ICT SUPPORTED COOPERATIVE LEARNING – TOWARDS ATTAINING 21ST CENTURY SKILLS

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ABSTRACT

Today's job market demands not only sound technical skills from their potential employees. When employers talk about graduates being job ready, they really mean that the graduates possess the skills of the 21st century, which include ability to seek information and critically analyze situations, ability to challenge ideas, being innovative and being able to communicate ideas. In realizing these needs, education systems have long since started to look into incorporating activities that could help in cultivating the above mentioned skills among students. Constructivism theory is seen as one of the applicable ones in designing teaching approach where learning activities are designed to include active process of information seeking and group work in order to shape students into developing the interpersonal skills required.

Keywords: Cooperative Learning, Constructivism, 21th Century Skills, ICT Skills.

1. INTRODUCTION

In addressing the current industry needs for job ready graduates, it is imperative that teaching and learning approaches offered at schools today facilitates the development of 21st century skills. Researchers refer to 21st century skills as certain core competencies students should be able to demonstrate in order to survive today's job market. Among the skills identified are knowledge building, digital literacy, problem-solving and innovation, self regulation, collaboration and skilled communication. (Trilling and Fadel, 2009; Cloud, 2010; Rotherham and Willingham, 2010). In addition to strong technical skills, employers are demanding for sound interpersonal skills in graduates (Kasim and Ali, 2010; Chang, 2004)

To cultivate such skills, pedagogy experts have seen cooperative teaching and learning to be suitable in providing the needed platform for students to equip themselves with the 21st century skills (Ewens, 2003; Kasim and Ali, 2010; Ramli, 2010). Studies have proven that students who are more involved during the teaching and learning process will demonstrate better understanding of what is being taught as well as benefit positively in their social and professional development

through this learning styles (Elby, 2000; Gillies and Boyle, 2009; Ramli, 2010; Zhu, Valcke and Schellen, 2009). This goes hand in hand with what has been preached through social constructivism theory where a strong bond is formed between social interaction and knowledge development (Nayir, Yildirim and Kostur, 2009, Ramli, 2010)

Taking cue from the constructivism theory, cooperative learning has been strategically identified to be an enabler to inculcate abilities for critical thinking and expressing opinions. Educators have long since incorporated activities such as collaborative projects to cultivate the culture of active teaching and learning in their classroom. (Ramli, 2010, Nayir, Yildirim and Kostur, 2009, Neo and Neo, 2000). In classrooms, teachers will usually engage the students in a social interaction through discussions, prompting students for their opinion and encouraging interactions through group works. Wresch, Arbaugh and Rebstock (2005) have asserted that the cooperative learning has put an end to the era of 'teacher-led' learning; and catapulted the new era of 'student-led' learning in the education system.

Educators have also been leveraging on the emergence of Information Technology to encourage more and more student led culture in their teaching and learning approach. This is made possible through the like of Web2.0 technology in which access to online collaboration facilities, information search tools and multimedia based material are in abundance. (Li, Liu, Li, Wang and Chen, 2011). Taking advantage of the generation Y's and the Netgenners' strong needs of being connected online (Tapscott, 2009), the Internet has fast become a popular educational tool among educators and learners (Ramli, 2012; Chai and Lim, 2011)

With this idea in mind, a study was conducted to determine the relationship between students development of 21st century skills with the implementation of cooperative learning. The research was conducted at Sains Alam Shah High School, Kuala Lumpur, a national high-performance, full boarding school which consists of students 16-17 years of age. The targeted audiences were the form four students undertaking subject Additional Mathematics. A pilot implementationwas conducted on a chosen class of 35 students for the duration of one academic year and observations were made focusing on students' progress in attaining the identified 21st century skills in the project objectives.

2. WHY MATHEMATICS

Mathematics was chosen as the domain for this research due to the fact that it has always been and will continue to be one of the 'must get through' subjects in order for students to demonstrate acceptable academic performance. (Levpušček and Zupančič, 2009). The vast majority of university degree programmes demand an above average high school performance in Mathematics as an entry requirement. Poor grade in the subject will result in difficulties in progressing to the next level of studies, especially when certain mathematics skills are required to be implemented as part of the syllabus.

Despite the realization that Mathematics being integral in ensuring a successful academic progress, the subject has remained among students as one of the most feared subjects. Many find Mathematics challenging and refer to it as one of the main obstacles in achieving good overall grades. Fear for the subject can lead to 'Mathematics anxiety' which is a common phenomenon

among school and university students today (Humphrey and Hourcade, 2010; De Wet, 2010, DeAbreu, 2012). Hence it is important to explore ways in which Mathematics can be innovatively delivered to overcome the said issues.

3. THE PROJECT

At the end of this project students are expected to demonstrate abilities that can contribute to the development of the 21st century skills. The skills areas to be focused in this project are knowledge building, digital literacy, problem-solving and innovation, self-regulation, collaboration and skilled communication. These choices of proficiencies have been adapted from the "Partners in Learning" initiative by Microsoft (MS Partners in Learning 2012 Global Forum Judging Form, 2012). Activities for this project are designed to suit the identified proficiencies as follows:

1. **Knowledge building and use of ICT for learning :** The project requires students to engage in research work in order to develop knowledge and skills on:
   a. The subject matter (Additional Mathematics) – students are to undertake a Peer-Teaching activity in which by working in a group, they are to deliver a teaching on a topic of their choice for the subject.
   b. The usage of ICT tools to develop learning contents – students are expected to include ICT elements in their teaching or development of the teaching materials.
2. **Problem solving and innovation:** Through the involvement in the project, it is expected that students will be facing problems from different perspectives such as the teamwork, technical IT knowledge and understanding the subject matter, and consequently will be forces to strategize ways to overcome the challenges. The students are also expected to demonstrate innovations in the approach taken.
3. **Self-regulation:** In adhering to the requirements of this projects, students will be trained to identify their strengths and weaknesses hence will learn to apply self-regulation in their handling of the project
4. **Collaboration:** This project is designed to be a group work of a minimum 4 members. The teacher is to ensure that the group is well balanced with a fair combination of students from different backgrounds and performance levels. The main part of this project will require the group to work together as a team to manage and deliver a peer teaching session to their classmates. The teaching material will come from their Additional Mathematics syllabus and they will be expected to demonstrate a use of IT as a teaching tool in their deliverables. It is also expected that students will embark on collaboration among the team members as well as external parties (e.g. IT experts, teachers and community members) in order to get the job done.
5. **Skilled communication:** Part of the project will necessitate effective communication skills as students will need to develop understanding of problems by seeking information from stakeholders, defending their work during the delivery sessions and also among the team members throughout the project lifetime.

This project is a double edged initiative; combining two strategically put-together elements that target the building of interpersonal and critical thinking abilities as well as strengthening technical knowledge among students. The two main elements are peer teaching which will be catering for the interpersonal skills requirement. The subject knowledge and IT skills on the other hand, will serve as a feeder to the technical skills requirement.

Referring to the National Training Laboratories' Learning Pyramid, which is a teaching framework adapted from Dale's Cone of Experience (1969), it has been established that through teaching others, students will be able to relate and understand more of a topic. The information retention rate is as high as 90%, so much higher than reading which is rated at 10%. (Walker, Cammy, Ellis, and Seibert, 2011) While there have been some doubts on the accuracy of the Learning Pyramid (Strauss, 2013; Lalley and Miller, 2007), the fact remains that students have been benefiting positively in their academic and social development through peer teaching. (Peets, Coderre, Wright, Jenkins, Burak, Leskosky, and McLaughlin, 2009; Asghar, 2010)

This project also takes into consideration students' interest in the use of ICT. Given its attractiveness to young people, it is inevitable that the ICT has become a platform for enjoyable social activities as well as a good 'test bed' for many 'tech savvy' students. (Ramli, 2012). ICT related activities have made a place in the teenagers' hobby lists and students have increasingly becoming adept at utilizing the many interesting features ICT has to offer. For this reason, the elements of ICT have been chosen as the main instruments in the project implementation.

Also considered in the design of this project, is students' inclination towards being involved only in tasks that are beneficial from their perspectives. This exam oriented culture is still quite prominent in the Malaysia academic system. (Manjula and Slethaug, 2010) In this case, this project seizes the opportunity which based on the fact that students will voluntarily put their efforts on work that will contribute to their academic performance or grades.

4. EVIDENCE OF LEARNING

The following observations have been made during and at the completion of the project:

1. **Knowledge building and use of ICT for learning**: A strong understanding and ability to share the technical knowledge with peers using creative utilization of ICT. The rubric used for this project substantially called for extensive use of the ICT tools in the delivery of the product as follows:

    i.   Students produced Gantt charts using Microsoft Project application in planning and keeping track of the project progress.

    ii.   Students updated their progress through their own blog

    iii. Students liaised with their teachers/other parties through the use of ICT i.e. emails, Skype

    iv.   Students extensively utilized Internet technology for their information seeking and research work as well as learning how to use the tools of their choice through various online tutorials

  v. Students have had exposure to the use of multimedia and other computer hardware in the development of their product as well as in the delivery of their presentation

  vi. Students developed substantial skills in the use of specific tools to develop the products required for this project. E.g. GSP, Autograph, Handygraph, Graphmatica, Kodu games etc.

2. **Problem solving and innovation:** Though the advantage is intangible, it has been observed that students have attained considerable level of maturity in solving issues and applying innovative approach in doing so. This is evident through the students' samples of problems and the work around that have been shared with the teachers during the course of the project

3. **Self-regulation:** Being in a full boarding school environment, it is important for the students to maintain good time management and self-regulatory ability. This is evident from their ability to successfully complete the project in timely manner. The teachers have not received any request for time extension.

4. **Collaboration:** The 100% participation rate which has been established through the project evaluation session has confirmed a good collaboration being attained as the result of this project. This is evident through the evaluation/interview session with project team, a marking scheme/rubric for each participant was prepared to establish the level of involvement from each team member

5. **Skilled communication:** All participants have demonstrated commendable communication skills in effective delivery of subject matter teaching as well as managing questions asked.

5. EVALUATION RESULT

  A quick interview was conducted with the students involved. Thirty five students were asked about their views and experience on the whole project. Table 1 shows the summary obtained, where it was evident that students have found the activities to be interesting though some did feel the pressure of getting their tasks delivered on time and the hassle of working in a group, the students agreed that they have come out of it with added values in terms of interpersonal skills and their knowledge on the syllabus.

Table- 1. Students Views on the Project

	Strongly Disagreed	Agreed	Strongly Agreed
Objectives : You understood the objectives behind this project	5%	20%	75%
Time Factor : The project demanded a lot of my time	-	74%	26%
Group work: It took quite sometimes to know and get used to the team members. Sometimes it can be challenging to handle different viewpoints and personalities.	-	66%	34%
Project Management : You needed to keep track of the project deliverable	-	-	100%
Subject Matter Knowledge: Your knowledge on the syllabus has been improved	-	-	100%
ICT Skills: You learnt to make use of new ICT tools	-	-	100%
Communication Skills: You have to put some efforts to polish your presentation and communication skill	-	71%	29%
Interpersonal Skills: It is not easy to get commitment from people	-	57%	43%

6. CHALLENGES

As the idea is rather new to the school, there have been some arising issues that will need further consideration in ensuring a successful implementation in the future. Students and teachers felt that the biggest constraint is time as this has not been part of the main deliverable be it in the subject syllabus or the school's programme. Being students in a full boarding school, their time and activities have been scheduled throughout the day. To work on extra tasks such as this will mean that the students have to sacrifice a few hours of their weekends to ensure the work is completed. Students may not be very receptive of the project as it adds on to their workload.

Another apparent problem is the ICT infrastructure at the school. The availability of ICT facilities may not be as sophisticated. It is quite challenging to dedicate an Internet enabled machine for every student at all time. In addition, the students have to also put in requests from time to time for tools that are new and not yet made available by the school. From the technical guidance's perspectives, teachers at school may not have a strong ICT knowledge to be able to guide the students with their project. For example in the current setup of Sains Alam Shah High School, there is only one ICT teacher and two IT technicians to cater for the whole population of 600 students and 75 staff members.

7. CONCLUSION

The "Peer Teaching through ICT" theme in this project offers the innovation element through sharing the teaching responsibility with the learners themselves. The pedagogy experts recognized the power of cooperative learning in providing a positive learning experience to the students. It is well understood that the traditional 'chalk and talk' approach alone is no longer sufficient in meeting the learning objectives. (Ramli, 2010). It is imperative that students are more involved

during the teaching and learning process to ensure understanding of what is being taught. Today's generation demands a lot more than the traditional teaching and learning approach. Students are so adept to the use of technology in their daily life; the conventional 'chalk and talk' method has rapidly lost its appeal to these youngsters.

The two prongs strategy in this project has proven to have successfully cultivated new technical and interpersonal skills among students.

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