

# **eProjBL FOR SPECIAL EDUCATION: A PRELIMINARY CASE STUDY IN A MALAYSIAN PRIMARY SCHOOL**

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## **Abstract**

The teaching and learning system for special education in Malaysia is being enhanced using ICT, specifically through the incorporation of edutainment elements. This is part of the education policy launched in year 2010, which emphasises the importance of inclusive education system. This paper presents the findings of a preliminary study for e-project based learning (eProjBL) in special education conducted in an urban primary school equipped with a computer lab. A total of twelve students consisting of six students with special needs and six prime students were involved in a one week experiment along with their two teachers. An eProjBL module was designed with features such as augmented reality, virtual reality, computer-based games, animation projects and other edutainment elements. The testing session was designed to explore students' and teachers' acceptance of the eProjBL module in special education. The observation was done through teacher evaluation via rubric, engagement form, post question for both teachers and students, spontaneous informal conversations and observations. The preliminary findings provide areas for further refinement of the eProjBL strategies for special education.

**Keywords:** Project-based Learning, ICT, Special Needs Learner, Augmented Reality, Game.

## **Introduction**

The Malaysian Government had launched the "Policy on ICT in Education Malaysia" on 12 October 2010 that focuses on groups with special needs (MOE, 2010; Yusof, Daniel, Low, & Aziz, 2011; Yusof, Daniel, Yun, & Aziz, 2010). Features of this policy include (MOE, 2010) :

For numbered lists ICT tools and devices such as screen readers and ‘embosses’ will be part of the ICT infrastructure provided to schools for students with special needs.

Teachers who are in charge of students with special needs will be trained and sensitized to issues specially-related to the use of ICT in teaching students with special needs.

All school teachers who are in charge of students with special needs trained to use ICT-enabled method during training and their source of professional development.

Web-based digital repositories should be deployed to address the lack of availability of resources for students with special needs.

In the year 2011, the government announced the 10th Malaysian Plan 2011-2015 highlighted the role of private sector on the usage of ICT in creative industries (EPU, 2010). In education prospect, creative industries influenced the private sector to advocate education content creatively (EPU, 2010; Yusof & Aziz, 2010). This is why the term ‘edutainment’ is relevant by producing educational content by adapting creative elements such as animation and multimedia (K. A. Aziz, Aziz, Avijit Paul, & Yusof, 2011; N. A. Aziz, Aziz, Paul, Yusof, & Noor, 2012; Mayer, 2003, 2009; Mayer & Moreno, 2002; White, 2003; Yusof & Aziz, 2010; Yusof, Daniel, et al., 2011; Yusof et al., 2010). Locally, the usage of ICT for learners with special needs is still in infant stage. In some areas, the implementation of ICT is critical in ensuring that the transformation gives a positive impact to the country. There are three types of special education programs that had been implemented in the Malaysian curriculum; 1) The Special Education School, 2) Integration of Special Education, and 3) Inclusive Programs (KDISC, 2010; MOE, 2008; UNESCO, 2009). Two of these programs were integrated with prime students in the same primary school which was defined by Malaysian education environment as inclusive education (UNESCO, 2009). According to these programs, there are Content, Confidence and Connect (3C) strategies explained by Ponter and Brown (2007) when creating the digital content strategies which had been discussed in the previous research by Yusof, Aziz, Daniel, Low, and Paul (2011).

#### *ICT supporting the Project-based Learning in Special Education*

Project-based learning is “...a model that organizes learning around projects” (Thomas, 2000, p. 1). The concept of project-based learning was already established by John Dewey’s “learning by doing” in early 1900s. Interestingly, Dewey’s findings also support Piaget’s constructivist theory, along with Vygotsky’s (Grant, 2012; Kurzel & Rath, 2007; Thomas, 2000). Constructivism is a theory of learning generated from idea and the knowledge is constructed based on intellectual activity (Liu & Chen, 2010; Matsuoka et al., 2004; Swan, 2005). The learner also becomes an active person that tries to fulfill the meaning (ATiT, 2004). According to Swan (2005), “all learning is an active process and all knowledge is unique to the individual, whether acquired from lecture and text or discovered through experience” (p.2).

Project-based learning is a student-centred activity which integrates collaboration in groups, where students apply several learning skills at one time within a provided time frame and also time for reflection of learning (ETD, 2006; Pearlman, 2009; Sun

Associates, 2003; Thomas, 2000; UNESCO Bangkok, 2009). Project-based learning also encourage students to understand the task and to complete it by answering abstract questions (ETD, 2006).

In Malaysia, the government acknowledges the benefits and the advantages of applying the innovative educational approach of project-based learning (PBL) by producing the handbook of project-based learning in the education field as a reference for all in the education sector. (ETD, 2006). The combination of project-based learning and ICT is relevant as the learner can easily understand the concepts taught in the lesson via technology/ ICT (Hussain, Ariffin, & Hassan, 2009; UNESCO Bangkok, 2009; Yusof, Daniel, et al., 2011; Yusof & Song, 2010).

Malaysia has grown tremendously with the support of technology and this affects our daily life. There are a lot of facilities that helps us to complete our work responsibilities using a computer. However, the usage of technology for minority communities such as learners with special needs is still in its pilot stage. The concern is how learners with special needs can adapt the technology in their learning if they do not have the supporting equipment, or customizing the technology that can maximize the usage of technology for special needs learners.

#### *ICT as mediate tool for alternative pedagogical approach in inclusive classroom*

In Malaysia, there three major programs which introduce by Ministry of Education offering the facilities for student with special needs to gain as same as normal student in inclusive classroom. In year 2010, cited in Yusof, Daniel, Low, and Aziz (2013) there are 0.74 % percentage of learning disabilities in the primary (student with learning disabilities was 21,310 students and number of primary students was 2,897,871 students) (JSEAP, 2010; MOE, 2010). The percentage of student from year 2006 to 2010 was increasing 35.5 % (NISE, 2007). In the inclusive program, student with special needs (high function condition) could choose to enter the inclusive classroom with normal student and optional to sit for the primary school evaluation test which called Ujian Pernilaian Sekolah Rendah (UPSR). “These integrated programs give room towards inclusive education where able special education student may be placed and study in normal education classes.” NISE (2007, p. 56). Unfortunately, using the same conventional teaching approaches in inclusive classrooms could be less beneficial to the student with special need Author (2013). Teacher highlighted the students’ challenge when to gain their attention and stay focus on topic. Therefore, the study conducted to introduce the alternative teaching method that supports the inclusive classroom with blended learning environment.

#### **The Purpose of Study**

This study focuses on the adaptation of the e-project based learning (eProjBL) for special needs students in an urban primary school provided with ICT facilities and edutainment approaches such as augmented reality edutainment elements, virtual reality, computer-based games, and animation projects. The eProjBL is the combination of online content and face-to-face learning in the classroom using the project-based learning principle (Yusof, Daniel, et al., 2011; Yusof & Song, 2010). The objective is to investigate the student capabilities and teacher acceptance of eProjBL in their learning environment. Their responses were discussed to explore the scenario from their perceptions.

## Methodology

The analysis strategies for this pilot study were formulated through Qualitative Descriptive where the user's perception was determined through data triangulation. The study was conducted in an urban primary school equipped with a computer lab. A total of twelve students were involved in this test for a week. One topic is provided with features such as augmented reality edutainment elements, virtual reality, computerbased games, and animation projects to be implemented. The data were collected from teacher evaluation, engagement form, and feedback questions for each session, spontaneous informal conversations and observations to obtain feedback from their perspectives.

### *Ethics approval*

Firstly, the ethical approval was obtained from the Ministry of Education and then, the authors identified the school from a list of suggested schools from the Putrajaya District Education Office. Following this, consent from the headmistress of the school was obtained. Consent was also obtained from the teachers involved. The school informed the parents (of selected students) in advance that the study is going to be conducted in the school.

### *Participation Selection*

The participants were selected via the selected urban school in Putrajaya, Malaysia through purposive sampling. The teacher who teach special needs learner identified six special needs students and the prime teacher identified six prime students (n=12). The selected six special needs students who have been diagnosed medically with high level capabilities with basic computer skills. Then, the six prime students selected by the prime teachers. The prime students were from year four (please refer table 1). They were identified with mild level of learning capabilities with basic computer skills. The mixed group is in line with the inclusive approach in special education. Table 1 summarizes the group make up.

*Table 1 - The test subjects who involved Pilot Test*

Code #	Sex	Age	Type of Special Needs
SK08-S1	female	11	Normal
SK08-S2	male	11	Normal
SK08-S3	female	11	Normal
SK08-S4	female	11	Normal
SK08-S5	male	11	Normal
SK08-S6	female	11	Normal
SK08-S7	male	12	Dyslexia
SK08-S8	male	8	ADHD
SK08-S9	female	12	Dyslexia
SK08-S10	male	13	Autism
SK08-S11	male	13	Autism
SK08-S12	female	14	Dyslexia

In the pilot study, there were two teachers from the special education classes that conducted the activities after a series of training by the first author (Anuar Mohd Yusof).

The teachers participated in a pre-session workshop before they conducted in classroom. The rationale of having special teachers is because their perceptions were evaluated based on context of special education. The teachers were required to have computer literacy because the alternative pedagogical approach requires them to use the ICT as a medium in Project-based Learning lesson.

*Instrument*

The data was collected based on a mixed method approach consisting of the pre-post question, semi-structure interview, and observation on field note, teacher evaluation form and engagement form. Pre question focuses teacher capabilities and previous experience using ICT. During the activities, one of the teachers filled the engagement form, while the second teacher filled in evaluation form with rubrics format. The second teacher analysed at the following list of criteria which counted in scoring (total =100%).

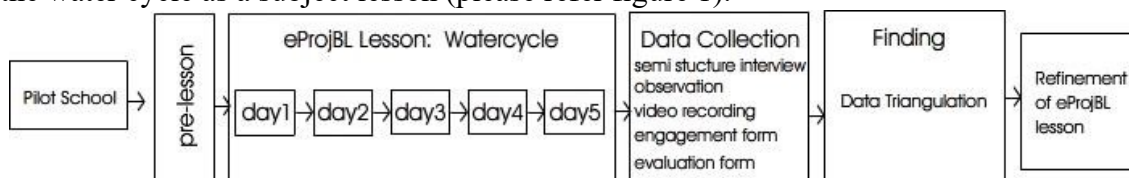
The first teacher acts as an observer and is responsible for filling in the engagement form that map out the students’ capabilities and environment when they implemented the eProjBL activity. The author also monitored teachers when they executed the lesson according to author’s instructions. At the end of each activity, the post-activity question was given to all teachers to fill in. The validation and reliability had been classified in Table 2 below:

*Table 2 - List of Instruments*

<b>Instrument</b>	<b>Validity</b>	<b>Reliability</b>
Engagement Form	Reviewed by expert	Adaption from Kember & Leung (2005); Yusof & Song (2010) Cronbach alpha
Rubric Evaluation Form	Reviewed by expert	Adaption from (4Teacher.org, 2008); Yusof & Song (2010) Reviewed by Experienced Teachers Cronbach alpha
Pre & Post Open Ended Question	Reviewed by expert	Approval from Experts

*Procedure of the Pilot study*

The activity of pilot study was done within a week with eProjBL lesson plan and utilizing the water cycle as a subject lesson (please refer figure 1).



*Figure 1 - Procedure of Pilot Study*

The students were assisted by their teachers every day until they were able to construct their own water cycle model through the group animation project. The teachers act as facilitator by providing them with edutainment features such as augmented reality edutainment elements, virtual reality, and computer-based games. On each session, the researchers distribute an open-ended question to the teachers to fill in their feedback.

## Results & Discussion

In this section, the authors identified the student's perception through the engagement form using a scale of one to five on each item. The median value for each items of student engagement shared the same value of 4.00. From the engagement form, the agreements for the technology for the prime students were constant because they were doing well in their lessons. The teachers also responded that the normal student (prime) do not have difficulty to fulfil the task given. Surprise, for the student with special needs, they also had positive feedback but in certain categories have some significant change for discussion. The reliability of data had been tested using Cronbach's Alpha with sixteen items (Capability = 0.979 Environment 0.905).

*Table 3 - The Student's Engagement*

CAPABILITIES	MEAN		
	Special Student	Prime Student	Overall
<b>Critical thinking</b>	3.33	4.00	3.67
<b>Creative thinking</b>	3.33	4.00	3.50
<b>Self-managed learning</b>	3.33	4.00	3.67
<b>Adaptability</b>	3.17	4.00	3.50
<b>Problem solving</b>	3.00	4.00	3.50
<b>Communication skills</b>	3.00	4.00	3.50
<b>Interpersonal skills and group work</b>	3.33	4.00	3.67
<b>Computer literacy</b>	3.50	4.00	3.67
<b>TEACHING AND LEARNING ENVIRONMENT</b>			
<b>Active learning</b>	3.67	4.00	3.67
<b>Teaching for understanding</b>	3.67	4.00	3.83
<b>Feedback to assist learning</b>	3.83	4.00	3.83
<b>Assessment</b>	3.61	4.00	3.67
<b>Relationship between teachers and students</b>	4.00	4.00	4.00
<b>Workload</b>	3.67	4.00	3.67
<b>Relationship with other students</b>	3.33	4.00	3.67
<b>Cooperative learning</b>	3.00	4.00	3.50
<b>Coherence of curriculum</b>	4.00	4.00	4.00

There are two characteristics of engagement which show both special students and prime students doing well in relationship between teachers and students ( $\sigma=4.0$ ). Moreover, the students' response of the lesson blended with coherence of curriculum ( $\sigma=4.0$ ). However, there were some issues on students' capabilities in Creative thinking, Adaptability, Problem solving and Communication skills were ( $\sigma=3.50$ ). In teaching and learning environment, some of special students showed disagreement in cooperative learning ( $\sigma=3.50$ ).

Table 4 - Teacher's evaluation (Rubric)

	Prime Student					Special Student								
<b>Cod</b>	SK0	SK0	SK0	SK0	SK0	SK0	SK0	SK0	SK0	SK0	SK0	SK0	8-S8	SK0
<b>e #</b>	8-S1	8-S2	8-S3	8-S4	8-S5	8-S6	8-S7	8-S9	8-8-			S10	S11	8S12
<b>Ma</b>	75	74	75	75	73	75	69	29	75	74	50	46		
<b>rk</b>														

Based on the result and the finding on the teacher's evaluation (please refer Table 4) and the agreement of prime students, the eleven-year-old prime students only obtain the range of mark between seventy three to seventy five per cent marks (73 to 75 %). For the special needs students, there were two students that obtained similar range as the prime students, one of them diagnosed with dyslexia (age 12, 75% mark) and the other with autism (age 13, 74% mark). The pedagogical model brought positive impact to the students. However, there are two special needs students with lowest mark (<50%), one diagnosed with ADHD (SK08-08 with 29 % marks) and the other with Dyslexia (SK0808 with 46%).

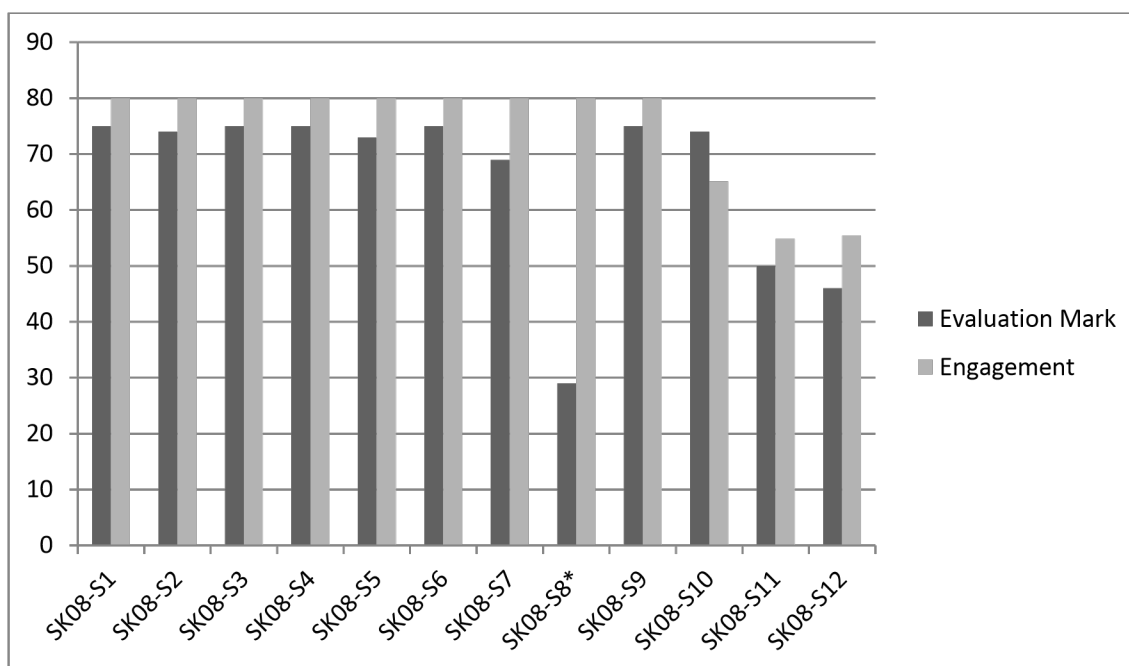


Figure 2 - Comparison between Percentage of Evaluation Marks and Engagement

The researcher also found some significant finding when triangulating the engagement form and the teacher's evaluation when the researcher comparing the individual engagement percentage and teacher's evaluation in the rubrics form. Based on Figure 2, the researcher noticed that student SK08-S8 (ADHD) who is the lowest percentage of mark in the classroom would be able to higher engagement mark than SK08-S10, SK08-S11, and SK08-S12. The teacher explained the student with ADHD would like to explore by himself in the testing session. Capabilities student to adapt and engage the activities was proven. However, it was really difficult for him to do the group's assessment because he prefers to do the task on his own. The researcher also identified student SK08-S10 (Autism) has the uniqueness graph which a percentage of evaluation mark was higher

than the engagement. The researcher realized the student SK08-S10 (Autism) have more prior knowledge more than other student with special need when she manage to complete the task successfully. However, the finding also showed that the student also lacking in certain criteria in the engagement form.

#### *Feedback Collected From Teacher*

After executing the pilot test, feedback from the teachers were collected to identify and conclude the overall pilot study. One of the teacher commented on the effect of eProjBL on all edutainment approach:

“Murid dilatih untuk bekerjasama dan berkumpul. Mereka juga lebih berani mencoba, Contoh: topi yang diletakkan kad –aktiviti augmented reality” (Students are trained to work together and collectively. They tried harder, for example, Cap placed by card – augmented reality activity).

The students enjoyed the session and very excited with e-project based learning as overall they learn faster.

“Murid-murid kelihatan gembira dengan topik.”(Students happy with the topic)

“Selepas sesi pada 6/11/2011, murid kelihatan gembira setelah mencipta animasi melalui eproject base learning ini.”(After November, 6 2011 session, students look happy after creating animation through this e-Project based Learning)

The teachers observed that the eProjBL pedagogical model had motivated and developed their creativity through the given tasks. The animation had captured their interest in their learning process, thus lengthening their attention span.

“Yes, it is different from conventional teaching. Graphics and picture motivate students and easy to understand. Student like pictures”

“Yes, using picture and graphics will definitely develop creativity. Students can utilise problems and will solve the more effectively.”

However, they also identified some weaknesses:

“Adakala murid khas tidak dapat dan kurang bekerjasama dengan murid perdana (untuk projek).”(Sometimes special children cannot and do not work with prime pupil (project)).

“Teknikal apabila power system tergendala.”(Technical when power system was down.)

“Main weakness is technical fault and power failure.”

The teacher suggested the reason why the ADHD student obtained the lowest mark but still were given good engagement feedback on relationship teachers and student and coherence curriculum is because the age student in the case was only eight years old which selected by teacher, and:

“Murid ADHD terlalu leka menggunakan computer sehinggakan tidak melihat sesi pengajaran yang dijalankan” (ADHD students too got carried away working on computer without focusing on the actual lesson)

”Murid ADHD kadangkala menjadi hyper apabila melihat warna yang terang.” (ADHD student sometimes become hyper when looking at bright colours).



### **Refinement Strategies for Actual Study**

Based on the findings discussed in the proceeding section, we have identified some elements that need to be further explored and modified. Following are the areas to be further refined for the next rounds of field test.

#### *Participant Selection*

Participating students in the study involved 'high function' prime students whose age is significantly older to some of the special needs students. The result revealed that the special needs learner (high function group) ranging from 12-13 years old have the capabilities to achieve the same evaluation as same as prime students. The result also showed that the ADHD student scored the lowest mark because his age level affected his capabilities. However, the student had improved in certain criteria. Thus, for future selection, more attention will be paid to the selection of students to ensure no major age gap is present among the students.

#### *Content*

They were a few technical problems that occurred during the lesson such as the power supply and malfunctioning applications. To overcome these problems, the technical aspect should be thoroughly inspected before proceeding with the lesson.

#### *Instrument*

It is proposed that additional Pre-post Question were asked to every student, by asking questions such as "Do you like this activity?" This is to obtain direct feedback for students and they can act as confirmatory measure for the observation.

The authors had changed the approach to gather reliable data; the semi-structure interview had been changed into a group discussion and spontaneous conversation to understand the actual teacher's perception regarding eProjBL activities.

### **Conclusion**

In conclusion, the important uses of technology in education have made our lives become more convenient. The paper might be the preliminary information to know the implication of alternative approach to minimize and support the special education. Then, the pilot testing was conducted to know and understand the process and refinements were done.

In Malaysia, the Ministry of Education had announced the significant policies that encourage the school communities to make full use of the ICT as the bridge to connect to several informal skills such as social skills, creativity and confidence to be included in their curriculum.

However, the created edutainment technology might face its own challenges, as shown in our study. The implication might be either positive or negative. Therefore, the researcher needs to continuously innovate and the successful innovation might not only be able increase the good beneficial to the learners

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