teaching approach chosen should consider the students'

inclinations, abilities, and skills based on age and their capacity to think. Suitable teaching methods will help students to follow the lesson as well as acquiring knowledge, skills and cultivating a deep interest in students (Mat & Yusoff, 2019)

On the other hand, the teaching and learning aspect of science in primary schools needs to be improved by improving the students HOTS and learning skills. Without a demand, efforts to elevate the standard of education in this diverse and demanding 21st century become non-competitive. In building 21st-century skills, there are three key frameworks: 1) learning and innovation skills, 2) life and career skills, and 3) information, media, and technology skills (Scott, 2017). The learning and innovation skills consist of communication, collaboration, critical thinking and creativity skills (4CS). Life and career skills is all about versatility, effort and personality, social and cross-cultural capacity, performance and efficiency, leadership, and accountability. Lastly, information, media and technology skills consist of relevant data and mass communication.

Therefore, because of the different ways that students learn, diversity is needed in the teachers' teaching methods. Learners aspire to blend new knowledge with existing knowledge. The changing complexities in technologically savvy 21st-century students have caused them to lose interest in traditional teaching and learning methods. To keep students engaged, instructional programs and teaching techniques require creative methods (Zaidi et al., 2018). This includes the adoption of new forms of lesson delivery to make learning more engaging, increase the content retention rate and enhance the comprehension of the content taught (Gulley & Jackson, 2016).

Researchers have recently shown a growing interest in the use of YouTube videos in teaching and learning. Research by Jackman and Roberts (2014), for instance, has demonstrated that the use of YouTube videos in psychology classes has a beneficial impact on concepts comprehension in students. Likewise, Zaidi et al. (2018) investigated the use of YouTube in Malaysia's ESL classrooms and demonstrated that the videos have helped the students complete their coursework. In another study, Green et al (2018) explained how the use of training videos in health management in the United States contributed to an increase in communication skills and teamwork for students.

On February 15, 2015, YouTube a subsidiary of Google has created the YouTube Kids app (Burroughs, 2017). In particular, YouTube Kids acts as a safe platform where parents can monitor the channels that their children watch or subscribe to ('YouTube Kids App', 2018). This software is very user-friendly and can be downloaded through Google Play and Apple iOS Store Apps ("YouTube Kids App", 2018) for iOS and Android smartphones or tablets. Since the app is intended for children's use, it provides several basic features, such as allowing parents to choose from various channels appropriate for children where parents can individually pick each channel or subject. Besides, a child's own personal accounts can only be created if the child is eight years old or older ("YouTube Kids App", 2018). Finally, parents can block or report inappropriate channels or video content ("YouTube Kids App", 2018). Therefore, this research will concentrate on the teaching and learning factors that virtual learning methods can achieve competitive advantage against conventional methods of learning.

Virtual Learning Environment

The chalk and talk approach works in conventional education where teachers use whiteboards and pen markers when offering knowledge (So, 2014). This method only allows one-way contact, where when prompted (Shah & Patel, 2017), students are encouraged to express their opinion or answer questions. It is often required that students copy what is written on the whiteboard. This chalk and talk approach is less critical to the needs of students today (Jabeen & Ghani, 2015). Pupils are more active if exercises or games are involved in their learning process. It is because learning only happens when students understand what is taught.

Besides, teaching approach applied in teaching and learning is the critical factor affecting students' perception towards science (Mata,Monteiro & Peixoto, 2012). Yet, some teachers still practice these conventional teaching and learning methods, which are teacher-centred learning. These methods might demotivate learners to learn. Thus, Frog VLE was launched by the Malaysian government as a forum to boost the understanding and awareness of students.

A cloud-based learning platform that emulates conventional face-to-face teaching and learning is known as virtual learning environment (VLE). Teaching and learning were more formal in the early days in the classrooms, but learning for students has changed with the rapid growth of technology (Rheingold, 2004). The virtual learning experience is seen as an opportunity to encourage learners to study science in the classroom (Yang & Wang, 2012). For example, the resources used in learning plays a crucial role in enhancing student engagement and motivating them to develop their practical activities (Oliver & Trigwell, 2005). Depending on the instructors' creativity, the case of web-based learning activities will vary, such as the experiment's on-screen presentation, online quizzes, journals, video conferencing, and much more. Cognitive abilities, such as critical thinking and exciting learning, are built in the interactive learning environment to support web-based learning tools.

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