CORPORATE SOCIAL RESPONSIBILITY (CSR) TOWARDS EDUCATION: THE APPLICATION AND POSSIBILITY OF 3D HOLOGRAM TO ENHANCE COGNITIVE SKILLS OF PRIMARY SCHOOL LEARNERS

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ABSTRACT

The integration of technology in education offers a platform and opportunity for companies to support that benefit both in academic and business communities. Generally, companies engage in corporate social responsibility (CSR) model in education sector will improve their reputation, increased exposure and goodwill locally. Apart from that, the participation of organization to support the integration of technology can enhance and supplement classroom learning to provide quality education. Digital learning technologies had been introduced for several decades with proven advantages, to motivate and engage students in their learning skills. A comprehensive analysis on the case study of three-dimensional hologram (3DH) as digital learning tools is carried out, and provides an overview possibility theory according to the uses of 3DH, to enhance cognitive skills of learning for primary school children. A meta-analysis and observation approaches are used in this study, to analyze qualitatively and summarized for the application of 3DH in teaching and learning process. Overall, this study shows that, 3DH technology has a positive potential and able to catch the children' attention in learning as well as reduce their cognitive load. This paper is valuable for integration 3DH technology in education, and the limitations are addressed as implicit recommendations for future research.

Keywords: Digital learning; Hologram; Education; Cognitive skills

1. INTRODUCTION

With the rapid development of technology in every sector, education plays a crucial role in strengthening and building the nation. The implementation new teaching methodology in education offers a platform and opportunity for companies to support that benefit both in academic and business communities. In today's changing environment, corporations have increasingly come to realize that the need of engaging in corporate social responsibility (CSR) model to achieve successful business (Singh, 2016). Organization is looking to contribute in education either for enhancing their corporate image or to be in competition. On the other hand, integration of technology in education can enhance and supplement classroom learning as an important tool in working to provide quality education for

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all. Therefore, the participation of organization to support the integration of technology in education has given a new way to benefits both parties of business and education.

In education, teaching and learning are formally undertaken in a school context as complementary activities. Educational activities can be categorized into the domains of cognitive, affective and psychomotor. However, the measurement of children achievement is according to their knowledge, understanding and thinking skills, which is directed measure from cognitive behaviors (Eshun & Mensah, 2013). Based on the research findings, cognitive skill weakness is the main cause to the difficulties of learning and reading (LearningRx, 2005). In order to enhance the development of children's cognitive skills, the adoption of digital learning technologies in education has already proven benefits to learners and educators. In comparison with the traditional physical interface, three-dimensional hologram (3DH) can provide users more on-the-spot experience and integrate with real environment. This technology allows children to learn from observing knowledge and information in their social environments, and increase their cognitive skills of learning. While there are only few studies of 3DH have been conducted in the education field. Hence, 3DH is a new technology that has great potential for application in education, and enhances children learning process.

2.   LITERATURE REVIEW

2.1.   *Children Cognitive Skill in Learning Process*

Conceptually, cognitive skills are the mental process of our brains use to take in information, understand, and remember. According to the theory of Bloom's Taxonomy, there are six major categories of cognitive processes, starting from the simplest to the most complex as shown in Figure 1. There are remember, understand, apply, analyze, evaluate and create (Anderson et al., 2001).

Figure 1: Cognitive Domain of Bloom's Taxonomy

Source: https://study.com/academy/answer/what-is-bloom-s-taxonomy-of-cognitive-domain.html
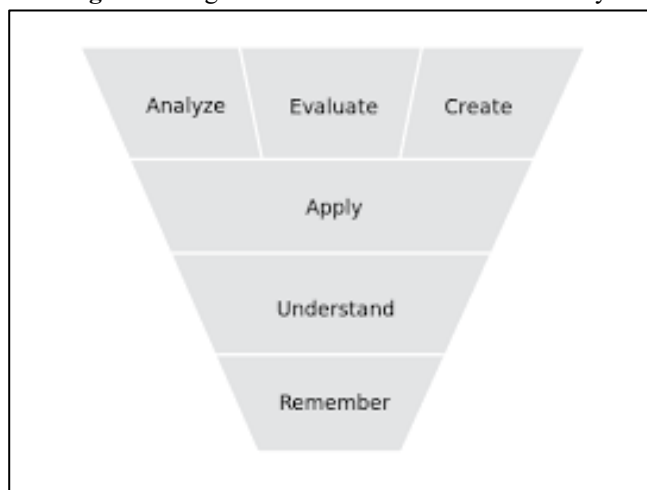
Skills in the cognitive domain describe the way of people to focus, think, problem solved and provides us the capacity to learn. It is the process involves recognizing basic concept, understanding ideas, use prior knowledge to solve problems, making inferences, building structure and validity the ideas. Cognitive behaviors is directly influence the children's achievement. In order to enhance the children cognitive skill in learning, capturing their curiosity play a vital role as the starting point in their learning process (Arnone et al., 2011). This is because curiosity is an elementary form of interest, as children learn best when they are interested and engaged.

Apart from that, visualization of information is important for the development of attention skills in children to understand the lessons (Kirkorian et al., 2008). In order to explain a difficult concept, text, charts and diagrams, visualization of information are well suited to convert complicated information to simpler form. It allows the children to observe and imaging the overall content, make them easier to remember and retrieve information learnt in the class. This is fundamental stage for the children to enhance their cognitive skills within the learning process.

2.2.   *Concept of 3d Hologram (3DH)*

Hologram is a visualization tool that can be referred as three-dimensional image (Barkhaya & Halim, 2016) and produced by holographic projection (Ahmad, 2014), as shown in Figure 2.

Figure 2: Concept of Teaching and Presentation Using 3D Holograms in School

Source: https://www.dreamstime.com/stock-illustration-innovation-education-elementary-schoollearning-technology-peo ple-concept-group-kids-looking-to-earth-hologram-space-image89516751

Reflection, transmission, and illusion holograms are three types of famous hologram commonly used. Reflection holograms are made with two beams approaching the holographic plate film from opposite side. On the other hand, transmission hologram is made with both the object and the reference waves approaching the film from the same side (Singh, 2015). Apart from that, illusion holograms works on the principle of Pepper's Ghost, in which created through angled mirrors, but the effect is not generated by using holography techniques (Krakovsky, 2016). Generally, illusion hologram creates 3D like illusion for the viewer and makes an image or video appear as if it is in mid-air. As paper

quotes, 3D hologram technologies recognized as effective visualization tools in the field of education (Upadhye, 2013). Aside from the obvious benefit of it being engaging, 3DH technology also improves children's cognitive learning skill and their concentration abilities. Hologram provides superior visual capabilities of information that is either not present or difficult to process in the textbook handouts.

2.3. *Integration of Technology, Teaching and Learning*

Integration can be defined as completeness and wholeness or including technology in the teaching and learning process by making basic components come together and eliminating artificial differences (Misirli, 2016). As Randall and Richard (2013) noted, technology integration is an effective implementation of educational technology to accomplish intended learning outcomes. It helps students to accomplish specified learning goals, as it can be any tool, piece of equipment, device, electronic or mechanical. These teaching strategies make used of digital hardware and software as an instructional tool, to help new learners develop mental pictures of cognitive frameworks (Ausubel, 1968). The benefits of technology integration inspire positive changes in teaching methods that facilitates the students' learning and boosts their capacity, productivity, and performance. For instance, the integration of new technology 3D hologram in education has given a new impetus to this thinking on the reformed systems of new education 4.0. As pointed out by a Professor in the Department of Mechanical Engineering, University of Malaya, education 4.0 is suggested to affect all the domains included the cognitive, affective and psychomotor in the Bloom's model (NewStraitsTimes, 2018). Therefore, integration 3D hologram technology into education offers a potential to create synergy and correlation between the current technological revolution of Industry 4.0 and the reformed systems of new education 4.0 framework.

2.4. *Corporate Social Responsibility (CSR)*

Corporate social responsibility (CSR) refers to a corporation's initiatives to assess and take responsibility for the company's effects on environmental and social wellbeing (Deshmukh, 2017). Kadlubek (2015) described CSR is the business management concepts, which companies are not only profit oriented but also take into account social and ecological interests. Holme and Watts (2000) also defined CSR it is a good marketing strapline and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large. Businesses that ignore corporate social responsibility run a risk to their bottom line and their brand. Having a bad reputation socially and environmentally can create serious negative effects on the overall profitability and success of a company, as nowadays consumers and other companies are likely to shun firms that develop unethical reputations.

In the present society the public education sector is the most entitled rewarding effort, which gives new opportunities for companies to get involved as a positive contribution to society. Supporting education will build positive reputation and goodwill among consumers, employees and other stakeholders (Thirumuru & Thirukkovela, 2015). More importantly, companies are looking to contribute in education to develop their brand recognition, whether to increase consumer loyalty, boost sales, or establish the company as an industry leader. Hence, the integration of 3D hologram technology in education offers a platform and opportunity for companies to support that benefit both in academic and in the business communities. Companies engage in CSR model in education sector will improve their reputation, increased exposure and goodwill locally. In the meantime, it also

improves the quality of education, as well as enhances the student experience of teaching and learning in schools. Furthermore, supporting integration of technology in education can transform our country to be globally competitive and meet the needs of education 4.0. The Ministry of Higher Education of Malaysia is forging ahead by revamping the education system in such a way as to create as much synergy and correlation as possible between the current technological revolution of Industry (IR) 4.0 (Haseeb et al., 2018).

3. METHODOLOGY AND ANALYSIS

3.1. Meta-Analysis

Meta-analysis is a statistical approach of combining the results from similar studies to provide an overall quantitative synthesis. The selected published papers are from the years of 2006 until 2016. This section is divided into two sub-sections in order to fulfill the aim of this study: (a) cognitive skill development in children learning process and (b) uses and advantages of 3DH application. All papers were analyzed qualitatively as presented in Table 1 and Table 2.

Table 1: Meta-Analysis of Cognitive Skill Development in Children Learning Process

Authors (year)	Country	Key Concept	Theory for Cognitive Skill Development
Kirkorian et al. (2008)	United States	Media Technology	Give better understanding and allows the children learn from real-life experiences.
Lieberman et al. (2009)	United States	Digital Media	Improve children's knowledge and skills in learning process.
Welsh et al. (2010)	United States	Working memory and Attention	Cognitive skills involve working memory and attention control growth in emergent literacy and numeracy skills that contribution to children's learning process.
Goswami (2010)	United States	Pretend play and the imagination	Pretend play and the imagination are important for cognitive development in the early years of education. It helps children gain a deeper understanding of the mind.
Arnone et al. (2011)	United States	Curiosity, Interest, and Engagement	Technology plays a role in stimulating curiosity, interest and sustaining purposeful engagement to increase student motivation during learning.
Guyton (2011)	United States	The role of play	A child's cognitive development involves thinking skills to process information and understands how the world works. The role of play can engage children and enhance in their learning.
Taylor & Parsons (2011)	United States	Student engagement	Children engagement is the key focus of enhancing all students' abilities to learn.

Table 2: Meta-Analysis of 3DH Application in the Field of Education

Authors (year)	Country	Application	Findings
Ghuloum (2010)	United Kingdom	As 'virtual teacher' appears to be in the classroom speak about themselves and/or explain something	3DHT reinforces the learning process, as well as potentially being an effective teaching tool for the future.
Mnaathr & Basha (2013)	Malaysia	Scientific topics of Planet in outer space (Sun, Moon, Our Planet) for children in primary schools	Raising the ability and cognition in children. Visual effects and model-based learning strengthen students' motivation to learn.
Sudeep (2013)	India	Engineering Education (Graphics and Drawing)	Interesting and better understanding that allows the students to view different angle of an object with 3DH. This is very needed in case of imagination study.
Pradeep et al. (2016)	Japan	Distance learning	3DHT as a good distance learning technology and have the potential provide an excellent platform for students to learn at their own pace and convenience.
Barkhaya & Halim (2016)	Malaysia	Visualization tools in teaching	Effective learning for attract children attention, motivate learners to remain engaged, increase student understanding and achievement through their cognitive development.
Pradeep et al. (2016)	Japan	Human bio-signal in a virtual environment	3DHT is applicable and strongly appreciated technology for virtual environments. The high cost of infrastructure and lack of expertise are the main barriers in implementing 3DHT classroom.
Okulu & Unver (2016)	Turkey	Astronomy concepts	3DHT arouse student's interest and curiosity which engage them to learn the topic. It also increase student understanding.

3.2.   *Observation on Adoption 3D hologram Technology in Primary School*

For the purposes of the study, observation on the adoption of 3D hologram technology in learning environment is extremely important. This research method is necessary to understand the impact and student sentiment towards the use of 3D hologram in their classroom. The participants were students

in primary one until primary three from SJK Chung Hua Kranji Bau. A three-minute 3D animation hologram was shown to participants with the topic of "The Plant Growth". The content was one of the science topic in their syllabus study, in which explaining the process of plant growth and the functions of plant parts.

Table 3: Observation on Adoption 3D hologram Technology in Primary School

| Observation on Adoption 3D hologram Technology in Primary School	
Three-minute 3D hologram animation with the topic of "The Plant Growth"	Pyramid hologram device were used in showing 3D animation
3D hologram animation was presented to students and they are very excited	Students pay attention on watching the animation until the end

Based on the observation, 3D hologram animation is able to grab student's interest and attract their attention. They are able to grasp the concepts of topics easily through the illustrations of 3D hologram animation when they are focus, get fun and understand. Surprisingly, the students request that they want to see more at the end of the animation. The teachers are also very excited to watch the animation. It is the first time for them to know and use of 3D hologram technology as a teaching tool in the classroom. Based on the interview, teachers are recommended that the integration of 3D hologram technology should be supported to use in the education system. It brings benefit to both teacher and students in teaching and learning process. The students seem very interest on this kind of learning method. Overall, both students and teachers give good and positive feedbacks of using 3D hologram animation in the classroom. The students also request that they want to have this kind of technology as a learning material in the school. Ideally, 3D hologram animation helps primary school students truly enjoy the process of learning. Plus, these technologies can help certain students learn

more effectively than traditional classroom methods by overcoming language barriers and accommodating visual learners.

4.   RESULT AND FINDINGS

The result of the meta-analysis and observation show that the use of 3D hologram technology can engage children and enhance in their learning process. Children engagement is the key focus in the development of cognitive skill. The ability to grab the children's curiosity and interest through media tools from the started points are important for them to deeply engage in their learning. Consequently, visualization of information is the next for the development of attention skills in children to understand the lessons. Children able to processes the information quickly, thinks logic and derives good solution for problem solving if they have a good understanding absorbing the knowledge. Therefore, a proposed concept of application 3D hologram in learning environment was derived from the study as shown in the Figure 3.

Figure 3: Proposed Concept of Application 3D Hologram in Learning Environment
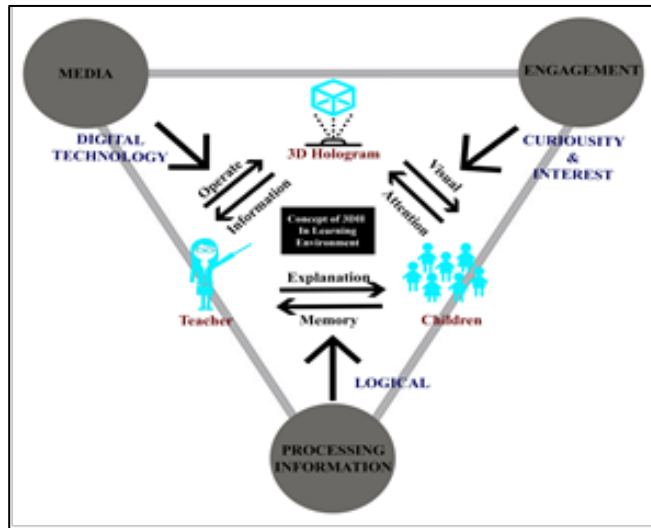
In Figure 3, the role of teacher, 3DH technology and children in learning environment are explained. Regarding to meta-analysis and observation, a basic overview and assumptions that hold together the whole concept of learning abilities are corresponding to the main focus that derived from 3 major elements which are related to each others. These elements are media, engagement and processing information. Teachers use 3DH technology as a teaching material to explain subject's information to the students in an easier way. In addition, 3DH makes the object to appear hanging up in the air. This interesting learning environment stimulating curiosity, interest and sustaining purposeful engagement can increase children's motivation during learning. In spite of engagement, students also allow to view the object in 360-degree from different perspectives via 3D images hologram. This enhances the students' understanding from various angles. 3DH technology is an effective learning for explaining a describing a complicated topic to an easier format to understand. The understanding

provides the children to think logically to process and remember the content of information. Indirectly, this will increase student achievement and develop cognitive skill among them. Thus, 3DH application shows the potential in education and gives a new impetus to educational transformation. It enables to improve cognitive skills towards primary school learners. However, there are some barriers are identified based on the previous research. According to the findings, 3DH needs high speed internet and involves high cost of installation. This cause most of the Institutions have difficulties to integrate 3DH in the classroom. Nevertheless, beside of being expensive tool, this technology can be used as a powerful tool for enhancing student achievement in teaching process.

5.   IMPLICATION AND DISSCUSSION

Based on the study, the better results are achieved by explore the main barriers that might prevent 3DHT being integrated into a learning environment. Future researchers can study more in enhancing the appearance visualization of 3D holograms that can increase children' understanding in their study. The proposed concept also can be experimented for future researcher of applying 3D hologram technology in the classroom, to study the efficiency of this technology in learning process. However, not all the subjects are applicable using 3DH technology as a teaching material. The use of vision of 3D holograms is suitable for the teaching on the concept of scientific topic, such as the phenomenon of astronomy, the structure and developmental process of human, animals and plants. Young children cannot understand and increase more scientific notions, because of the limitation in their thinking abilities (Fernbach & Sloman, 2009).

Even though the teachers and educational specialists are finding the adoption technology such as 3D hologram really beneficial, yet the usage rate of this technology is still new and very low across the globe. Educators are aware that many teachers still do not feel prepared to integrate technology into their classroom instruction. Currently, Malaysia embraces the dawning of the IR 4.0, hence the education is adapting to the changing demands of the Fourth Industrial Revolution. Therefore, government, private companies and school leaders are encourage introducing and supporting new technology integration in education system, as well as help establish a reliable technical environment, in order to achieve education 4.0 frameworks. These demands have also given way to new opportunities for businesses to support education, in which the companies will benefits in corporate social responsibility model. This is essential as emphasized that, the health of economy of a country is depends substantially on the level and quality of the education it provides to its workforce (Jhurree, 2005).

6.   CONCLUSION

In short, cognitive skill identify the efficiently of children understand new information and recall previously learned information. The present study indicates that 3DH technology shows the potential in enhancing cognitive skills among the children, and enables to promote comprehension in learning. The results of meta-analysis and observation are generally encouraging. The findings have proved that the advantages of 3DH usage are effective tools to improve students' learning outcomes and motivation. Based on the study, a concept of application 3D hologram in learning environment is proposed. The whole concept explained the role of teacher, 3DH technology and children in learning and holds 3 major elements of media, engagement and processing information together. 3DH technology is able to stimulate curiosity, interest and sustaining purposeful engagement for children,

by making the object to appear floating in free air. In the meantime, it also can make children easy to understand by using visual explanation from a difficult topic to a simpler form. This point of view do significantly enhance children' academic performances comparing to 2D images of traditional teaching tools. 3D hologram technology not only helps teacher and children more easily access learning content, it also gives parents a birds-eye view into exactly what their child is learning and how they are learning it.

Today, technology and other changes in society demand innovation in education. There is different from the passive "knowledge giving model" in the past situational learning system, 3D hologram technology is able to create the joyful learning environment that integrated into virtual situation to change knowledge effectively. This technology can enhance the learning motivation of learners and improve their learning effectiveness especially for lower primary school students. Enjoyment is important to produce meaningful learning for children in their first three years in school. Educationist Datuk N. Siva Subramaniam also support this and emphasized that, children should enjoy their first three years in school and provide holistic education for them. As reason, Malaysia Education Minister, Dr Maszlee Malik have implement the education system for primary one, two and three students will not have to sit for examinations. In this context, it is vitally important to appropriate integrate new 3D hologram technology to make the innovative learning effective for primary school learner. Used strategically, innovative teaching methods able to create joyful learning environment, ignite a passion for learning and provides students with the tools they need to succeed in the innovation economy.

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