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Head of Publication Committee
Faculty of Social Sciences & Humanities,
Universiti Teknologi Malaysia (UTM), Malaysia
https://people.utm.my/draqeel/

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Editor's Preface

Dear Contributors and Readers,

The Faculty of Social Sciences and Humanities (FSSH) of Universiti Teknologi Malaysia (UTM) had successfully organized the 6th International Social Sciences Postgraduates Conference (ISPC) 2019 on 2 and 3 December 2019 at Johor Bahru, Malaysia. ISPC 2019 provide scholarly platform for the innovative leaders with new talents in the field of social sciences and humanities. Throughout the conference, participants were exposed to the opportunities for researchers to share and exchange ideas, experiences and resources in the development of social sciences and humanities research.

Impactful workshop was conducted by the experts in the instrument development and paper publications field aims to uncover the latest trend of research in the field of social science. This conference has attracted the postgraduate students, lecturers and scholars to participate in raising their knowledge levels in the scope of education, human resource development, Islamic civilization and language. The 6th ISPC, 2019 have received overwhelmed support from both local and international participants.

We would like to express our gratitude and appreciation for all of the editors and reviewers who helped us maintain the high quality of manuscripts to improve special issue quality. We would also like to extend our thanks to the 6th ISPC 2019 team for their hard work. Special issue successfully integrated all components of education, social sciences and humanities in one place to assist researchers and educators. Selected articles were given opportunity to be submitted for possible publication in Universal Journal of Educational Research (UJER).

This special edition will be useful, exciting and inspiring for the educators and researchers to stimulate ideas that will enrich the transformation of effort and continue the determination and resolution in striving towards strengthening the higher education. We also thankful to journal editor who provided us great opportunity to publish papers.

With Best,
Dr. Aqeel Khan

Dr. Aqeel Khan
Head of Publication Committee,
Universiti Teknologi Malaysia (UTM), Malaysia.
https://people.utm.my/draqeel/
The Influence of Self-Regulation towards Academic Achievement in English among Malaysian Upper Primary Students

Lo Sook Shing*, Mohd Rustam Mohd Rameli

Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia (UTM), Malaysia

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Abstract Negative feelings towards English language learning are a common for some students due to the time constraint and needed of more effort. The main objective of this study was to investigate the influence of self-regulation towards upper primary students’ academic achievement in English in Johor Bahru. This study employs quantitative approach by using survey research design. The study was carried out to investigate the significant difference of self-regulation in learning English across gender and student achievement level. Instrument used in this study is Self-Regulated Learning Questionnaire. The respondents were 389 Primary 4 and Primary 5 students from the Chinese primary schools in Johor Bahru. The sampling technique used was simple random sampling. Based on the study, it showed no significant difference of self-regulation in learning English across gender during forethought phase (t = -.544, p = .587). There is significant difference of self-regulation in learning English across gender during performance phase (t = -2.289, p = .023) and self-reflective phase (t = -3.254, p = .001). There is significant difference of self-regulation in learning English across student achievement level during forethought phase (F = 3.610, p = .000), performance phase (F = 1.761, p = .001) and self-reflective phase (F = 2.869, p = .000). Regression analysis was performed to predict the influence of self-regulation towards upper primary students’ academic achievement in English. Findings showed there is significant influence of self-regulation towards upper primary students’ academic achievement in English during forethought and performance phase. The findings of the study provide instructional implications for teachers and English language learners, as well as to enrich the current empirical research data in Malaysia context.

Keywords Self-Regulation, Academic Achievement, Gender, Upper Primary Students

1. Introduction

Based on the education policy over the past decades, the students are taught the "3 R's" which are reading, writing and arithmetic in language and social studies [1]. However, the evident proves that knowledge alone is not enough to prepare students to thrive in the world. According to Paige [2], knowledge, thinking, innovation skills, media, and real life experience should be blended and adopted in 21st century curriculum especially in the context of core academic subjects. A balanced education as its foundation is continued to be used as the National Education Philosophy’s vision as stated in the Education Blueprint Malaysia 2013-2025. One of the student’s aspiration include thinking skills which every child will have to learn how to continue gaining knowledge throughout their lives. Every child will have to master in cognitive skills such as critical thinking, reasoning, creative thinking and innovation so that love was instilled for inquiry and lifelong learning in the same time the different pieces of knowledge are to be connected hence to create new knowledge. However, students were found to be less competent in applying knowledge and thinking critically outside familiar academic contexts and thus the education system was historically fallen short in this area [1].

In recent years, self-regulated learning (SRL) has become important towards the students. With self-regulated learning attitude, students will realise their learning responsibilities on when and what extend to learn, knowing relevant methods and strategies related to the structuring of learning on their own. Self-regulation strategies are individual skills that the students have to develop in order to be successful in their lives since they are conceivable, learnable and controllable [3].
Self-regulation is not a personality trait which measures one’s mental intelligence, instead it is learnt through experience [4,5]. To promote active engagement in learning among students, positive educational outcomes and desirable characteristics need to be linked with the importance of self-regulated learning as supported by previous studies [6-8].

As stated in The Education Blueprint 2013-2025, bilingual proficiency is one of the National Education Philosophy’s vision that would need students to thrive in. In Malaysia, every child will be operationally proficient in Bahasa Malaysia and English as Bahasa Malaysia is the national language while English acts as the international language of communication. In other words, the students gain advantages in the workplace by being bilingualism upon leaving school [1]. Moreover, as encouraged by Malaysia government, English is considered to be an important second language to be learnt in order for the country to become developed and recognized internationally [9]. However, there is a decline in the standard of English proficiency in Malaysia since the students perceive it as a foreign language instead of second language. In the 2011 SPM English paper against Cambridge 1119 standards, only 28% of students achieved a minimum credit. Since 2006, Malaysia employers faced an issue which reported that most fresh graduates are poor in English proficiency. It has been ranked as one of the top five issues at that time [1].

Nowadays, it is believed that students will benefit most from curriculum that promotes active learning and independent thinking in view of the expectation of the competitive working force. Students are expected to perform more complex tasks in working tasks. However, the current education system does not adequately prepare students for success in life and career. A good self-regulator is the one who can withstand temptations, persist through obstacles, and delay gratification and are more likely to be physically healthier, more successful in their career, and experience more life satisfaction [10]. As such, it emphasizes on the importance of self-regulation.

2. Problem Background

In Malaysia, English is a second language to be learnt in primary schools and secondary schools. English learning is the center of significance due to the fact that it is the leading language of Science and Technology and emerged as the lingua franca in the world [11]. Most students do not have interest in learning English as it is just part of a subject for students to score in exam. The issue of improving the standard of English proficiency among young learners has been one of the most important topic in Malaysia. Due to the time constraint and more effort is needed, the students lose their interest and enthusiasm towards language learning most of the time. This also results in negative feelings such as low self-confidence and esteem [12], excessive anxiety [13], teacher’s harsh and discouraging attitude and psychologically insecure classroom atmospheres [14].

There is a need for learners to develop a positive attitude towards English language learning for a better learning of English. In this regard, the factors of motivation were investigated by numerous researchers to further improve the learning of the target language [15,16]. In fact, motivation is the most influential factor that affects success of the language learner in the field of second language learning as shown in the studies. To improve the proficiency of English among students, the LINUS programme which consists of English literacy was promoted. To determine if the students who are in Year 1 to 3 are progressing in Bahasa Malaysia and English literacy at an expected pace, each of them will be screened twice a year. Remedial coaching will be given for those students who fall behind until they are able to catch up. According to international standards, every student will be taught English by a teacher who is proficient. This will be achieved by having all 61,000 English teachers to pass the Cambridge Placement Test (CPT) within two years. Teachers who have yet to meet this standard will receive intensive upskilling [1]. Furthermore, the performance targets for its performance on the PISA and TIMSS international assessments are also set and monitored by Ministry.

As supported by Juliana Othman [17], learning English should be fun and pupil-centred. According to the Malaysian primary school curriculum, learner-centred and activity-oriented teaching-learning strategies are promoted to ensure pupils gain basic linguistic knowledge in English. Based on the philosophy that the student is at the heart of the learning process, student-centred learning is implemented with the integration of innovative teaching, team learning, problem-based learning, and self-regulated learning [18]. Today, education system is built to standardize the way we teach and test. Strengthening education system and focusing on children’s learning is a key to improve global education. However, student’s learning outcome is based on their result and academic performance. The quality of children’s lives before beginning formal education greatly influences the kind of learners they can be. These include their early childhood experiences, home support and health [19].

Self-regulation is a key ingredient in learning performance as shown in a large number of studies [20,21]. The basic components of self-regulation, from the operant perspective are goal setting, self-instruction, self-monitoring and self-reinforcement. Recent educational researches show that self-regulated learning helps students to achieve the adaptiveness to the school environment in order to reach the learning outcome [21]. Self-regulated process requires students to independently plan, monitor and assess their learning in the same time acts as an
important predictor of student academic motivation and achievement. However, few students naturally do this well [22]. Self-regulation is important in the learning process. With self-regulation, students create better learning habits and therefore their study skills are strengthened.

There was a dramatic change in the Malaysia education system when the Smart School Project was implemented in 1999. Under this Smart School Project, the learning concepts focus on student-centred learning, active knowledge construction, as well as critical and creative thinking. Smart schools refer to schools that have internet for all students and take advantage of the latest technologies in teaching and school management [23]. It focuses on student-centred learning such as to develop students’ active knowledge as well as creative and critical thinking which is a big difference compared with the conventional pedagogy. In other words, without relying too much on teachers, students have to be self-initiate, self-direct, self-access and self-pace in learning.

Gender differences in self-regulatory abilities among children have been discovered by many researchers whereby girls displaying higher level of self-regulation at an earlier age than boys [24,25]. As reported by Hartley and Sutton [26], boys develop gender stereotypes as to which girls are perceived as academically superior in terms of motivation, self-regulation and performance. However, some of the studies revealed inconsistent results in which gender differences in academic achievement depend on different domains of school achievement [27]. In terms of achievement motivation, females tend to be doing well in school by engaging themselves in classroom activities [28]. Females prefer tasks where they know they can succeed, while males prefer tasks which embrace more challenges [29]. For the positive relationship between greater school achievement and self-regulation by girls, it is supported by Duckworth and Seligman [30] that in a sample of US-American eighth graders, girls’ higher school achievement can be explained by behaviour regulation, which is a part of the component of self-regulation.

In Malaysia, there are hardly any documented records of studies of learning about students’ use of self-regulated learning in the specific domain [31]. The past studies are limited to show the relationship between self-regulation and academic achievement in English in Malaysia context. In education literature, the concept of low achievement (failure to meet average academic performance) is different from underachievement (a discrepancy between ability and expected performance) [32]. According to Pintrich, Smith, Gracia and McKeachie [33], a high achiever students had used more SRL compared to low achiever students. Self-regulation abilities can predict individuals’ health problems, socioeconomic position, and tendency to criminal offence [34]. One must have both intrinsic and extrinsic motivation consistent with the goal of achieving behaviour for a certain period in order to achieve successful self-regulation. According to Zenner, Herrnleben-Kurz and Walach [35], self-regulation abilities facilitate goal oriented actions and optimal adjusting to emotional and cognitive challenging stimulating throughout successful regulation of feelings, emotions, behaviours, and cognitions.

3. Research Objectives

The objectives of this research are as following:

i. To examine the difference of self-regulation in learning English across gender.

ii. To examine the difference of self-regulation in learning English across student achievement level.

iii. To investigate the influence of self-regulation towards upper primary students’ academic achievement in English.

4. Methodology

This research study was carried out in Chinese primary schools in Johor Bahru district of Johor state, Malaysia. Simple random sampling has been applied to determine the population samples. 389 students of Primary 4 and Primary 5 from the Chinese primary schools in Johor Bahru district had been randomly selected as the samples of the study.

In this study, primary data is collected from the questionnaire distributed among the upper primary students. Instrument used to measure self-regulation level in English among upper primary students is Self-Regulated Learning Questionnaire [36]. This instrument was chosen because it involves the three phases of self-regulation. In addition, this instrument is based on triadic model of self-regulation theory by Bandura [37]. All the items in this instrument are categorised into three phases to answer the research questions. Research done by Wu showed that each construct in this instrument has the high reliability which is more than 0.7 [38]. To customize the items in research context, each of the item was modified to be specialised for English.

The questionnaire consists of 2 sections. Section A is the demographic data while section B consists of the scaling items that need respondents to assess it. The main purpose of section A is to get some background information of the respondents. The demographic variables include student’s gender, ethnic, age, and the mid term score for Paper 2 in English. For section B, it consists of 40 items which is designed to assess student’s motivation and self-regulation in learning English in class. The questions are set in rating scales with four options which include ‘strongly agree’, ‘agree’, ‘disagree’ and ‘strongly disagree’ whereby it is very useful to build in a degree of sensitivity and differentiation of response. Ethical procedures include informed consent, confidentiality and anonymity were followed while conducting this research.
Table 1. Statistic Tests of Self-regulation across Gender during Three Phases

<table>
<thead>
<tr>
<th></th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>F</th>
<th>Sig.</th>
<th>t</th>
<th>df</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Forethought</strong></td>
<td>MALE</td>
<td>211</td>
<td>2.82</td>
<td>.60</td>
<td>4.921</td>
<td>.027</td>
<td>-.544</td>
<td>387</td>
<td>.587</td>
</tr>
<tr>
<td></td>
<td>FEMALE</td>
<td>178</td>
<td>2.85</td>
<td>.49</td>
<td></td>
<td></td>
<td>-2.554</td>
<td>386.303</td>
<td>.580</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>MALE</td>
<td>211</td>
<td>2.54</td>
<td>.78</td>
<td>9.376</td>
<td>.002</td>
<td>-2.289</td>
<td>387</td>
<td>.023</td>
</tr>
<tr>
<td></td>
<td>FEMALE</td>
<td>178</td>
<td>2.71</td>
<td>.65</td>
<td></td>
<td></td>
<td>-2.324</td>
<td>386.978</td>
<td>.021</td>
</tr>
<tr>
<td><strong>Self-Reflective</strong></td>
<td>MALE</td>
<td>211</td>
<td>2.66</td>
<td>.52</td>
<td>4.732</td>
<td>.030</td>
<td>-3.254</td>
<td>387</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>FEMALE</td>
<td>178</td>
<td>2.82</td>
<td>.44</td>
<td></td>
<td></td>
<td>-3.298</td>
<td>386.950</td>
<td>.001</td>
</tr>
</tbody>
</table>

5. Findings

Table 1 showed the statistic tests of self-regulation across gender during three phases. During forethought phase, the mean value of the male students is 2.82 whereas the mean value is 2.85 for the female which is slightly higher as compared with male. Result indicated that during forethought phase, the significant value is .587 which is greater than the alpha value, .05, which it is failed to reject null hypothesis. This means that there is no significant difference of self-regulation in learning English across gender during forethought phase.

During performance phase, the mean value of self-regulation of female is higher which is 2.71 compared with the mean value of self-regulation among male which is 2.54. The significant value is .023 which is smaller than the alpha value, .05 and thus null hypothesis was rejected. This means that there is significant difference of self-regulation in learning English across gender during performance phase.

During self-reflective phase, the mean value of the male students is 2.66 whereas the mean value is 2.82 for the female which is higher as compared with male. The significant value is .001 which is smaller than the alpha value, .05. The result indicated that null hypothesis was rejected. On the other hand, this means that there is significant difference of self-regulation in learning English across gender during self-reflective phase.

Table 2 represented the Anova tests of self-regulation and student achievement level during three phases. During forethought phase, the significant value as shown in the table is .000 which is smaller than the alpha value, .05. The result indicated that null hypothesis was rejected. Therefore, there is significant difference of self-regulation in learning English across student achievement level during forethought phase. During performance phase, the significant value as shown in the table is .001 which is smaller than the alpha value, .05. The result indicated that null hypothesis was rejected. Therefore, there is significant difference of self-regulation in learning English across student achievement level during performance phase. During self-reflective phase, the significant value as shown in the table is .000 which is smaller than the alpha value, .05. The result indicated that null hypothesis was rejected. Therefore, there is significant difference of self-regulation in learning English across student achievement level during self-reflective phase.
Table 2. Anova Tests of Self-Regulation and Student Achievement Level during Three Phases

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
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<tr>
<td>Forethought</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>48.107</td>
<td>62</td>
<td>.776</td>
<td>3.610</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>70.073</td>
<td>326</td>
<td>.215</td>
<td></td>
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<tr>
<td>Total</td>
<td>118.179</td>
<td>388</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>51.499</td>
<td>62</td>
<td>.831</td>
<td>1.761</td>
<td>.001</td>
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<tr>
<td>Within Groups</td>
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<td>326</td>
<td>.472</td>
<td></td>
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<tr>
<td>Total</td>
<td>205.312</td>
<td>388</td>
<td></td>
<td></td>
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<tr>
<td>Self-Reflective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>32.785</td>
<td>62</td>
<td>.529</td>
<td>2.869</td>
<td>.000</td>
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<tr>
<td>Within Groups</td>
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<td>326</td>
<td>.184</td>
<td></td>
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<tr>
<td>Total</td>
<td>92.871</td>
<td>388</td>
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Table 3. Post-Hoc Test of Categorisation of Achiever for Three Phases

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<tr>
<th>Dependent Variable</th>
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<th>Categorisation of Achiever</th>
<th>Std. Error</th>
<th>Sig.</th>
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<td>.06203</td>
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<td>.012</td>
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<td>High</td>
<td>.08263</td>
<td>.091</td>
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<td>High</td>
<td>Low</td>
<td>.06203</td>
<td>.000</td>
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<td>Moderate</td>
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<tr>
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<td>Low</td>
<td>Moderate</td>
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<td>.200</td>
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<td></td>
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<td>Low</td>
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<td>.135</td>
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<td></td>
<td>High</td>
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<td>.899</td>
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<td></td>
<td>High</td>
<td>Low</td>
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<td></td>
<td></td>
<td>High</td>
<td>.07429</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td>.05577</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moderate</td>
<td>.07429</td>
<td>.004</td>
</tr>
</tbody>
</table>

Table 3 showed the post-hoc test of categorisation of achiever based on three phases of self-regulation. Post-hoc test was done where null hypothesis is rejected with more than two treatment conditions. On the other hand, it was designed to explore the differences among means to provide specific information on which means are significantly different from each other. During forethought phase, the significant value between low achiever and moderate achiever is .012 while the significant value showed .000 between low achiever and high achiever. This showed that null hypothesis was rejected. Therefore, there was significant difference of self-regulation in learning English between low achiever and moderate achiever, in the same time between low achiever and high achiever during forethought phase.

During performance phase, all the significant values are greater than the alpha value, .05 and thus it is failed to reject null hypothesis and there was no significant difference of self-regulation across student achievement level during performance phase. During self-reflective phase, the significant value between low achiever and high achiever is .000 while the significant value showed .004 between moderate achiever and high achiever. This showed that null hypothesis was rejected. Therefore, there was significant difference of self-regulation in learning English between low achiever and high achiever, in the same time between moderate achiever and high achiever during self-reflective phase.

Table 4 showed the regression value between self-regulation and academic achievement among upper primary students. With the overall mean of self-regulation level, 12.2% of self-regulation accounted for student academic achievement.
The Influence of Self-Regulation towards Academic Achievement in English among Malaysian Upper Primary Students

Table 4. Regression Value between Self-regulation and Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.349$^a$</td>
<td>.122</td>
<td>.120</td>
<td>19.347</td>
</tr>
</tbody>
</table>

As shown in table 5, with ‘Forethought’ alone, self-regulation contributes 16.7% of the changes of the variance towards academic achievement. With both ‘Forethought’ and ‘Performance’, self-regulation contributes 17.6% of the changes of the variance towards academic achievement.

Table 5. Regression Value between Self-regulation and Academic Achievement for Different Phases

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.411$^a$</td>
<td>.169</td>
<td>.167</td>
<td>18.818</td>
</tr>
<tr>
<td>2</td>
<td>.425$^b$</td>
<td>.180</td>
<td>.176</td>
<td>18.717</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Forethought
b. Predictors: (Constant), Forethought, Performance

Table 6 showed the regression test between the influence of self-regulation and student’s academic achievement in English. The significant value is .000 which is smaller than the alpha value, .05 and thus null hypothesis was rejected. This means that there is significant influence of self-regulation towards upper primary students’ academic achievement in English during forethought phase. Furthermore, the result as shown in table 6 also presented that during phase of forethought and performance, the significant value is .000 which means null hypothesis was rejected. Thus, there is significant influence of self-regulation towards upper primary students’ academic achievement in English during forethought and performance phase.

Table 6. Statistical Test between Self-regulation and Academic Achievement

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>27935.717</td>
<td>1</td>
<td>27935.717</td>
<td>78.888</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>137043.260</td>
<td>387</td>
<td>354.117</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>164978.977</td>
<td>388</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>29759.615</td>
<td>2</td>
<td>14879.807</td>
<td>42.476</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>135219.362</td>
<td>386</td>
<td>350.309</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>164978.977</td>
<td>388</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: SCORE P2
b. Predictors: (Constant), Forethought
c. Predictors: (Constant), Forethought, Performance
6. Discussion

6.1. Discussion on Self-regulation in Learning English across Gender

During the three phases of self-regulation, all the mean values of self-regulation among female students are higher than male students. This indicated that female students are more self-regulated than males in learning. This is supported by few of the studies that self-regulation proved to be connected to gender [39,40]. As compared with males, females are generally report more intensive use of self-regulatory strategies than men [39].

The findings showed that there is no significant difference of self-regulation in learning English across gender during forethought phase. As supported by Bembenutty [41], his study did not reveal differences between females and males in terms of the usage of learning material and effort management. As far as there is concern about the gender differences in metacognitive self-regulation, inconsistent research results were obtained [41]. Despite the inconsistent results obtained across gender, one of the major ways in which gender influences learning and performance is through the differing self-efficacy beliefs held by males and females for academic tasks and self-regulated learning. From the early school years, gender differences in self-efficacy beliefs are apparent. Girls from age 10 to 12 typically achieve higher science grades than do boys. However, Britner and Pajares [42] found that girls’ success at Science was not matched by higher science self-efficacy beliefs than boys. This mismatch between self-efficacy beliefs and performance is likely, over time, to negatively impact on girls’ achievement in science. This is one of the reason to support the findings in this study that result showed no significant difference of self-regulation in learning English across gender during forethought phase.

Consistent with the view of self-efficacy beliefs and performance, Pajares and Miller [43] have shown that self-efficacy for solving math problem was highly predictive of math achievement. Self-efficacy beliefs are important for future achievement as the more students believe they are capable of mastering a particular activity the more effort they expend in learning about it and the more persevere when they encounter difficulties. The more confident students are about their capabilities, the less performances are likely to be undermined by anxiety [44].

During performance phase, the findings showed that there is significant difference of self-regulation in learning English across gender. As discussed earlier, two processes which include self-observation and self-control are important to determine one’s self-regulation. With the systematic monitoring of one’s performance, regulating one’s behaviour is part of self-observation. For example, a language learner will try to understand the part of the English lesson which he/she does not understand after completion of each topic. When it comes to self-observation, females tend to be doing well than males in school and they are more engaged in classroom activities [28].

In term of the aspect of self-control, the imagery strategy helps one to visualize and enhance memorization by organizing information in a systematic way. On the other hand, the self-instruction strategy helps one to monitor and control the focus level through verbalizations. This is supported by a study conducted by Edens [45] which his findings revealed that females show slightly higher verbal ability while males show slightly higher visual-spatial ability [45]. Finding indicates that applying visualisation and verbalisation techniques has boosted the language learner’s vocabulary knowledge [46]. Hence, there is significant difference of self-regulation across gender during performance phase.

Furthermore, the findings showed that there is significant difference of self-regulation in learning English across gender during self-reflective phase. In view of the importance of self-satisfaction, females prefer tasks which they are more confident to gain success, while males are more willing to take academic challenges [29]. Females, unlike males, tend to attribute failure to a lack of ability while males, tend to take their failures in stride, attributing them to a lack of effort [29]. With regard to adaptivity, women are more effort goals oriented than men [47] and more frequently adapt effort to task requirements [48].

6.2. Discussion on Self-regulation in Learning English across Student Achievement Level

There is significant difference of self-regulation in learning English across student achievement level during three phases, which are forethought phase, performance phase and self-reflective phase. Student achievement level is divided into three components that include low, moderate and high. Like other forms of academic achievement, achievement in language learning depends on expertise in self-regulatory processes. A person who is self-regulated will have his/her own responsibility in learning to organize himself/herself, formulate goals and anticipate problems to achieve in a better way which he/she aims for. Those who are self-regulated will get to use the easy learning style which suits their talents and interests [10]. Self-regulated learning can be related with better academic performance. For example, high achieving students using its defining strategies more frequently and more frequently adapt effort to task requirements [49,50].

During forethought phase, one of the important aspect includes self-efficacy which is part of learning motivation. Ahmed [51] presented that there is significant difference in self-efficacy among the high and low achieving undergraduates at Al-Hussein Bin Talal University in Jordan. The past researches revealed that there is significant positive relationship between self-efficacy and
A study conducted by Ahmad [62] on a sample of 128 students from the faculty of education revealed positive relationships between self-regulation and students’ academic achievement.

As discussed, the influence of self-regulation towards upper primary students’ academic achievement in English during forethought phase is significant. The main construct of self-regulation for forethought phase is learning motivation which refers to the student’s willingness in studying. Effective self-regulated learners have a high degree of internal motivation. They have a greater readiness to exert the needed efforts and persevere for long periods of time [63]. A study conducted by Azlina [64] also indicated that self-efficacy is one of the significant predictors for academic achievement since it is one of the most influential factors for second language learning.

In addition, Al-Jarrah [65] conducted a study to examine the predictability of self-regulated learning (SRL) and academic achievement. In the same time, it investigated whether there is academic achievement difference among students with high or low levels of SRL. Purdie, Hattie, Douglas’s [66] SRL scale was used on a sample of 331 male and female undergraduate students from Yarmouk University. His study revealed that there were statistically significant differences in academic achievement between students with high or low scores on the SRL in view of goal setting and planning, rehearsing and memorizing in the favour of the high self-regulated students.

7. Conclusions

This study emphasized on the influence of self-regulation towards upper primary students’ academic achievement in English. Based on the findings of the study, all the mean values of self-regulation among female students are higher than male students during the three phases of self-regulation. It showed no significant difference of self-regulation in learning English across gender during forethought phase. This is because as far as gender differences in metacognitive self-regulation are concerned, inconsistent research results were obtained. However, there is significant difference of self-regulation in learning English across gender during performance and self-reflective phase. Most of the past studies also revealed positive relationships between self-regulation and students’ academic achievement.

Acknowledgements

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REFERENCES


The Influence of Self-Regulation towards Academic Achievement in English among Malaysian Upper Primary Students

Psychology Press.


[58] Dörnyei, Z. (2005). The psychology of the language learner:


Emotional Intelligence and Self-Regulated Learning towards English Examination Stress: A Comparative Study between Primary and Secondary School Students

Mohd Rustam Mohd Rameli\textsuperscript{1,}\textsuperscript{*}, Sharmilla Sinivashom\textsuperscript{2}

\textsuperscript{1}School of Education, Universiti Teknologi Malaysia, Malaysia
\textsuperscript{2}Sekolah Jenis Kebangsaan (Tamil) Masai, Johor, Malaysia

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Abstract  English Examination stress is becoming an alarming issue to most of Malaysian students nowadays. There are hardly any documented records of studies on influence of emotional intelligence and self-regulated learning towards English examination stress faced by the students. The major purpose of this study is to investigate the influence of emotional intelligence and self-regulated learning towards English examination stress among primary and secondary school students in Pasir Gudang District, Johor. The research design applied in this study was quantitative approach. The instruments used in this study were Wong and Law Emotional Intelligence Scale (WLEIS), Self-regulation formative questionnaire and Examination Stress Scale (ExamSS). The respondents were 334 Year Four students and 388 Form Four students from Pasir Gudang District. Results in linear regression analysis revealed that the self-regulated learning significantly contributing 4.4\% in primary and 13.7\% in secondary towards examination stress. Meanwhile, the multiple regression showed that, only self-regulated learning was more significant towards examination stress. The present study contributes to an understanding of the relationship and impact of self-regulated learning towards English examination stress.

Keywords  Emotional Intelligence, Self-Regulated Learning, English Examination Stress, Primary School Students, Secondary School Students

1. Background of Study

The Malaysian education system considered public examinations as one of the important feature. In Malaysian Education System, English is taught as a second language in primary and secondary schools. Most of Malaysian students do not have interest in learning English. Malaysian students are still inhibited by social factors including lack of motivation and lack of interest to learn English\textsuperscript{1}. Moreover, for second or foreign language learners, L2 or foreign language exams is very anxiety provoking causing the learners to be reluctant to score good results. Students get stress when they sit for English examinations. The dominant form of examinations in Malaysia makes the students undergo stress.

Emotional Intelligence plays a significant role in students’ academic performances. Such characteristic helps students to be more efficient in their studies and reduce examination stress among students. The recent research shows that emotional intelligence is the best method to manage stressful situations\textsuperscript{2}. EI is the ability to manage and use emotions in beneficial ways. EI is a set of abilities that enable individuals to organize and manage the emotions of themselves and others. Currently, teachers instil EI skill among students from both primary and secondary schools through their 21\textsuperscript{st} century learning method. There is a strong correlation between students’ EI and their academic achievement in the both level of schools.

Self-regulated learning is a self-directive process where students transform their mental abilities into task-related academic skills. According to self-regulation is about the actions and thoughts on attaining goals\textsuperscript{3}. Students are aware of their learning activities, they are conscious of their strengths and weaknesses. SRL students able to set up their own goals and learning strategies based on their strengths such as time table to manage their learning time proactively. Nevertheless, students can’t be able to become self-regulated by themselves. SRL is shaped by numerous and diverse learning experience is different schools. Hence, there is a need to examine the level of SRL towards
examination stress in both primary and secondary schools. A lot of previous researches studied about examination stress but most of the researches included other variables than emotional intelligence and self-regulated learning which are anxiety, changes in mood and health behaviour and self-control. However, there is no study on the examining EI and SRL simultaneously towards examination stress particularly in Malaysia context. Besides, the past studies are limited to show the relationship between EI and SRL towards English examination comparing both primary and secondary schools. Furthermore, the level of EI and SRL are different among age. This study helps to determine the influence of EI and SRL on English examination stress among year five and form four students. Therefore, this research is aimed to close the gap on the issue of the influence of emotional intelligence and self-regulated learning skills towards reducing English examination stress among Year Five and Form Four students in Pasir Gudang district.

2. Research Objectives

The main objective of the study is to determine the influence of emotional intelligence and self-regulated learning towards English examination stress among school students. Besides, this study will also determine the influence of students’ emotional intelligence towards English examination stress and self-regulated learning towards English examination stress among school students.

3. Methodology

The research design of this study takes the form of the quantitative research approach. Statistical analysis of numerical data was done to deduct a conclusion to explain the issue. This research study was administered in 3 primary schools and 3 secondary schools in Pasir Gudang district of Johor state. This research applied stratified simple random sampling to determine the population samples. 354 primary school students of Year 5 and 365 secondary school students of Form 4 had been randomly selected as the samples of the study. The first section of the questionnaire is demographic information. This section consists of four questions that determine the demographic information of the respondents. The second section of the questionnaire is Wong and Law Emotional Intelligence Scale (WLEIS) which measures four dimensions namely Self emotional appraisal, others’ emotional appraisal, use of emotion and regulation of emotion.

The second instrument that used to measure self-regulation level in facing English examination among Standard Five and Form Four students is Self-regulation formative questionnaire by Gaumer Erickson and Noonan. This item measures three dimensions such as plan, control and reflect. Meanwhile, the third instrument that used to measure examination stress was Examination Stress Scale (ExamSS).

4. Findings

Table 1 showed the linear regression analysis between emotional intelligence and examination stress in primary school. The independent variable of this hypothesis is emotional intelligence and the dependent variable is examination stress. Based on the data derived, 13.9% of influence of emotional intelligence towards examination stress. Table 1, shows the significance value is 0.011 which is lesser than the value of alpha, 0.05.

<table>
<thead>
<tr>
<th>Model Summary</th>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>.139a</td>
<td>.019</td>
<td>.016</td>
<td>.579</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANOVA(a)</th>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression Residual Total</td>
<td>2.185</td>
<td>111.235</td>
<td>332</td>
<td>113.420</td>
<td>2.185</td>
<td>.335</td>
</tr>
<tr>
<td>Total</td>
<td>2.185</td>
<td>111.235</td>
<td>332</td>
<td>113.420</td>
<td>2.185</td>
<td>.335</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficients (a)</th>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
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<td>.216</td>
<td>.139</td>
<td>11.673</td>
<td>.000</td>
</tr>
<tr>
<td>Mean EI</td>
<td>.153</td>
<td>.060</td>
<td>2.554</td>
<td>.011</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 showed the linear regression analysis between emotional intelligence and examination stress in secondary school. The independent variable, emotional intelligence (β = 0.186, p < 0.05) is significant predictor of examination stress. The result also states that emotional intelligence contributes 3.2% [F (1, 386) = 13.098, p < 0.05], r=0.186 changes of variance in examination stress.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.186a</td>
<td>.035</td>
<td>.032</td>
<td>.482</td>
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</tbody>
</table>

**ANOVA (a)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression Residual Total</td>
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<td>1</td>
<td>3.226</td>
<td>13.898</td>
<td>.000b</td>
</tr>
<tr>
<td></td>
<td>89.589</td>
<td>386</td>
<td>.232</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>92.815</td>
<td>387</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coefficients (a)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.619</td>
<td>.175</td>
<td>14.935</td>
<td>.000</td>
</tr>
<tr>
<td>Mean EI</td>
<td>.187</td>
<td>.050</td>
<td>.186</td>
<td>3.728</td>
</tr>
</tbody>
</table>

Table 3 showed the linear regression analysis between self-regulated learning and examination stress in primary school. The independent variable, emotional intelligence (β = 0.217, p < 0.05) is significant predictor of examination stress. The result also states that self-regulated learning contributes 4.4% [F (1, 332) = 16.337, p < 0.05], r=0.217 changes of variance in examination stress.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.217a</td>
<td>.047</td>
<td>.044</td>
<td>.571</td>
</tr>
</tbody>
</table>

**ANOVA (a)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression Residual Total</td>
<td>5.310</td>
<td>1</td>
<td>5.319</td>
<td>16.337</td>
<td>.000b</td>
</tr>
<tr>
<td></td>
<td>108.101</td>
<td>332</td>
<td>.326</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>113.420</td>
<td>333</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Coefficients (a)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.181</td>
<td>.223</td>
<td>9.800</td>
<td>.000</td>
</tr>
<tr>
<td>Mean SRL</td>
<td>.263</td>
<td>.065</td>
<td>.217</td>
<td>4.042</td>
</tr>
</tbody>
</table>

Table 4 showed the linear regression analysis between self-regulated learning and examination stress in secondary school. The independent variable, emotional intelligence (β = 0.373, p < 0.05) is significant predictor of examination stress. The result also states that self-regulated learning contributes 13.7% [F (1, 386) = 62.554, p < 0.05], r=0.373 changes of variance in examination stress.
Table 4. Linear Regression Analysis between self-regulated learning and examination stress in secondary school

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.373a</td>
<td>.139</td>
<td>.137</td>
<td>.455</td>
</tr>
</tbody>
</table>

ANOVa(a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>12.944</td>
<td>1</td>
<td>12.944</td>
<td>62.554</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
<td>79.871</td>
<td>386</td>
<td>.207</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>92.815</td>
<td>387</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coefficients (a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean SRL</td>
<td>1.929</td>
<td>.384</td>
<td>.171</td>
<td>.049</td>
</tr>
</tbody>
</table>

Table 5 showed the multiple regression analysis between self-regulated learning and examination stress in primary school. At this point, the emotional intelligence is excluded from this table. Self-regulated learning is the only variable that attached in this table; \( F (1, 332)= 16.337, p < 0.05\), \( r=0.217\).

Table 5. Linear Regression Analysis between self-regulated learning and examination stress in primary school

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.217a</td>
<td>.047</td>
<td>.044</td>
<td>.571</td>
</tr>
</tbody>
</table>

ANOVa(a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>5.310</td>
<td>1</td>
<td>5.319</td>
<td>16.337</td>
<td>.000b</td>
</tr>
<tr>
<td>Residual</td>
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<td>332</td>
<td>.326</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>113.420</td>
<td>333</td>
<td></td>
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Coefficients (a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean SRL</td>
<td>2.181</td>
<td>.263</td>
<td>.223</td>
<td>.065</td>
</tr>
</tbody>
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Table 6 showed the multiple regression analysis between self-regulated learning and examination stress in secondary school. At this point, the emotional intelligence is excluded from this table. Self-regulated learning is the only variable that attached in this table; \( F (1, 386)= 62.554, p < 0.05\), \( r=0.373\).

Table 6. Linear Regression Analysis between self-regulated learning and examination stress in secondary school

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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<tr>
<td>1</td>
<td>.373a</td>
<td>.139</td>
<td>.137</td>
<td>.455</td>
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ANOVa(a)

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<tr>
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<th>Mean Square</th>
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<tr>
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<td>387</td>
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Coefficients (a)

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<tr>
<th>Model</th>
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<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Mean SRL</td>
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<td>.171</td>
<td>.049</td>
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<table>
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<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>(Constant)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean SRL</td>
<td>.384</td>
<td>.049</td>
<td>.373</td>
<td>7.909</td>
</tr>
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</table>

Table 6 showed the multiple regression analysis between self-regulated learning and examination stress in secondary school. At this point, the emotional intelligence is excluded from this table. Self-regulated learning is the only variable that attached in this table; \( F (1, 386)= 62.554, p < 0.05\), \( r=0.373\).
5. Discussion

5.1. Influence of Emotional Intelligence towards English Examination Stress among school students

According to data analysis, the influence of emotional intelligence towards English examination stress among school students is significant. Linear regression analysis was conducted for this objective. The results show that the influence of emotional intelligence towards English examination stress among secondary school students are more significant compared to primary school students. It brought to the limelight that emotional intelligence influenced secondary students more than primary school student. Besides, secondary school students are more mature enough to acquire EI skill when facing examination stress compare to primary level students.

Based on previous studies, students with higher emotional intelligence skills less likely undergo examination stress. For instance, students with higher level of emotional intelligence skills are less likely under pressure, anxious and having the higher level of self-confidence and positive vibes. EI students acquire problem solving skills in their life. They able to control and manage their emotions and project in smart way where they could handle English examinations well. EI students well verse in controlling pressure and manages their impulses. As a result, students get motivated during English examinations and have positive thinking towards accomplishment of their goals.

Based on the findings, the result of this linear regression of EI towards examination stress between primary and secondary schools have gave out the expected results. Secondary school students are highly organized in managing their emotions compared to primary school students. 3.2% of EI from secondary school students significantly contributing towards English examination stress whereas 1.6% of EI contributing towards English examination stress among primary school students. The overall result of researches suggest that high EI people helps individuals to communicate better, able to reduce their anxiety and stress, build strong, healthy relationships, and able to overcome life’s challenges effectively.

5.2. Influence of Self-Regulated Learning towards English Examination Stress among School Students

According to data analysis, the influence of self-regulated learning towards English examination stress among school students is significant. Linear regression analysis was conducted for this objective. The results show that the influence of self-regulated learning towards English examination stress among secondary school students are more significant compared to primary school students. Thus, we can conclude that self-regulated learning influenced secondary students more than primary school student.

With SRL attitude, student will realise their learning responsibilities on what to learn, knowing the suitable methods and structure their own learning. This method helps students to manage their studies during the examination period. A good self-regulator is the one who withstand temptations, persist through obstacles and delay gratification and more likely to be more successful in their goals and life satisfaction. As such, it emphasis on the importance of self-regulation towards students in learning.

Based on the findings, the result of this linear regression of SRL towards examination stress between primary and secondary schools have gave out the most expected results. Secondary school students are highly good in regulating their learning compared to primary school students. 13.7% of SRL from secondary school students significantly contributing towards English examination stress whereas 4.4% of SRL contributing towards English examination stress among primary school students. Moreover, based on the results secondary school students are more capable on acquiring SRL attitude compare to primary school students. Secondary students are more capable on their independent learning compare to primary school students.

5.3. Influence between Emotional Intelligence and Self-Regulated Learning towards English Examination Stress among School Students

Multiple regression analysis were conducted to examine the influence between Emotional Intelligence and Self-Regulated Learning towards English Examination Stress among school students. The multiple regression findings indicated that self-regulated learning was the significant predictor that influenced English examination stress among school students. On the other hand, emotional intelligence was not significant predictor of this research. This may because, SRL playing more important role in preparing students towards facing English examination stress.

Besides, through this study, the students of primary and secondary school students in Masai, Johor will know the importance of emotional intelligence learning in their studies besides self-regulated learning. Emotional intelligence brings out self-awareness among students where the students encompassing their own knowledge to themselves. They also able recognise and understand their behaviours and emotions. Thus, they able to be in control of the stress they endure during examination days. They might act as aggressive to peers, parents which lead to unhealthy relationships. Emotional intelligence creates rational thinkers where students able to understand others’ feelings and help to build and maintain relationships and also get to manage conflict with others.

As a conclusion, multiple regression analysis stated that
SRL is the only significant predictor towards English examination stress among primary and secondary school students in Pasir Gudang. Besides, secondary school students are more capable on acquiring SRL compared to primary school students due to environmental factors such as age, maturity, different learning method, and etc. Thus, secondary school students are more competent on facing examination stress compare to primary school students.

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Conflict of Interest

No

Ethical Clearance

Obtained from Ministry of Education, Malaysia

REFERENCES


Current Teaching Practice of Physics Teachers and Implications for Integrated Stem Education

Muhammad Abd Hadi Bunyamin1*, Corrienna Abdul Talib1, Nur Jahan Ahmad2, Nor Hasniza Ibrahim1, Johari Surif1

1School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia
2School of Educational Studies, Universiti Sains Malaysia, Malaysia

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Abstract  Physics teaching practice is important to be studied because the literature shows that physics has a close connection with the idea of integrated science, technology, engineering and mathematics (STEM). Understanding physics teaching would likely show many features of integrated STEM teaching. However, this assumption needs to be researched. Thus, this study aims to characterize the current practice of teaching of physics to inform the future implementation of integrated STEM teaching.

A qualitative research design was adopted. Three physics teachers were purposefully selected because of their background in STEM education. Classroom observations, semi-structured interviews and documents were used to gather data on usual teachers’ practice of teaching physics. The modified version of integrated STEM teaching framework was used to guide the data analysis. In-depth descriptions on teachers’ teaching practice are provided. This study found that the physics teachers’ teaching practice did not align with their thoughts on integrated STEM teaching. However, they relatively had precise conceptions of integrated STEM teaching. Support should be given to physics teachers to translate their conceptions of integrated STEM teaching into actual classroom teaching practice.

Keywords  Integrated STEM Teaching, Teaching Practice, Physics Teachers, Qualitative Approach

1. Introduction

The Malaysian Ministry of Education (MOE) (2013) has expressed an interest in enhancing science, technology, engineering and mathematics (STEM) education. Many initiatives have been undertaken to reform STEM education such as the introduction of a new science curriculum for secondary schools in 2017 and school-based assessment in 2011. All of these efforts are aimed to transform STEM education to place Malaysian schools in the global education landscape.

Nonetheless, the word of “STEM” has many perspectives. Bybee (2013) has described nine perspectives of STEM. Some of them are: (1) STEM means science and incorporates technology, engineering, or mathematics, (2) STEM means both science and mathematics, (3) STEM equals science (or mathematics), (4) STEM equals a quartet of separate disciplines, (5) STEM is a new discipline (transdisciplinary). Each of the STEM perspective is either single-based discipline or multiple-based. For example, the perspective of STEM equals a quartet of separate disciplines is a single-based perspective while STEM means both science and mathematics is multiple-based. Recent studies have found that teachers now tend to adopt integrated STEM education but with different degrees of integration (Kloser, Wilsey, Twohy, Immonen, & Navotas, 2018; Srikoon, Hanuscin, & Faikhamta, 2017).

In the STEM education literature, the preferred perspective of STEM is integrated STEM (Bryan, Moore, Johnson, & Roehrig, 2016). It is a multiple-based discipline of STEM and is not simply teaching science with additions of other subjects. Bryan et al. (2013) has defined integrated STEM as “the teaching and learning of the content and practices of disciplinary knowledge which include science and/or mathematics through the integration of the practices of engineering and engineering design of relevant technologies” (pp. 23-24). Additionally, Bryan et al. have mentioned that STEM practices and skills in integrated STEM teaching cover scientific inquiry, engineering and engineering design, and mathematical thinking and reasoning.
Many studies have used physics as the primary subject of research on integrated STEM. For example, Kim et al. (2015) have used the topic of Robotic in researching STEM teaching. Other researchers have used the topics of force and motion (Kertil & Gurel, 2016). All of these topics are physics and physics-related. Roehrig et al. (2012) has suggested that physical science has a natural connection with engineering. Roehrig et al.’s claim is true even though they did not provide in-depth explanations about the claim. From this scenario, physics teaching might be the most probable platform for scholars to capture integrated STEM elements than the other subjects’ teaching such as chemistry and biology.

However, many studies have found that implementing integrated STEM teaching is challenging (Czerniak & Johnson, 2014; Stohlmann et al., 2011; Wang, 2012). In general, the challenges are that many science teachers were not trained to use integrated STEM during the pre-service teacher education programs and they have insufficient knowledge in integrated STEM teaching (Siew et al., 2015). These problems impede effective teaching of integrated STEM.

Another issue is that many researches in STEM education have been conducted in higher education settings (Jayarajah, Saat, & Rauf, 2014). The finding from Jayarajah et al.’s review is not surprising because universities can offer many STEM courses that are transdisciplinary unlike schools. School settings are totally different from the universities’ because schools’ systems are more standardized than universities’ hence schools cannot offer many courses created by themselves unlike the universities. This explanation might be best to respond to Jayarajah et al.’s review.

From this scenario, the researchers of this study deem that researching physics teachers’ teaching in schools would be the best option to see how physics teachers teach in actual classrooms. Considering that integrated STEM is not well established in Malaysia and is quite new for many science and physics teachers, the researchers want to characterize the physics teachers’ current teaching practices to inform the way forward to implementing integrated STEM in the future.

The significance of this study is that the results regarding analysis of the physics teachers’ current teaching practices would expose the specific elements of integrated STEM that are available and not. From the analysis, recommendations would be made to improve and enhance teaching of physics using the concept of integrated STEM as the framework of referenced. The results might be transferable to other subjects such as chemistry and biology when appropriate. Recognizing that STEM education researches are not common in school settings, this study would also contribute to the literature in school STEM education.

2. Objective and Research Questions

This study aims to characterize the current practice of teaching of physics to inform the future implementation of integrated STEM teaching. The research question is: what is the current teaching practice of physics in actual classrooms in relation to integrated STEM teaching practice?

3. Literature Review

This review of literature covers the debates of STEM perspectives, studies on physics teaching in relation to integrated STEM, studies on physics teaching, and the conceptual framework of this study. All these three are important to inform readers about the reality of diverse perspectives on STEM, the connection of physics with STEM and the main approach of teaching physics, and the framework that has guided this study.

3.1. Multiple Perspectives on STEM

The literature has shown that STEM has no single perspective. Many perspectives on STEM are available (Bybee, 2013). Bybee has described nine perspectives on STEM (pp. 74–79). The nine have indicated that STEM may be either single-based discipline or multiple-based. For instance, Bybee mentioned about the perspective on STEM that equals a quartet of separate disciplines, science, technology, engineering, and mathematics (pp. 76). It means each of the four STEM discipline is silo and may include four separate courses. On the other hand, one example of the multiple-based discipline is STEM as a transdisciplinary course or program (pp. 78). It means the elements of science, technology, engineering, and mathematics are all integrated to produce a new course such as Smart City that requires use of all STEM disciplines. From the nine perspectives, only two are single-based discipline while others are multiple-based. This shows that the perspectives on STEM are mostly multiple-discipline.

Should STEM be single- or multiple-discipline? Czerniak and Johnson (2014) have conducted a review on interdisciplinary science teaching (pp. 395–411). It shows that the debates of teaching science of either single- or multiple-discipline have been happening for more than a hundred years (pp. 396). Thus, the debates are not new. However, the important thing is to know that few empirical studies have supported the assertion that integrated STEM teaching is more effective than the single-discipline or traditional teaching (pp. 398). The result of Czerniak and Johnson’s review has implied that implementation of integrated STEM teaching might not always be the choice for teaching in practice. Lacks of evidence to say that...
integrated STEM teaching is effective provide a critical question, is it necessary for all physics teachers to adopt this approach?

The researchers of this study (we) deem that the necessity of adopting integrated STEM is varied across teachers. One teacher may take up the approach while others may not, depending on what he or she can do. In this regard, levels of implementation of STEM would be expected. Bybee’s descriptions on various STEM perspectives are referenced. In terms of implementation, and even the planning or thinking of teaching, not all teachers may reach the highest level of integrated STEM, the 9th perspective (Bybee, 2013, pp. 79). The reason is that each teacher may have different conceptions of STEM and thus their teaching practices are diverse. We do not hold the paradigm of postpositivism that tends to “standardize” STEM teaching and meaning. Instead, we want to see how physics teachers teach topics of physics in relation to their thoughts regarding STEM and see the multiple realities of teaching physics which are the paradigm of an interpretivist.

3.2. Physics and STEM

Many studies on STEM have been carried out. Excitingly, the topics used as the subject of research are mostly physics and physics-related. For instance, Kertil and Gurel (2016) have made a theoretical discussion regarding the connection between integrated STEM and mathematical modelling. In their discussion, they used an example of a project-based learning as an example of integrated STEM education. Excitingly, they put a model of rocketry project as the specific example, which is closely related to physics. Designing a rocket requires applications of physics concepts such as Newton laws, impulse, and momentum. Kertil and Gurel have mentioned about these physics concepts in their writing.

The second example is a study by Kim et al. (2015). Kim et al. have used robotics as the subject of research. They studied about pre-service teachers’ STEM engagement, learning, and teaching through robotics using multiple data sources, surveys, classroom observations, interviews, and lesson plans. The reasons for selecting robotics are that it enables students to apply concepts of engineering and technology and to make science and mathematics more concrete than abstract. However, Kim et al.’s did not explicitly mention about the good fit between physics and STEM.

The two studies described imply that physics might be the subject that has the best fit with integrated STEM elements. Other studies (Siew et al., 2015; Roehrig, et al. 2012) have also used topics that have many physics elements. Thus, selecting the physics subject is appropriate and is most likely to show elements of integrated STEM (Bunyamin & Finley, 2016).

3.3. Studies on Physics Teaching

Duit, Schecker, Hottecke, and Niedderer (2014) have made a review on physics teaching. In the review, they identified practical work as one research area that is popular in physics education research. Practical work is vital for physics classes. Teachers usually ask students to do experiments with some guides from teachers’ demonstrations. However, many physics teachers strictly guide their students for doing the experiments, meanwhile students conduct lab work using step-by-step procedures mentioned in lab manuals. For this reason, Hofstein and Kind (2012) stated that doing lab work is mostly about manipulating materials and apparatuses, but not ideas.

According to the national physics curriculum (Ministry of Education, 2005), doing experiments or lab work is recommended. Teachers are suggested to ask students to conduct investigations such as buoyancy, atmospheric pressure, gas pressure, and momentum. In fact, the Paper 3 of the national physics examination asks students to plan for a scientific investigation of a given phenomenon.

In relation to integrated STEM, scientific inquiry is one of STEM practices along with engineering design and mathematical thinking (Bryan et al., 2016). This suggests that integrated STEM is not just about engineering design. Scientific inquiry is still valuable and useful for students to learn physics using concrete materials. Without conducting scientific investigations, students might not be able to “see” physics in tangible manners. For this reason, this study covers engineering design and scientific inquiry as two STEM practices for physics.

3.4. The Conceptual Framework

The researchers have deemed that the studies and writing by Bybee (2013), Czerniak and Johnson (2014), Bryan et al. (2016), Kertil and Gurel (2016), Kim et al. (2015), Moore et al. (2016), etc. are useful and informative. From their studies, the researchers use the framework of integrated STEM by Moore et al. (2016) with minor modifications. The minor is the second construct regarding engineering design. The framework covers:

1. Integration of science and mathematics
2. Use of engineering design and/or scientific inquiry and redesigning/reinvestigating activities for a better student learning
3. Inclusion of real-world contexts
4. Use of student-centred approaches
5. Communication and teamwork among students

The primary intention for using the framework is not to assess physics teachers’ teaching, but is to characterize elements of integrated STEM available in the teachers’ current practice of teaching physics. This study did not want to judge the teachers’ teaching, but to identify elements of integrated STEM that could be strengthened, continued, or added for future teaching of physics.
4. Methodology

The authors adopted an interpretive paradigm for this study. We acknowledged diverse teaching practices of physics teachers and STEM conceptions and tried to understand them. Thus, a qualitative design was appropriate to answer the research questions that were subjective in nature.

Three physics teachers were selected using the purposeful sampling method (Creswell, 2013). Three participants were sufficient because a qualitative study usually involves a small number of participants in order to get in-depth data. The main criteria for the selection of participants were: (1) they all taught physics, (2) they had STEM or STEM-related backgrounds and (3) they must have an academic qualification in physics education. All of these criteria were important to ensure that they were confident to teach physics with sufficient knowledge and skills and also would be able to convey about STEM teaching.

The first teacher was Yusof (not real name) who is a male physics teacher and has been teaching physics since 2009. His current school is located in Johor, Malaysia and is a high performing school. In 2015, he brought a group of students to compete in an international competition of scientific innovations in South Korea, which was related to STEM education. It was a great achievement for him as the mentor of the group. Yusof possesses a master’s degree in physics education and a bachelor’s degree in the same field.

The second teacher was Aliah. Aliah is a female physics teacher who has a status of an excellent physics teacher, awarded by the MOE in 2015. That status was the reason for her selection because she would be able to convey about excellent physics teaching and would be able to relate it with STEM teaching. She has been teaching physics since 2007. Her current school is located in a suburban area in Johor and has shown potential to be an excellent school in the future. Aliah has a bachelor’s degree in physics education.

The third teacher was Maryam. Maryam is a female physics teacher. She has a role in managing international assessment tasks by her school. The international assessments, which were the Program for International Student Assessment (PISA) and the Trends in the International Mathematics and Science Study (TIMSS), were related to STEM education. This role was the reason for her selection. She has been teaching physics since 2010. Her school is located in a suburban area in Johor and has a vision to be an excellent school. Maryam possesses a bachelor’s degree in physics education.

This study was carried out from 1st July 2015 to 2nd September 2015. To get data, we conducted individual semi-structured interviews (Rubin & Rubin, 2012), made classroom teaching observations (Patton, 2002), and collected documents related to the topics taught.

First, we conducted individual pre-teaching interviews for all teachers to get data on the teachers’ preferences of teaching, goals of teaching, and their usual teaching practices. The interviews were around 60 to 70 minutes and were recorded and transcribed. Some of the main questions asked were: (1) what are the goals of your physics teaching? (2) how do you usually teach physics? and (3) what are the reasons for using particular teaching approaches? These main questions were asked to all the physics teachers.

Then, we made classroom teaching observations for six topics of physics: pressure, pressure in liquid, atmospheric and gas pressure, Pascal’s principle, Archimedes’ principle and Bernoulli’s principle (Ministry of Education, 2005). The aim was to get data on the teachers’ actual classroom teaching practices as a way to validate data from interviews. Seven observations were made for Yusof, six for Aliah, and eight for Maryam. The numbers of observations were different because each teacher taught based on her or his personal plan of teaching. The observations were recorded using a voice recorder given to the teachers and were transcribed. When observing the teachers, the principal researcher took free notes of the teachers’ approaches of teaching to inform construction of the post-teaching interview questions as well as to help the data analysis process. The principal researcher also took several pictures of learning materials and products to enrich observation notes.

After completing the classroom teaching observations, individual post-teaching interviews were conducted. The interview was about the teachers’ conceptions of STEM teaching. Some of the main questions asked were: (1) how do you conceptualize STEM teaching? and (2) what would be the reasons for using STEM teaching approaches? These main questions were asked to all the physics teachers. The interview was conducted around 40 minutes for each teacher.

Finally, documents such as lesson plans, teaching slides and written questions given by the teachers to students were collected. These documents were important to strengthen the interview and observation data. The teaching slides and written questions were mostly from commercial companies that provided the teachers and schools with useful learning materials.

When transcriptions of classroom teaching observation recording and interviewing were completed, we referred to the guiding framework of Moore et al. (2016) regarding integrated STEM teaching to frame the data analysis process. First, we set initial codes for each teacher in each data source. For example, we created codes of “teacher-driven questioning” and “lecture” in the observation transcriptions, “dam” and “shoes” in the teaching slides and “integration of science, technology, engineering and mathematics” in the interview transcriptions for Yusof. This was called within case analysis (Saldana, 2013).

Then, cross-case analysis was conducted. Initial codes of
each teacher were grouped into five categories. These categories were formed from the framework of integrated STEM by Moore et al. (2016) with minor changes: (1) integration of science and mathematics, (2) use of engineering design and/or scientific inquiry and redesigning/reinvestigating activities for a better student learning, (3) inclusion of real-world contexts, (4) use of student-centred pedagogy and (5) communication and teamwork among students. In-depth descriptions on the teachers’ teaching practice of physics are provided to reveal the real practice of teaching as the means to extract integrated STEM teaching features. To ensure accuracy of the descriptions, the researchers contacted the three teachers for the member checking process (Merriam, 1998) where the teachers checked the descriptions made. Minor revisions were made accordingly.

Data triangulation was carried out to strengthen the findings. Data from pre- and post-teaching interviews were compared with observation data. The similarities of findings across data sources indicated a strong finding. For example, when Aliah was teaching pressure in liquid, she conducted a design activity (observation data). When she was interviewed, she explained the reasons for doing the activity. Photos of the activity were also taken to show that activity. Thus, observation data, interview data and document data were triangulated.

Finally, we came up with findings that answered the research questions. The main findings were produced when all teachers had a similar physics teaching practice and conception of STEM. However, findings that were unique for a teacher or two were also included to enrich the primary findings.

5. Findings

It is important to mention that this study is not intended to assess teachers’ teaching of physics using integrated STEM framework. The real purpose is to characterize their current teaching practice and to see possible elements of STEM in their practice. The framework of integrated STEM is used as the ideal. Descriptions of the teachers’ teaching practice are provided.

5.1. Student-centred and Teacher-centred Pedagogy

Across the three teachers, two teachers, Yusof and Maryam mostly used teacher-centred pedagogies when teaching all topics while Aliah frequently used student-centred ones. For Yusof, he primarily used the teacher-driven questioning method. One example of the questioning activity is when he was teaching the topic of Archimedes’ principle:

Yusof: What are factors that affect the upward buoyant force?
Student 1: Density.

Yusof: Indeed.
Student 2: The volume of an object.
Yusof: Yes. You just mentioned the density of liquid. If you use different types of liquids that means you have different densities. For instance, we can compare water and seawater. If we place the same apple into two those liquids, what difference can you note of the level of the apple?
Student 1: The apple floats higher in seawater than fresh water.
Yusof: Yes, it does. It floats higher in seawater than fresh water. Then, see the volume of an object. The bigger the object, the bigger the buoyant force because its weight sustains the volume, right? The weight of the apples is equal to the buoyant force. We will see this idea after this. Hence, factors affecting the buoyant force are the volume of an object, the density of a liquid, and the gravitational acceleration.

[Data source: Voice records, 22nd July 2015]

In this type of questioning, Yusof asked questions, students answered them, and Yusof provided feedback to students’ answers.

For Aliah, she mainly used student-centred pedagogies in many of the teaching activities especially when teaching the topics of pressure in liquid (design activities), atmospheric and gas pressure (student presentations) and Pascal’s principle, Archimedes’ principle and Bernoulli’s principle (group discussion). For example, she implemented design activities when teaching the topic of pressure in liquid.

![Figure 1. A Model to Understand Pressure in Liquid.](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAgAAAAAg...)

[Data source: Photos, 6th July 2015]

Each table has bottles to do an activity to prove that pressure in liquid is influenced by height, \( h \). The teacher demonstrated students a big cylinder (Figure 1) that was modified with some holes at different heights. She asked students to produce a similar model in groups. Bottles and hole makers were used to make holes at each bottle.
This activity was a design activity. The teacher made a competition of the best model of pressure in liquid.

[Data source: Observation notes, 6th July 2015]

For Maryam, she mainly used the teacher-driven questioning method when teaching all topics and she adopted a cookbook type of laboratory work when teaching Archimedes’ principle. She asked students to do laboratory work according to her specific instructions and students needed to follow them. One example is provided, with a photo taken on the laboratory apparatuses settings in Figure 2.

![Figure 2. The Laboratory Work of Archimedes’ Principle.](image)

[Data source: Photos, 17th August 2015]

Students were seen taking apparatus for a laboratory activity. The topic was Archimedes’ principle. Each group had apparatus like spring balance, loads, and beakers. The teacher instructed the students to run the experiment step-by-step. The teacher interacted with students using questions to get students’ ideas about Archimedes’ principle. Each group was asked to give ideas why there was a difference in the reading of the weight of the object was due to pressure in air and in water. Another group suggested that there was buoyant force.

[Data source: Observation notes, 17th August 2015]

On the other hand, when interviewed, all teachers indicated that STEM teaching should be student-centred. They mentioned in the interviews that STEM teaching would give more opportunities for students to actively participate in the learning process, and teachers act as facilitators or do not totally control the learning process. For instance, Yusof mentioned that:

What I know about STEM is, it is science, technology, engineering and mathematics. STEM is a complete teaching approach where it involves mathematical calculations in teaching science and includes inventions or innovations to enhance technological use in the future. I feel that STEM is closely related to science subjects.

[Data source: Observation notes, 6th July 2015]

Think that STEM teaching is student-centred where students control the learning process. Students need to question and generate new ideas while teachers do not dominate the learning process.

[Data source: Post-teaching interview, 26th August 2015]

For Aliah, she stated that:

I have heard about the word of STEM. It emphasizes higher-order thinking and the twenty-first century skills and I imagine STEM as the use of science and mathematics into technological applications. I understand that STEM teaching should be student-centred using learning technologies. Probably we can see the use of robots in teaching in the future.

[Data source: Post-teaching interview, 22nd August 2015]

For Maryam, she thought that, “STEM is the applications of science and mathematics in engineering and real-world applications. STEM teaching should be student-centred where students control the learning process and they might present their work more. Teachers are facilitators of students’ learning” [Data source: Post-teaching interview, 2nd September 2015].

Overall, the teachers’ conceptions of STEM teaching seemed to have large contradictions with their usual teaching approaches, except for Aliah. However, they all appeared to have a relatively common conception of integrated STEM teaching: incorporating science with other STEM disciplines and use of student-centred pedagogies. These findings revealed that most of the teachers’ typical approaches of teaching physics did not align with their views on integrated STEM teaching.

5.2. Inclusion of Real-World Applications of Physics

All of the teachers included real-world applications of the physics concepts taught. They all connected physical phenomena such as a floating ship or a boat with Archimedes’ principle and a dam with pressure in liquid. Figures 3, 4 and 5 show the three teachers’ slides of the topic of Archimedes’ principle.

![Figure 3. A Ship and the Buoyant Force.](image)

[Data source: Yusof, 22nd July 2015]
Incorporating real-world applications of physics such as the ships and boats in the Archimedes’ principle learning was particularly relevant to show students the significance of a physics concept in the actual life.

### 5.3. Use of Design Activities

Only one teacher, Aliah, conducted a design activity whereby she asked students to design a tangible model of pressure in liquid using low-cost materials. Students were asked to creatively make holes on the bottle to show the influence of height to the pressure of water.
In the lesson plan that Aliah made (Figure 6), she wrote the word of “mencipta” or in English is called “creating.” The design activity required the students to create the model of pressure in liquid.

In relation to the design activity, Aliah realized that time was not sufficient for her to lengthen the activity in order for students to complete and improve their work. She said during the class that: “Have you done design your models? Any group that has finished can present the model first. Please, we did not have enough time. You will need to present your models and compete with other groups” [Data source: Voice records, 6th July 2015].

5.4. Subject Integration

For the element of subject integration, all teachers believed in the importance of incorporating real-world applications in physics as a way to integrate science with other subjects. They really taught students applications of physics concepts. For Yusof, he stated that, “Physics is one of the branches of science. Science has chemistry, biology and physics. Physics is closely connected to STEM because it includes technologies, inventions, and innovations that require students to think” [Data source: Post-teaching interview, 26th August 2015]. Yusof taught students applications such as ships when teaching Archimedes’ principle (see Figure 3) and other applications such as vacuum cleaners (atmospheric pressure) and hydraulic jacks (Pascal’s principle).

For Aliah, she described that, “Kids are like little engineers. They like to modify objects such as changing their bicycles’ design. We need more of this kind of kids to make learning more concrete by allowing them to apply physics concepts in real-world applications” [Data source: Post-teaching interview, 22nd August 2015]. When teaching topics such as Archimedes’ principle, Aliah taught students the applications such as ships (see Figure 4) and other applications such as dams (pressure in liquid) and Bourdon gauges (atmospheric pressure).

For Maryam, she mentioned that, “I see that physics has many technological applications such as the use of telescope in the topic of Light. I feel that STEM could be applied in many physics topics” [Data source: Post-teaching interview, 2nd September 2015]. Maryam taught students applications such as boats (see Figure 5) and other applications such as aeroplanes (Bernoulli’s principle) and siphons (atmospheric pressure).

Overall, the teachers tended to view the integration of science with other STEM subjects as incorporation of real-world applications in physics learning because those actual applications could mainly cover engineering and technology elements. The teachers inclined to view engineering and technology as the applications of science concepts, such as Bernoulli’s principle that is applied to design aeroplanes.

5.5. Group Work and Communication

Two teachers, Aliah and Maryam practiced teaching that encouraged student teamwork and communication through
group-based learning. The element was not evident in Yusof’s teaching. Aliah asked students to work in groups for design activities (for the pressure in liquid topic) and asked students to make group presentation when teaching the topic of atmospheric and gas pressure. One example is provided.

Students were divided into several groups for a group activity. They were provided with posters and marker pens. There were six (6) groups formed. The teacher asked students to give explanations and to do group presentations. This activity was consistent with one of STEM features, teamwork and communication. Each group needed to choose and present only one application of atmospheric and gas pressure, namely siphon, vacuum cleaner, drinking straw, crushed can, plastic hook and Magdeburg sphere.

[Data source: Observation notes, 14th July 2015]

For Maryam, she asked students to do laboratory work in groups and make group discussion when teaching the topic of Archimedes’ principle.

When you measure the weight of the object (loads) in air and water, they were different in magnitudes. Why did this happen? Please answer my question and rationalize your answer. Each group needs to discuss the question. I want only one answer for each group. You need to write down your answers on the whiteboard.

[Data source: Voice records, 17th August 2015]

From Aliah’s and Maryam’s practices of teaching, teamwork and communication could be applied through in-group design activities, student presentations, and in-group laboratory work and discussion. These various approaches of teaching have provided the students opportunities to exchange ideas and communicate with peers.

6. Discussion and Implications

Overall, the descriptions on the physics teachers’ teaching practice have indicated that the teachers have a relatively accurate concept of integrated STEM. However, their actual teaching practice in classrooms did not totally align with their thoughts, especially when all of them believed that teaching of physics and STEM should be student-centred, but in real practice, they still use teacher-centred pedagogy. Traditionally, Malaysian science teachers have practiced teacher-centred approaches (Thomas & Watters, 2015). This established teaching practice seems to prevail in schools. In this regard, the teachers’ thinking regarding teaching and their real teaching practice did not align. Even though some of the physics teachers practiced group discussion and group-based lab work, this practice of teaching needs to be enhanced because it was still in the large control by the teachers such as one teacher asked students to do lab work according to the teacher’s specific instructions. This type of “cookbook” lab work is the practice of many science teachers around the globe (Hofstein & Kind, 2012). The implication to integrated STEM teaching is that physics teachers need to be assisted to translate their thinking of teaching into actual teaching. This translation is to ensure that they really can work on one critical feature of integrated STEM teaching, use of student-centred pedagogy. Translating integrated STEM teaching ideas into real practice of teaching is proven challenging and scholars (Czerniak & Johnson, 2014; Stohlmann et al., 2011; Wang, 2012) acknowledged it. Therefore, a systematic training is required to ensure the goal of STEM education stated in the Malaysia Education Blueprint 2013-2025 (Ministry of Education, 2013) to improve STEM education is achievable.

Another point is that all teachers tended to value the importance of incorporating real-world applications of physics as the means to connect physics with technology, engineering and mathematics. They really covered the physics applications in their teaching. In relation to integrated STEM teaching, inclusion of meaningful and engaging contexts of learning is central. Nonetheless, the teachers’ teaching practice appear to use the routine-type of solving problems regarding physics applications. This means they use written questions of physics as the means to teach students about the real-world applications. Integrated STEM teaching requires teachers to not simply use routine problem-solving activities. Instead, teachers are required to provide students with real-world problems from the surrounding and students are to solve those complex problems. This would enhance students’ critical thinking and creativity.

In addition to the value of incorporating real-world applications of physics, this element might be able to integrate various STEM subjects, science, technology, engineering, and mathematics. For example, a teacher, Yusof, believed that physics has a close connection with STEM. Yusof’s thought aligned with the literature (Kertil & Gurel, 2016; Kim et al., 2015). Yusof mentioned about inventions and innovations that are tightly connected to STEM. Inventing and innovating solutions go through an engineering design process. However, not all physics teachers adopted design activities except for Aliah, but Aliah’s activity of design was rather simple and less challenging. The implication to integrated STEM teaching is that teachers should be trained to use engineering design as one pedagogy to be used in classrooms. Engineering design is likely to integrate each STEM discipline because students need to apply their knowledge of physics, technology, engineering and mathematics to invent or innovate solutions to real-world problems.

Regarding teamwork and communication, they might be realized in engineering design process and/or scientific inquiry. Two teachers used group-based learning as the means to promote communication and collaboration. This
practice should be continued in the future because it aligns with the integrated STEM teaching.

7. Suggestions for Future Research and Limitation of the Study

For future studies, we would like to suggest scholars to further investigate a critical question, how to implement effective integrated STEM teaching in actual classrooms? This question is central to help teachers to get concrete guides for integrated STEM teaching in real practice.

This study was limited in terms of the small number of participants. For future studies, more teachers could be included to give a better picture of current status of physics teaching in school contexts in relation to integrated STEM teaching. Probably, scholars could also include mathematics, technology, and engineering teachers to enrich perspectives of integrated STEM teaching because STEM disciplines are wide and not only for physics.

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REFERENCES


Preparing Student Teachers to Teach Mathematics with GeoGebra

Nurhashimah Za'ba, Zaleha Ismail*, Abdul Halim Abdullah

Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia

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Abstract

This paper shares the working process that has been carried out in a postgraduate mathematics teacher education course known as Technology in Mathematics Education. Many efforts around the world attempt to train student teachers on the use of technology without giving much attention to appropriate instructional model. Our work in this area gave special considerations in integrating technological pedagogical and content knowledge (TPACK) in training student teachers to teach mathematics with GeoGebra, a dynamic multi-purpose mathematics software. Specifically, this paper shares the (1) theoretical background that guides the structure of the course, (2) the course methodology, which includes teaching and learning activities to prepare 15 student teachers to teach mathematics with GeoGebra and (3) the learning outcomes of the 14 weeks course. The design for integrating teachers’ knowledge of subject matter, and teaching with subject matter with the development of TPACK was discussed. Among the GeoGebra activities emphasized are (1) creating geometric constructions and exploring their mathematical properties (2) exploring ratio and proportions, (3) applying sliders to modify parameters, (4) visualizing algebraic input and functions, and (5) modelling and constructing transformations in geometric designs and animations. Elements of TPACK were traced as the student teachers carried out experimental teaching with GeoGebra in schools as part of the requirement of the course. The Malaysian mathematics curriculum in its latest development has incorporate GeoGebra activities in the textbooks. Hopefully with the course we described in this paper, not only more teachers are willing to adopt GeoGebra but to integrate GeoGebra effectively in their practices.

Keywords

Technological Pedagogical and Content Knowledge, Mathematics Education, Postgraduate Level, GeoGebra, Technology Integration

1. Introduction

Successful integration of technology in teaching occurs when teachers are able to use technology tools to help them obtain information, analyze and synthesize the information, and present it to students professionally [1]. In Malaysia, various efforts have been made to improve, maintain and enhance the mathematics education progress with the development of the technological world today. In National Education Blueprint, the Ministry has spent more than RM6 billion on Information and Communication Technology (ICT) to expand capacity and allow for more customized learning [2]. The funds went towards additional computer labs in every school and delivery of laptops for each teacher in schools. Mathematics teachers are then encouraged to teach mathematics using the latest technology to foster students mathematical thinking. A software known as GeoGebra, is one of the most effective educational software in teaching and learning of mathematics and is being the most highlighted technology medium in Malaysian mathematics curriculum. The new secondary mathematics syllabus also embed GeoGebra activities in the latest textbooks [3].

Teaching mathematics with GeoGebra requires reconstruction of mathematical knowledge, pedagogical and technological knowledge as [4] said that certain software has a potential in treating certain selections of mathematics topics or support certain instructional approaches. TPACK came as a framework to understand teachers’ knowledge toward technology integration in teaching and learning [5]. Thus this type of knowledge should be integrated in courses for teacher training.

With the rapid changes in ICT, mathematics teachers are encouraged to study at the postgraduate level, so they can enhance their teaching to become more proficient and highly trained with the current practices. Numerous efforts had been made through postgraduate teacher education programs to ensure mathematics teachers are adequately trained to develop TPACK.
Traditionally, mathematics teacher education programs have prepared on one course focuses on learning about technology. The challenge is that the student teachers will achieve proficiency in technology integration prior to the completion of their course. However, the problem in most of those courses is they were not focusing on developing mathematics TPACK, instead, they were focusing on increasing ICT skills. Based on [6], there is no common structure for ICT courses in public universities in Malaysia, especially for teacher training to produce highly-trained teachers who will be able to teach with ICT in schools. [7] suggested, to develop TPACK, a concern about teaching with technology should be included in the approaches of the course.

This paper provides the working process that has been done by the authors in a postgraduate mathematics teacher education course, Technology in Mathematics Education. The authors want to share their works on teaching postgraduate student teachers to teach mathematics with GeoGebra throughout the course. Specifically, this paper shares (1) the theoretical background that guides the structure of the course, (2) the course methodology which are teaching and learning activities to prepare student teachers to teach mathematics with GeoGebra and (3) the learning outcomes of the course. This sharing views the goal of this design holds for integrating teachers’ knowledge of subject matter, and teaching with subject matter with the development of knowledge of technology (TPACK).

2. Theoretical Background

Constructivists believe that knowledge is constructed by individuals based on their experiences. [8] explained the view of constructivism about knowledge, learning, teaching and relationship about the constructs. He stated that individuals are assumed to construct their own understandings and meanings by connecting to their existing knowledge with new receiving knowledge and experiences. As the theory, constructivism is where a process of learning occurred caused by adaptive activities in receiving knowledge that required building conceptual structures and self-regulation through reflection and abstraction. Basically, learning is an active process of knowledge construction influenced by how individual interacts with and interprets new ideas and situations. [9] argued that when teachers are adapting new instructional practices, they are experiencing a process of assimilation and accommodation that results in changes in their thinking. This process occurs during the development of TPACK to teach with technologies among mathematics teachers.

The course is guided by a framework of “Knowledge Growth in Teaching” described by [10]. This conceptual framework highlighted the integration of five domain of knowledge that impact pedagogical content knowledge (PCK) – schools, learners, subject matter, curriculum, and pedagogy including PCK. Investigation of PCK research studies provides some insight into the preparation of postgraduate students to develop TPACK. In postgraduate teacher education course, student teachers are prepared with skills in using software technology and abilities to engage students in learning specific topics in mathematics using the technology (GeoGebra) and other supported technological resources (tutorials videos, online manual, video cam application etc). This conceptual framework is developed primarily from a constructivist epistemology proposing the outcome of knowledge, skills and abilities to support teachers in making decision when confronted with many instructional decisions that occur during teaching in the classroom.

In postgraduate teacher education course, we expected that student teachers would involve in constructing their own knowledge of teaching by connecting their existing beliefs, goals, knowledge, and thinking with new knowledge in instructional settings. With respect to teaching with technology, technology education course typically provides a lesson about technology with a unit or discussion on teaching with technology and a requirement that student teachers design lessons to teach with technologies. The experiences during the course is what the development of new knowledge, which is believed as TPACK, is involved. [7] stated that as learners, teachers are involved in integrating new knowledge received from the course into their prior understanding for teaching the content. From constructivist perspectives, their learning is largely originated from personal experiences, and their understanding depend on what they have been taught during the course. In this case, the hope is that their beliefs, knowledge and thinking would grow through the course experiences and instructional practice. These experiences require a process of thinking and decision making of the teachers.

Overall reviews on teacher thinking process related to instructional practice have identified three important components: planning during the preactive (prior to teaching) stage [11], monitoring and regulating during the interactive (teaching) stage [12], and assessing and revising in the postactive (after teaching) stage [13]. These components found in the teacher metacognitive framework [14]. Reference [15] claimed that the development of an integrated knowledge structure for typical expert teachers requires experiences focused on an integration of these teaching stages. In postgraduate level course, student teachers must be challenged to reconsider their subject matter content (that they learned from graduate level or teaching experiences) and the impact of technology on the development of that subject itself as well as on teaching and learning that subject.

While [11-15] explanations provide more clarify to teachers thinking about instruction, reference [16] argued that differences could be occurred in teachers’ actions when teaching mathematics with various technologies. [16] described such differences in his innovation-decision process framework when working with innovation,
whether to accept or reject a particular innovation. Our study refers to this framework to understand decision-making experiences that provide the critical actions in support of teachers’ knowledge, belief, goals and thinking for the growth and maturation of teachers’ professional development.

3. Course Methodology

A. The course

The postgraduate teacher education course for this study held in a public university in Malaysia, met for 3 hours at every Wednesday, every week in first semester of 2017/2018. There are 15 weeks for one semester and one mid-semester break at Week 6. The learning lessons specifically emphasized on teacher professional development toward appropriate teaching with nowadays technological instructional tools or software in mathematics curriculum. GeoGebra was chosen as the software applied in this course as it is being the most highlighted technology medium in Malaysian mathematics curriculum. The course originally discussed the issues of computer applications in mathematics education with emphasis on its special role in teaching and learning processes. The authors, one is a mathematics educator with many years of experiences and another is an educator assistant. Mathematics educator had previously taught the course form past semesters and had years of teaching experiences. In that semester, student teachers learned a teaching and learning lessons with GeoGebra to develop their TPACK.

B. Students Background

15 postgraduate students are enrolled in this course; most of them are mathematics teachers and still teaching mathematics in schools, while, the others are fresh graduate who continue their study to postgraduate level. We are informed that the students who are mathematics teachers are still teaching while attending the course. These students had previously earned at least a Bachelor’s degree including subject matter requirements for their proposed teacher areas. There are three distinct degree streams within the students: science mathematics, mathematics education and education. All degrees are accredited. Most students have already specialized in science, mathematics, technology and education. The descriptions of the students’ background are as follow:

[1] Ten of them are mathematics teachers who have teaching experiences between 3 to 15 years and five are fresh graduate

[2] Six of them from bachelor of education and nine from bachelor of science mathematics

[3] Majority are familiar with computers and technology application

[4] The students are taking the course at second or third semester of their postgraduate study

Understanding the differences, we do not find it as problems to us because we consider their differences and degree specialisms are still in the set. We believe their differences is an aid to them to cooperate with each other in order to increase their professional development into a wider technology and computer integration.

C. Teaching and Learning Activities

The course used a multi-dimensional approach for teaching and learning activities. There are so many teaching approaches include lectures, demonstrations, discussion, laboratory work and academic forum. In the course, we let student teachers did hands-on experiences, discussion and cooperative learning, and independent study on applying technology in teaching and learning mathematics.

For the first two weeks of the course lessons, we gave a brief explanation about the course outline to the students. Firstly, the students will be explained the synopsis of the course, the learning outcome and the first introduction lessons about TPACK, nowadays open source movement and GeoGebra. We incorporate with the students upon understanding of the potential for learning technologies to work as tool to teach mathematics.

Second sessions, we gave lectures and demonstrations on teaching and learning mathematics with GeoGebra. The next several weeks before semester break, the students would be taught a basic use of GeoGebra and exploring its applications. Teaching and learning with GeoGebra can be many ways, include demonstrations, explorations and modelling, constructions of mathematical objects and experimental work [17]. For the course, the educator teach and demonstrate the students to (1) create drawings and geometrics constructions such as rectangle, square, parallelogram, equilateral triangle and regular polygons, (2) explore ratio and proportions, (3) applying sliders to modify parameters, (4) visualize algebraic input and functions, and (5) model and create transformation in geometric design and animation, using GeoGebra application. During the activities, we guide our students to always analyse every activity by comparing the results of learning the mathematical concept using GeoGebra with other conventional methods. Through these activities, the students are focused on making decision about issues of teaching with technology.

After semester break, the instructions are more focus on applying GeoGebra in problem solving and designing technology based lessons. The educator gives mathematics problems and along with the students, we let them discuss to solve the problems within their own group. Example of the problems as below:
• Find the center of a circle without and with GeoGebra.
• Imran who stays in Trabzon heard that his friend in Ankara injured himself in a car accident. Imran would like to bring a walking stick 42 inches long by train to his friend. The train service would only allow passengers to carry object that is not more than 36 inches long. How can he package the walking stick?
• Arrange 5x5 points on a piece of paper. Draw 5 circles that pass on at least one point. All the 5 circles pass through all 25 points. Do this task without GeoGebra and then with GeoGebra.
• Ibrahim’s mother is critically ill and being hospitalized. At that time in their piggy bank, Ibrahim have 60 50cents coins and 28 25cents coins while his younger brother has 30 50cents coins and 20 25cents coins and 100 5cents coins. While their mother is in the hospital, Ibrahim give away for sadaqah 50cents per day while his younger brother gives 25cents per day. On what day will both brothers have same amount of money left?
• Hasbul is 8 years older than Nurul Ain. Four years ago, Hasbul age is 5 times Nurul Ain. How old are they?
• A factory owner Mr Mok makes drinking glasses of volume 300cm$^3$ in the shape of right circular cylinder open at the top. Find the dimensions which use the least material.

The student teachers explore a variety of mathematics problems that can be solved using GeoGebra and might be considered in the curriculum. We are also making some discussions with the students to compare teaching strategies which are suitable with the problems using or not using GeoGebra. These activities were designed to help student teachers to become proficient with the use of GeoGebra application. Moreover, through these activities, the student teachers are focused on thinking and decision making about issues of teaching with GeoGebra. We focus on letting student teachers to design GeoGebra mathematical problems and worksheets, so it might help them to design lessons for the main learning outcomes of the course.

4. Outcomes

We expect the learning outcomes of the course can be analysed through a group project assignment that we designed for the student teachers. The student teachers must complete a group project where the groups are expected to prepare GeoGebra mathematics teaching lesson plan, go to school to teach the lessons to small group of students outside from the class times. From the beginning, the 15 student teachers have been divided into five groups with three group members in each group. Each group had at least one mathematics teacher as a member so that it is convenient to conduct geogebra lessons in schools. After the semester break, the course is more in depth into providing some instructions and supporting for writing lesson plans and teaching.

TPACK can be assessed from analyzing the designed lesson plan [18]. The lessons must demonstrate a clear subject matter of mathematics lesson, teaching strategies to mathematics learning, designed GeoGebra techniques that can support transfer of knowledge, support together the teaching strategies to the lesson objectives, align GeoGebra techniques to the lesson objectives, support GeoGebra to the teaching strategies and fit together within mathematical content, teaching strategies and GeoGebra techniques. For early assessment, at Week 8 of the course, the groups must present their lesson plan (using PowerPoint) in the class so they can get some feedback and advices for improvements of their plans before they teach the lessons to the students.

Starting week 9 until week 12, the groups were allowed to teach the lessons that they designed and planned to the students at the schools that they have chosen. The lessons must span around six to eight hours of teaching and learning activities with integration of GeoGebra. The student teachers have to do a full report which compiled their experiences and learning for this project. At week 15, the report must be submitted to be assessed. The teaching activities that took place in schools were videotaped so that they can reflect on the teaching experiences in which they consider how to improve the lesson and their own teaching and put in the report. Assessment through teaching practices focus on the teacher students thinking processes to consider the multitude of variables that affecting the success of a lesson in guiding students’ progress toward the lesson objectives. By the end of the semester, all groups had accomplished in working on the group assignment.

From our observations based on their videos and written reports, both the teachers and students were very comfortable working with geogebra in the mathematics classrooms. The lessons were conducted in the school computer labs such that students could worked on hands-on activities. They ensure that in their teaching not only they introduced the technical aspects of geogebra but also highlighted the mathematics concepts behind the mathematical constructions. For example in teaching translation, by constructing an object being translated through a vector, students can experiment the constructions to discover the properties of translation. Further in the follow up activity, they could apply this concept of translation along with rotations, scaling and reflection, creative constructions such as an animated fish or moving airplane were successfully achieved. This kind of enriched teaching that go beyond the teaching of concepts required teachers to have knowledge not only on mathematical content and pedagogy but also the blending of pedagogical content knowledge which is an important component of TPACK.
5. Conclusions

The process of TPACK development is the process of how TPACK is gained or developed progressively to understand the relationship between the integration of new technology in teaching mathematics among teachers and their professional development. Using GeoGebra as the technology to be integrated, our aim is to understand the process of gaining TPACK in depth in the postgraduate technology mathematics education course. As the aim of this paper is merely sharing our efforts in training to teach mathematics with Geogebra, we keep the complete analysis of the TPACK development in other coming publication. As such, for ongoing professional development, our investigation through technology mathematics education course would led to the goal of the community to see technology can be integrated effectively in school practices. The Malaysian mathematics curriculum in its latest development has incorporate geogebra activities in the textbooks. Hopefully with the course we described in this paper, more teachers are willing to adopt geogebra effectively in their practices.

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REFERENCES


Resilience in Mathematics, Academic Resilience, or Mathematical Resilience?: An Overview

Nur Hidayatul Fitrah Binti Ishak*, Nur Fatihah Binti Mat Yusoff, Amalia Madihie

Faculty of Cognitive Science and Human Development, University Malaysia Sarawak, Malaysia

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Abstract

Aim: To analyze the concept of resilience in mathematics subject based on three-term use; resilience in mathematics, academics resilience in mathematics, and mathematical resilience. Background: Resilience in academics is a contemporary focus, especially in mathematics subjects. A few terms and concepts of resilience in mathematics subjects introduced, and recently, the term mathematical resilience has received attention and become based on other resilience research in mathematics. Methods: The primary database is Scopus and Google scholar. The keyword use is (a) resilience, resiliences (b) mathematics (c) subjects (d) students, child, adult, to identify the relevant article. Two reviewers are involved in screening and filtering the article in the data extraction process. The screening process is based on the definition, attribute, model use, issue tackle, and approach to tackle the issue. Results: There are 82 articles found both in Scopus and google scholar and Scopus, and 29 were used in the final data analysis. The finding shows that resilience is considered as a personal attribute in a person, which results from the process of adapting to the environment or situation that is challenging. Every term uses a different kind of model to represent resilience but origin from the Bandura Self-Efficiency mechanism. Conclusion: This study provides the meaning of resilience for each term and the differences between them. Even though the world resilience almost similar purpose, the application in each field is different. Future studies should focus on the process and intervention to boost resilience.

Keywords Resilience, Academic Resilience, Mathematical Resilience, Mathematics

1. Introduction

During these few decades, resilience in academic problems has undergone extensive research. Some researchers focus on specific subjects, some focus on the whole learning life journey. Therefore, many models have been developed to portray resilience in academics. In mathematics subjects, many studies on resilience have been done to prove that resilience is one of the reasons for student success in mathematics. Instead of focusing on the backstory, they try to provide the environment and learning strategy that able to help the student overcome their hardship. The student tends to exhibit bad feeling, especially anxiety when they are working on mathematics problem or attending mathematics class.

Their problem can be detected since kindergarten, especially when the performances are consistently poor (1). While mathematics has imaged as a hard subject, complicated and cause of fear (2), these group of people who has resilience able to overcome it and this draw researcher attention to focus on how the resilience built in them. Many questions revolve, causing this topic to become a depth study. Is resilience a process? Or a personal characteristic? Is resilience is the same for other subjects? Or is there any specific resilience for a specific problem? Do Educational Resilience/Academic Resilience are same with Resilience in Mathematics? Is Mathematical Resilience different from ordinary resilience?

2. Resilience

An act to rebounded back after an adverse situation (3) or criteria of a person to display specific positive outcomes after experiencing risk (4,5). According to the dictionary, resilience has two meaning:

I The capacity to recover quickly from difficulties; toughness.

II The ability of a substance or object to spring back into shape; elasticity (6)

There have been many studies that try to uncover the
meaning of resilience. Since early 1970, people try to
describe resilience from a psychology perspective.
Bandura's theory on self-efficiency mechanism has become
the foundation of the related theory to describe resilience. It
is regarding a person's ability on how to react, to thought
when facing harsh situations (7). The word resilience when
interpreted in psychology perspective, there are three
phenomena that they always use is
I Good outcomes despite the high-risk status
II Sustained under threat,
III Recovery from trauma (8)

All of the studies that using resilience with a variable
coming out with similar finding, which is human has
capacities to have protectives factors for development. It
can be described either as a process or as an attitude in a
person when they face hardship (9). The studies on
resilience are always covering this three category which is
individual studies (related to trauma and risk recovery),
high-risk group (comparing two groups that have a better
outcome than other individuals) and ability to adapt despite
the stressful situation (10).

Since there are many studies regarding resilience toward
mathematics subject, we are going to divide the discussion
into three-term
I Resilience in mathematics
II Academic resilience in mathematics
III Mathematical resilience in mathematics.

3. Resilience in Mathematics

There have been only a few studies that define the term
resilience that relates to mathematics subjects. According
to Hernandez-Martinez & Williams (2013), resilience in
mathematics is student reflexivity in making the decision
when encountering a new situation. This opinion adapts
from the Bourdieu's relational view of social and cultural
capital as the capacity for a person to apply agency in a
field which is
1. Incorporated in the habitus,
2. Objectified in artefacts or,
3. Institutionalized, (12).

In a study that is using this definition, they interview two
students, Jenni and John, in the transition from compulsory
school to college and university. Despite coming from a
background that does not promote further education, they
able to overcome the situation where they undergo a
reflective process that allows both of them to adjust to the
situation. When an encounter with a problem, John makes
self- reflection that makes them conscious of developing
institutional capital. He takes full advantage of what is
provided and strive better than others. This concludes that
mathematics learning requires reflective works and think
out of the box (11).

Among ‘Black’ students, there is a trajectory model
composed to represent resilience in them toward
mathematics and engineering (figure 1). To understand the
coping mechanism in ‘Black’ student, Mcgee (2009) refers
to a PVEST model developed by Spencer (2006). The
model starts with an assumption on an individual's
perception of their environment and experience that is
important in gaining understanding about the Black student
response.

Based on the PVEST (figure 2), he comes out with a
resilience trajectory is a developmental process that
occurred over time. Fragile forms of resilience were
dominant during early school experience among the
participant; then, over time, robust resilience takes part.
High achievement in mathematics that focuses on racial
stereotypes is considered a fragile form of resilience. The
racial stereotype in social institutions occurs due to
historical racism that has been foster for so long (15). This
model can explain how the resilience change in students
from fragile to robust.
Figure 1. Model for Trajectories of Resilience among Successful Black Mathematics and Engineering Student

Figure 2. Phenomenological Variant of Ecology Systems Theory (PVEST)
4. Academic Resilience in Mathematics

Academic resilience or educational resilience is defined as “the heightened likelihood of success in school, and other life accomplishments despite environmental adversities brought about by early traits, conditions, and experiences” (Wang, Haertel, & Walberberg, 1994). It is the student's ability to gain success despite being under depressed or harsh situation compared to his other peers. Related to mathematics subject, since many students faced long-tail under-achievement or failure, there are few studies using academic resilience to find out how some students able to gain success despite some obstacles.

A study was done by Borman and Overman (2004) among poor and minority students to understand what is the feature that helps the students become more resilient when learning mathematics subjects. He does not define what resilience concept in his study is; however, the opinion was individual, and school characteristics related to academic risk and resilience, which adapt from Garmezy (1991) that recognized among the high-risk group that encounters some difficulties; many individuals manage to achieve success despite the harsh condition. The resilient in a student can increase or decrease over time, depending on their protective factors.

Some of researchers use model to represent academic resilience in mathematics subject the model of Self-Efficacy, Coping Skills and Educational Aspiration (Hope) with antecedent to Bandura social cognitive framework (figure 3) (20). Based on the analysis done Zhaomin, (2014) the result shows that Hope predicts student performances the least, which resulted in overlapping with their coping skills. Coping skills are the latent factors able to measure student performances in mathematics. Family background, cultural, or any risk situation that occurs in student life can be overcome if they have excellent coping skills. This attribute model that has been purposed shows that positive attitude, and their hope gives student power to remain resilient despite the environment adversity.

5. Mathematical Resilience

The new emerging concept to study resilience in mathematics is mathematical resilience. Since 2008, there have been many papers produce to discuss the use of mathematical resilience. It is an approach that assembles all the support needed to encounter mathematics problems. For many people, mathematics is something that they need to face until the end of school, but many choose to avoid it as soon as school is over (22). There are four aspects of mathematical resilience which are:
- Growth mindset
- The personal value of mathematics
- Knowing that mathematics requires struggle
- And knowing how to find support when pursuing mathematics learning.

This aspect is considered to exist by other researchers such as Bandura (1995) Hernandez-Martinez & William (2013), Dweck (2000) and Ryan and Deci (2000). When a student exhibits mathematical resilience, he or she will be characterized by a growth mindset. A growth mindset is a belief where with desire and effort, everyone can learn mathematics. It emphasizes the ability of the brain to develop with skills and resilience when the faced problem (26). It is a change from "I cannot" to "I can."

To change the mindset of a student in learning mathematics can be hard, especially when they already suffer anxiety and learner helplessness. The growth zone model (figure 4) is developed to bring the idea in approaching the mathematical problem which adapts from Vygotsky (1978). This model will enable the learner to understand their feeling when they are working in solving a mathematical problem.

Based on the diagram, there are three zones, which are anxiety or danger zone, growth, and comfort zone.

- Anxiety or danger zone: Offline zone where learner encounters bad memories when learning which lead them to feel danger when talking about mathematics
- Growth zone: Learner able to learn and progress as more time taken in this zone. They will be challenged to some degree and generate some novel idea.
- Comfort zone: Learner will feel comfortable to work with mathematics and develop fluency in this subject (22).

Many studies use mathematical resilience as a measure to understand resilience in mathematics. Since academic resilience is considered in the opposite direction toward learner helplessness, mathematical resilience is a subset of
the resilience which allows a learner to approach their anxiety and allow them to learn.

The issue that relates to mathematical resilience is mostly related to anxiety and learner helplessness. For example, in their study, stated to overcome repeated failure among students, it is by implementing mathematical resilience in them. This study also has the same concept as a study done by Goodall and Johnston-Wilder (2015). Cropp (2017), in his study, states that mathematical resilience maybe one of the solutions for mathematical anxiety problems. Mathematical anxiety or mathematics anxiety is the feeling of tension and stress when dealing with a number or solving mathematical problems in life (30).

Mathematical resilience can be concluded as a positive stance when learner find mathematics is challenging, and they will find new strategies to overcome it. There are three effective domain to be a resilient mathematical learner which are Value (consider experience learning mathematics is valuable), Struggle (recognize that everyone face hardship with mathematics) and Growth (a belief that all people can develop mathematics skills) (22).

6. Conclusions

This overview is done to have a better understanding of how to describe resilience in mathematics. We came up with a table (Table 1) to understand the differences between these three concepts.

The studies on resilience on mathematics subject will keep growing year by year, and this will change the interpretation of the three-term use depend on the direction of the studies done. There are many aspects of resilience that need a precise definition, such as how is resilience describe in developmental psychology, social, and other fields. The only clear definition we have is 'Resilience is an act or behavior or attribute result from adapting adverse situations.' Future study should focus on how the process of resilience happen in a person and also more intervention needed to boost up resilience, especially in mathematics. Since attention on educational psychology rises day by day, there is hope that in the future, there will be a clear border on which concept the researcher will use for the study. We hope this overview will help in understanding the term resilience use relate to mathematics subjects.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Resilience in Mathematics</th>
<th>Educational/Academic Resilience in Mathematics</th>
<th>Mathematical Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition</td>
<td>Behaviour that results from the process adapting with new situation or risk</td>
<td>An attribute in a person that displays based on the environment.</td>
<td>Positive stance when a person finds mathematics is challenging, and they will find new strategies to overcome it</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process / personal quality</th>
<th>Personal quality</th>
<th>Personal quality</th>
<th>Personal quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model involved</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resilience concept (31)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVEST (14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resilience and Vulnerability (18)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The concept of resilience (20)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth mindset theory (26,27)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Issues tackle |                  |                  |                  |
| Students at risk (family background, race, identity, family income). |                  |                  |                  |
| Student at risk (family background). |                  |                  |                  |
| School environment. |                  |                  |                  |
| Mathematics anxiety. |                  |                  |                  |
| Learner helplessness. |                  |                  |                  |

| Approach to tackle issue |                  |                  |                  |
| Intervention on teaching use by educators. |                  |                  |                  |
| Modifying the school environment from traditional to a more communitarian school model. |                  |                  |                  |
| Implement good coping skills. |                  |                  |                  |
| Coaching (for non-mathematical instruction). |                  |                  |                  |
| Peer mentoring. |                  |                  |                  |
| Problem-based learning. |                  |                  |                  |
| Cognitive behaviour therapy. |                  |                  |                  |
REFERENCES


[21] Zhaomin H. Examining the Academic Resilience in Mathematics Performance for the Underprivileged Ninth Graders Using the National Data from the High School Longitudinal Study [Internet]. Texas Tech University, Texas, USA; 2014. Available from: http://hdl.handle.net/2346/58948


Myers-Briggs Type Indicator (MBTI) Personality and Career Indecision among Malaysian Undergraduate Students of Different Academic Majors

Lee Wai Kin*, Mohd Rustam Mohd Rameli

School of Education, Universiti Teknologi Malaysia, Malaysia

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Abstract Due to the exam oriented Malaysian education system coupled with societal preconceived notions of a supposedly ideal career, Malaysian undergraduates lack the opportunity for career exploration, resulting in career indecision. Therefore, clearer understanding of their own personality can potentially guide Malaysian undergraduates in analyzing their own strengths and weaknesses as well as in processing career information and environment, which in turn helps in their career decision making. As such, the purpose of this study is to investigate the link between MBTI personality type, academic major and career indecision among Malaysian undergraduates, since such studies in the Malaysian context are lacking in current literature. A quantitative research design was employed and the respondents comprised of 500 sophomore (Year 2 and Year 3) undergraduate students from six different academic majors (Engineering, Science, Architecture, Education, Human Resources and Computing) in Universiti Teknologi Malaysia, obtained via stratified random sampling. Myers-Briggs Type Indicator (MBTI) and Career Decision Difficulties Questionnaire (CDDQ) were used as the instruments in this study. Descriptive and inferential statistics were used to analyzed the results of this study. Chi-Square Test revealed significant association between academic major and two MBTI personality constructs. ANOVA demonstrated significant differences between means for career decision when comparing Engineering-Education undergraduates as well as Engineering-Computing undergraduates. The study has demonstrated to some extent, the association between MBTI personality and academic major, in which the findings can be potentially applied to optimize one’s performance in a selected major, in turn reducing career indecision.

Keywords Myers-Briggs Personality Type, Career Indecision, Academic Major, Malaysian Undergraduate Students

1. Background of Study

Due to the lack of exposure to various real-life vocational information and experience at high school education phase among young Malaysians, there is a considerable possibility that Malaysian undergraduate students make decisions of their majors in their tertiary education without proper justification. This results in career indecision, the inability in choosing desired university major or vocation as they move on towards the work realm. Malaysian students mainly make such decisions based on assumptions and societal expectations because of the struggle in identifying their real interests. This vocational cluelessness can also be attributed to the Malaysian secondary and pre-university education system whereby the subjects taken by students are largely determined by the schools’ prescription, rather than the actual domains that students want to explore. Brown reported that a large number of college students showed indecisiveness in selecting initial vocational preferences. Counselling research reported by Herr, Cramer and Niles portrayed that more than 50% of university students encounter career-related problems such as career maturity, career readiness, career self-efficacy and career exploration, ultimately resulting in career indecision. Apart from this, there are many occupational categories and industries that remained alien to Malaysian graduates nowadays, thus lowering their chances in obtaining a desirable career.
1.1. Problem Statement

Theoretically, final year undergraduates aged 21–23 should have undergone career crystallization and specification of career option\textsuperscript{11}, whereby they form self-concept to match their interest and work-related abilities. In fact, Ramlee and Maimun as well as Makki, Salleh, Memon and Harun, stated that career exploration is necessary for youth to gain opportunity in making connection between academic and practical subjects with work-related skills, starting at secondary school level.\textsuperscript{10,14}

However, due to the rigidity of the Malaysian education system coupled with resultant societal perception of a ‘good career’\textsuperscript{13}, Malaysian students lack the opportunity for career exploration in the attempt to match their own personal attributes such as personality, interests, skills and values with real-life occupational demands in the market\textsuperscript{11}. Reece\textsuperscript{15} reported that career undecidedness is positively correlated to stress, implying the effects of career indecision to one’s psychological well-being. There are several studies on the relationship between career indecision and personality, using the Five Factor Model. However, there is a lack of empirical studies that links career indecision with personality based on the Myers-Briggs Type Indicator (MBTI), especially in the Malaysian context among different academic majors.

1.2. Objectives

The objectives of this study are as follows:
1. To study the most prevalent MBTI personality type among UTM undergraduate students of different academic majors.
2. To study the career indecision level of UTM undergraduate students across different academic majors.
3. To investigate the association between MBTI type and academic major of UTM undergraduate students.
4. To investigate the differences of career indecision across academic major of UTM undergraduate students.

2. Methodology

A cross-sectional quantitative research design was utilized to fulfil the objectives of this study. This study focuses on the population of sophomore undergraduate students (second or third year of study) in Universiti Teknologi Malaysia (UTM) from six Schools under different academic majors (Mechanical Engineering, Science, Architecture, Education, Human Resource and Computing). A total of 500 sophomore undergraduate students were sampled via stratified random sampling based on the six selected Schools in UTM.

The instruments used for this study were Myers-Briggs Type Indicator (MBTI) adapted from Chang\textsuperscript{3} as well as Career Decision-Making Difficulties Questionnaire (CDDQ) developed by Gati, Krausz, and Osipow\textsuperscript{5}. Objectives 1 and 2 were analyzed using descriptive statistics while the analysis for Objectives 3 and 4 were in form of inferential statistics (Chi-Square Test and ANOVA respectively).

3. Findings

Table 1 illustrated the descriptive analysis for MBTI personality types of sophomore undergraduates in UTM across six different academic majors.
Table 1. Frequency and Percentage of MBTI Personality Types Based on Academic Major

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E f (%)</td>
<td>I f (%)</td>
<td>S f (%)</td>
<td>N f (%)</td>
<td>T f (%)</td>
</tr>
<tr>
<td></td>
<td>(52.80)</td>
<td>(47.20)</td>
<td>(65.60)</td>
<td>(34.40)</td>
<td>(70.40)</td>
</tr>
<tr>
<td>Engineering</td>
<td>66</td>
<td>59</td>
<td>82</td>
<td>43</td>
<td>88</td>
</tr>
<tr>
<td>Science</td>
<td>49</td>
<td>46</td>
<td>65</td>
<td>30</td>
<td>67</td>
</tr>
<tr>
<td>Architecture</td>
<td>37</td>
<td>29</td>
<td>26</td>
<td>40</td>
<td>33</td>
</tr>
<tr>
<td>Education</td>
<td>50</td>
<td>11</td>
<td>43</td>
<td>18</td>
<td>41</td>
</tr>
<tr>
<td>Human Resource</td>
<td>44</td>
<td>24</td>
<td>51</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td>Computing</td>
<td>46</td>
<td>39</td>
<td>57</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>Overall</td>
<td>287</td>
<td>205</td>
<td>317</td>
<td>175</td>
<td>320</td>
</tr>
</tbody>
</table>

E=Extrovert, I=Introvert, S=Sensing, N=Intuitive, T=Thinking, F=Feeling, J=Judging, P=Perceiving (f = frequency)

Table 2. Frequency and Percentage of Career Indecision Levels Based on Academic Major

<table>
<thead>
<tr>
<th>Academic Major</th>
<th>Career Indecision</th>
<th>Lack of Readiness</th>
<th>Lack of Information</th>
<th>Inconsistent Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low f (%)</td>
<td>Mod f (%)</td>
<td>High f (%)</td>
<td>Low f (%)</td>
</tr>
<tr>
<td></td>
<td>(12.60)</td>
<td>(67.80)</td>
<td>(19.60)</td>
<td>(18.20)</td>
</tr>
<tr>
<td>Engineering</td>
<td>13</td>
<td>85</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td>Science</td>
<td>8</td>
<td>70</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>Architecture</td>
<td>8</td>
<td>38</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>Education</td>
<td>13</td>
<td>35</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Human Resource</td>
<td>8</td>
<td>47</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Computing</td>
<td>13</td>
<td>64</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Overall</td>
<td>63</td>
<td>339</td>
<td>98</td>
<td>91</td>
</tr>
</tbody>
</table>

*Level of Career Indecision: Individual Mean Score of 1.00-2.33=Low; 2.34-3.67=Moderate; 3.68-5.00=High (f = frequency)
Based on Table 1, the most prevalent MBTI type for each academic major were respectively Thinking for Engineering major, Judging for Science major, Intuitive for Architecture major, Extraversion for Education Major as well as Sensing for Human Resources and Computing major. Based on Table 2, undergraduates who scored high in the construct of lack of information of career indecision was higher compared to the other two constructs. Table 3 showed that the undergraduates from the major of Engineering and Architecture obtained the first and second highest mean for overall career indecision. Meanwhile, the two majors with the lowest mean were Education and Computing.

Table 4. Chi-Square Tests (Direction of Energy Flow X Academic Major)

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>19.28a</td>
<td>5</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>20.821</td>
<td>5</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>2.600</td>
<td>1</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.58.

According to Table 4, Chi-Square test showed significant association between academic major and Direction of Energy Flow (MBTI construct), \( \chi^2(5, N=500) = 23.42, p = .000, \phi = 0.216 \).

Table 5. Chi-Square Tests (Perception of the World X Academic Major)

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>23.416a</td>
<td>5</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>22.538</td>
<td>5</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.817</td>
<td>1</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.47.

Table 6. ANOVA (Career Indecision X Academic Major)

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>9.638</td>
<td>5</td>
<td>1.928</td>
<td>4.133</td>
</tr>
<tr>
<td>Within Groups</td>
<td>230.386</td>
<td>494</td>
<td>.466</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>240.024</td>
<td>499</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7. Robust Tests of Equality of Means (Career Indecision X Academic Major)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welch</td>
<td>4.272</td>
<td>5</td>
<td>207.097</td>
</tr>
<tr>
<td>Brown-Forsythe</td>
<td>3.907</td>
<td>5</td>
<td>384.013</td>
</tr>
</tbody>
</table>

a. Asymptotically F distributed.
As shown in Table 6 and Table 7 respectively, Classic ANOVA \( F(5, 494)=4.133, p=.001 \) and Welch’s ANOVA \( F(5, 207.097)=4.272, p=.001 \) showed that there was significant difference between career indecision and academic major. Thus, Tukey post hoc test was computed as referred to Table 8, indicating significant differences of mean score of career indecision between undergraduates from engineering and education major, as well as between undergraduates from engineering and computing major.

### 4. Discussion

Based on Table 1, the most prevalent MBTI function for Engineering major was the Thinking under the dichotomy of Decision-Making Style, in which can be explained as the nature of engineering profession which requires much critical thinking and problem-solving skills in constructing effective mechanical models which are feasible for actual application\(^1\). Rosati\(^10\) reported that graduates with I_TJ MBTI profile dominate the engineering major. Judging function under the dichotomy of Life Structure was the most prevalent for undergraduates in Science major. This could be attributed to methodical and systematic nature of scientific experiments, whereby Science undergraduates needs to be organized and rule-abiding to minimize error in their laboratory works. Ware\(^21\) reported the high prevalence of Judging (92%) type function among pharmacy students. Rottinghaus, Lindley, Green and Borgen reported that conscientiousness, which corresponds to the Judging type is associated to good planning and organizational skills\(^17\).

The Intuitive function tend to be highly prevalent among Architecture undergraduates, as being creative and having abundant of ideas could be advantageous in producing ground breaking architectural designs. Most undergraduates from the Education Major tend to be extroverts, which could be a pre-requisite or catalyst to be effective in implementation instructional strategies as well as interaction with students, as supported by Rottinghaus, Lindley, Green and Borgen\(^17\). For both human resources and computing major, the most prevalent MBTI type was Sensing. This can be elucidated due to the fact that the tasks in both fields require high level of attention to detail, and are of less need for the in-depth interpretation of the meaning behind the tasks.

With reference to the Chi Square analysis, there was a considerable association between two MBTI dichotomies (E/I & S/N) and academic decision. This means that for the case of direction of energy flow (E/I) and perception of the world (S/N), the selection of an academic major that is compatible with one’s MBTI typing can potentially facilitate their learning and adaptability in that discipline, which in turn boost the chances of excelling in careers of corresponding field.

Based on Table 2, the endorsement of high score for CDDDOQ occurred most under the construct of Lack of Information compared to the other two constructs. This implies that students had a harder time obtaining career-related information, either about their own abilities and personality or about the characteristics of a particular occupation. This can be supported by the fact that the Malaysian education system may have placed too much emphasis on examination and academic grades\(^19\). Therefore, there is a lack of priority to promote self-development or career exploration programs at school and university levels, in order to provide a better channel for students to obtain information on their potentials as well as prospective career options\(^12\).

Based on comparison of means and ANOVA, career indecision of undergraduates from Engineering were significantly higher than undergraduates from Education and Computing. This could be attributed to the more technical nature and vocational environment of Engineering field, which may require certain predispositions and skillsets in order to cope and excel in. Rouvais and Chelin elaborated that some engineering students are not career-driven and do not actually aim to be engineers\(^18\). Any explanation is that the preconceived notion on the status and expected salaries for Engineers and Architects. Survey conducted by Gibson and Hutton reported that 79\% of the respondents viewed engineering field with high respect based on moderate familiarity, while 82\% respondents viewed engineering as financially rewarding\(^6\). Such perception may lead some students to choose in Engineering major based on external factors rather than their innate suitability in those majors. On the
other hand, it may be easier to identify interest towards the field of education or computing due to the more direct exposure to role models in school as well as the emergence of 4th industrial revolution respectively.

5. Conclusions

The present study has exhibited the concerning issues of career indecision among Malaysian undergraduate students. The study has also demonstrated some degree of association between MBTI personality and academic major, which can potentially optimize one’s performance in a selected major and in turn reduce career indecision. Therefore, the relationship between MBTI personality and career indecision as well as its mediating and moderating factors, can be further examined, in order to improve the application of MBTI to facilitate the real-world solution for career-related dilemmas or difficulties.

Conflict of Interest

Nil

Source of Funding

Fundamental Research Grant Scheme (Vot. No. RJ30000.7853.5F039).

Ethical Clearance

Obtained from Ministry of Education Malaysia

REFERENCES


[21] Ware KB. Relationships Between Myers-Briggs Type Indicators and NAPLEX Performances. American Journal of Pharmaceutical Education. 2019 Feb 1;83(1).
Digital Storytelling vs. Oral Storytelling: An Analysis of the Art of Telling Stories Now and Then

Yee Bee Choo¹*, Tina Abdullah², Abdullah Mohd Nawi²

¹Department of Language, Institute of Teacher Education Tun Hussein Onn Campus, Malaysia
²Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia

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Abstract  Generally, oral storytelling is an ancient art of telling stories that has been passed down from generation to generation while digital storytelling incorporates technology which consists of various multimedia modes such as graphics, audio, texts, videos and animations. This paper analyses the differences between the two strategies by discussing their differences in four aspects: (1) the use of technology, (2) the role of storyteller, (3) the approach of process and product, and (4) the engagement of audience. The analysis aims to create awareness among academicians about these differences and highlight that digital storytelling is the combination of both the art of storytelling and digital story. Then, this paper provides a critical review of empirical studies on the potentials of using digital storytelling in teaching and learning for education. The results have shown that the use of digital storytelling is not only beneficial in developing the teachers’ content, pedagogical and technological knowledge, but also in enhancing their students’ learning as it increases their understanding of content and caters for their multiple intelligence. This study suggests the implementation of digital storytelling in teaching and learning in the classroom and future directions for research are suggested.

Keywords  Digital Storytelling, Oral Storytelling, Technology, Teaching and Learning

1. Introduction

The emergence of technology brings new dimensions to language learning as it offers learners new avenues to explore target language in its functional use (Lee, 2014). Integration of salient new technologies is also one of the underlying pedagogical principles in the primary school syllabus in Malaysian education (Ministry of Education, 2013). Recently, academicians have advocated the use of technology in teaching and learning strategies through digital storytelling. Digital storytelling incorporates technology which consists of various multimedia modes such as graphics, audio, texts, videos and animations meanwhile traditional oral storytelling is an ancient art of telling stories that has been passed down from generation to generation and it precedes modern technology and historical record-keeping (Maddin, 2012). This paper presents an analysis that aims to create awareness among the teachers about the differences between the two types of storytelling and provide a review on the potentials of using digital storytelling in teaching and learning.

2. Objectives

The objectives are to:
1. identify the differences between oral storytelling and digital storytelling
2. identify the potentials of using digital storytelling in teaching and learning

3. Literature Review

Storytelling is an oral tale that was passed on by word of mouth from generation to generation. Dujmović (2006) explains that storytelling is the art of narrating a tale from memory rather than by reading. It is a very different activity to story reading due to the breadth of opportunities present in storytelling that it engages the audience or listeners and makes them participators rather than passive hearers (Daniel, 2007). Likewise, Hsu (2010) defines storytelling as “the use of voice, facial expressions, gestures, eye contact, and interaction to connect a tale with listeners” (p.7). Therefore, storytelling is a two-way
interaction between the storyteller and the listeners or audience where the storyteller needs to use the crafts of storytelling in order to get the feedback from the audience.

Storytelling remains in a constant process of variation, depending on the memory, talent, or purpose of the storytellers (Anderson, 2002). The storyteller might modify the story based on his choice of setting and detail, and the rapport between him and the audience (Dujmović, 2006). The building materials used by the storytellers are words, sounds, and language patterns while the tools are the voice projection, facial expression, and hand gestures, and the product is the shared human experience creation. Thus, storytelling is largely about bringing characters to life, so the storytellers and the audience can experience the emotions and thoughts of these characters. Using features such as diction, voice projection, intonation, gesture, facial expressions and so on are an excellent way to bring characters to life. Therefore, teachers are encouraged to use storytelling as a teaching and learning strategy in the classroom to engage their students.

3.1. Differences between Oral Storytelling and Digital Storytelling

Oral storytelling is a powerful tool for teaching and learning as it engages the students’ mental imagery and imagination of the story. According to Dujmović (2006), oral storytelling enables the students to connect the story to their own lives so that they understand human behaviour. By listening to the story, the students not only learn the language skills in vocabulary and reading comprehension, but they also learn to understand the universal truth of human relationship and dealing with others. However, with the technological affordances of today’s world, digital storytelling is suggested as one possibility that places technology as a meaningful tool for teaching and learning (Harriman, 2011). This section will discuss the differences between oral storytelling and digital storytelling in teaching and learning in four aspects: (1) the use of technology, (2) the role of storyteller, (3) the approach of process and product, and (4) the engagement of audience.

Firstly, digital storytelling differs from conventional oral storytelling in an important way: the use of technology. Both the oral and digital storytellers deliver their story orally to the audience but they use different means to deliver it. McLellan (2006) defines digital storytelling as “the art and craft of exploring different media and software applications to communicate stories in new and powerful ways using digital media” (p. 66) while Robin (2011) simply defines digital storytelling as the practice of using computer-based tools to tell stories. Therefore, digital storytelling is different from oral storytelling in that it uses technological tools to enhance the storytelling.

Secondly, the roles played by the two storytellers are different. A traditional storyteller only tells story orally to communicate and share information. It is delivered orally so that the information can be shared immediately to the audience without writing down the notes. Whereas, a digital storyteller has an additional role of an author and it has proved to be a practical and simple way to promote authorship (Harriman, 2011). He needs to do research on a related topic before drafting and writing the story. Then, he spends some time in writing the story and uses the technological tools to insert images and music to make the story interesting. Though it takes a longer time for a digital storyteller to prepare for his presentation compared to a traditional storyteller, he becomes more creative during the designing process when he selects a topic, conducts the research, writes a script, and develops the story.

Besides, oral storytelling is process-based while digital storytelling is process and product-based. The oral storytellers modify the content of the story every time it is told, emphasising various aspects depending on the audience or, indeed, the mood of the storyteller. He may add or delete the details during storytelling. Such an organic approach is also available to the digital storyteller and his audience. But digital storytelling can be available as a product. Once the story is committed to a digital format and shared in the digital area, it becomes static as a product. Though the content is fixed, the digital storyteller can modify it by pausing the digital story. The story can be stored and retrieved and the digital storyteller can access the content anytime.

Another difference between oral storytelling and digital storytelling is the engagement of the audience. In oral storytelling, the audience hears the story and needs to imagine the story mentally to understand the story. This might pose a huge cognitive challenge to them (Sundmark, cited in Wallin, 2015) hence making them passive listeners. However, in digital storytelling, the audience can watch the visuals and hear the music or soundtrack to help them understand the story in a vivid way. Rule (2010) suggests that digital storytelling is powerful as it integrates images, music, narrative and voice which bring life to characters, situations, experiences, and new understanding. Like the oral storyteller, the digital storyteller uses crafts of storytelling such as voice projection, facial expressions and so on to tell the story when he is speaking directly to the audience. He also uses digital media such as images and sounds to help his audience understand his story. Atta-Alla (2012) claims that when storytelling is more engaging and becoming contextualised, consequently it raises the audience’s interest in listening to stories. As the audience could listen to the digital storyteller and watch the visuals, they understand the story easily, so they are more active and engaged during the face-to-face interaction. Therefore, the digital storyteller can get the audience to be more actively involved compared to the oral storyteller.

The engagement of the audience can be influenced by the number of audience for both oral and digital storytelling. Oral storytelling is commonly conducted in a
small group of audience while digital storytelling can involve a wider audience as separate individuals could watch the online digital story during their free time. As digital information, the digital story can be stored, archived, transferred, or uploaded to the web (Davis, 2004). Thus, digital storytelling can be watched by individuals and a group of people in a setting such as a classroom where they can exchange their ideas and opinions about digital storytelling.

The feedback received through oral storytelling is immediate while digital storytelling can be immediate and delayed. In oral storytelling, the storyteller can get the feedback orally from the audience immediately through their facial expressions and verbal responses. Then, he will vary his intonation or change his crafts of storytelling according to what he observes from his audience. On the other hand, the digital storyteller can receive both oral and written online feedback from the audience. Though online feedback is delayed, it provides time for him to interact with the audience. Meadow (2003) believes that digital storytelling is the social practice of telling stories as the engagement between the storyteller and audience involves social interaction. This is because when the audience gives immediate and delayed feedback by asking questions and seeking for clarification, they are more engaged with the storyteller, thus there is more interaction between the audience and storyteller. Table 1 summarises the differences between oral storytelling and digital storytelling that have been discussed earlier.

<table>
<thead>
<tr>
<th>No.</th>
<th>Oral Storytelling</th>
<th>Digital Storytelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>No use of technology</td>
<td>Focus on technology</td>
</tr>
<tr>
<td>2.</td>
<td>Less time in preparation</td>
<td>More time in preparation (by doing research, looking for the images and music)</td>
</tr>
<tr>
<td>3.</td>
<td>No writing process</td>
<td>Drafting and rewriting</td>
</tr>
<tr>
<td>5.</td>
<td>Content can be modified</td>
<td>Content is fixed but can be modified</td>
</tr>
<tr>
<td>6.</td>
<td>Story can be accessed through oral narratives told by storyteller</td>
<td>Story can be retrieved and accessed through oral narratives told by storyteller</td>
</tr>
<tr>
<td>7.</td>
<td>Audience need to imagine the story mentally</td>
<td>Audience can watch the visuals on digital form</td>
</tr>
<tr>
<td>8.</td>
<td>Audience is passive</td>
<td>Audience is active and engaged</td>
</tr>
<tr>
<td>9.</td>
<td>Involve a group of people</td>
<td>Involve a group of people and individuals</td>
</tr>
<tr>
<td>10.</td>
<td>Oral feedback</td>
<td>Oral and written / online feedback</td>
</tr>
<tr>
<td>11.</td>
<td>Immediate feedback</td>
<td>Immediate and delayed feedback</td>
</tr>
</tbody>
</table>

In sum, digital storytelling for this study is an art of storytelling combined with digital story. The digital storyteller designs a story by using multimedia modes, including images, audio, text, and video. Then, he uses technology effectively with the crafts of storytelling that involves the audience. The analyses of the differences between oral storytelling and digital storytelling have shown that digital storytelling is better than oral storytelling in some ways and the next section will provide a critical review of empirical studies on its potentials in teaching and learning.

3.2. Potentials of Digital Storytelling in Teaching and Learning

There are a number of ESL studies that have demonstrated the potentials of using digital storytelling in teaching and learning. This section will discuss its potentials in developing the teachers’ content, pedagogical and technological knowledge, as well as its advantages to enhance their students’ learning.

Firstly, using digital storytelling could develop the teachers’ content knowledge. In creating a digital story, the teachers engage in higher order thinking (e.g., critical, creative, and reflective thinking) as they create content through understanding, synthesis, and evaluation by making use of the information (Sadik, 2008). In a research carried out by Hur and Suh (2012), they found that the teachers were active learners when they explored the contents used for their digital stories. Through the design of the digital story, they select stories with its criteria in the plot, characters, theme and moral values which develops their critical understanding of cultural, social and historical contexts in content knowledge.

Secondly, digital storytelling develops the teachers’ pedagogical knowledge as they could use it as an instructional tool. They could show the digital stories to their students to introduce content which could serve as an anticipatory set or hook to capture students’ attention when presenting new ideas (Robin, 2008). It also helps to make an abstract or conceptual content more understandable (Robin, 2008). Teachers who use digital storytelling may find that it is very helpful to engage their students in the discussion of the story.

Besides, the teachers could use digital storytelling to engage students through fun and meaningful activities. One of the learning standards outlined for Language Arts in the Malaysian English syllabus is to stimulate students’ imagination and interest so that they will use English language extensively (Ministry of Education, 2011). The teaching of Language Arts should ensure that the students benefit from hearing and using language from fictional and non-fictional sources (Ministry of Education, 2011). Through digital storytelling, the students are able to hear the language (aural) and speak the language (oral), thus they are more exposed to the usage of English language. Therefore, teachers could use digital storytelling in their pedagogy to engage their students.

Furthermore, the teachers could develop their knowledge of technology through digital storytelling. According to Ohler (2008), the process of crafting digital
story affords teachers opportunities to build 21st-century skills in 4C including critical and creative thinking, collaboration and communication. The teachers becomes critical in selecting multimodal means, including multimodal (e.g., audio, video, animation) and multimedia forms of communication (e.g., text, image, voice) to compile the digital story. A study of a four-week digital story project revealed that when the ESL students create their own personal digital stories, they enhanced their written, visual, and digital literacies (Alameen, 2011). By designing digital stories, they become authors as they produce their own educational product content and this would motivate them in creating more digital stories in the story-making and sharing process. Therefore, the process of digital story production enhances the teachers’ creativity when they deal with digital images, text and sound to construct narratives.

Moreover, the creation process of digital storytelling could facilitate the teachers’ communication and collaboration when they actively participate in it (Jakes & Brennan, 2005). Harriman (2011) agrees that it engages the teachers in a participatory rather than a passive process. They develop enhanced communication skills as they learn to conduct research on a topic, ask questions, organise their ideas, express opinions, and construct meaningful narratives. Reinders (2011) agrees that digital story develops their information literacy along with their communicative abilities as well as their interpersonal skills in teamwork and collaboration when they do in pairs or small groups. Those who experience the designing process of digital story may learn to critique their own work, and the work of others which could facilitate social learning. Tiba, Condy, Chigona, and Tunjera (2013) had found that digital storytelling could promote acquisition of multiple skills such as reading, writing, critical thinking, problem-solving, technological skills and communication skills. Thus, the process of creating the digital story enables the teachers to develop their technological knowledge.

While potentials of digital storytelling in classrooms have been recognised, digital storytelling can only be effective and widely used if teachers integrate the content knowledge (subject matter) and pedagogical knowledge (teaching methods) with technology (digital storytelling). They also need to optimise these knowledge areas in their teaching beliefs and put them into practice in their classroom to enhance their students’ learning.

Digital storytelling could help the teachers to increase their students’ understanding of the content. Researchers such as Burmark (2004) had found that integrating visual images with written text enhanced and accelerated student comprehension while Ohler (2008) found that digital storytelling had promoted student-centred learning. Tsou, Wang and Tzeng (2006) also reported students’ improved story comprehension as well as increased sentence complexity in their story recalls. Yee, Abdullah and Mohd Nawi (2017)’s research had found that the students were able to understand the meaning of words and the story through the visual images. Therefore, using digital storytelling is beneficial for both the teachers and their students in their content knowledge.

Digital storytelling is also effective for student learning as it caters for multiple intelligences (Gardner, 1983). Students who prefer visuals could see the images, musical learners could hear the music, and linguistic learners could learn the words or vocabulary. It also appeals to students’ interpersonal when they give opinions through interaction and their intrapersonal in understanding themselves after learning the story. Lynch and Fleming (2007) also indicate that the “flexible and dynamic nature of digital storytelling, which encapsulates aural, visual and sensory elements, utilises the multitude of cognitive processes that underpin learning - from verbal linguistic to spatial, musical, interpersonal, intrapersonal, naturalist and bodily-kinesthetic” (p. 7). Smeda, Dakich, and Sharda (2014) also support that digital storytelling can provide practical environment for students to engage their three different senses: hands, eyes and ears. This provides an opportunity for teachers to engage their students to learn in different potentials and interests.

4. Conclusions

This paper analyses the differences between oral and digital storytelling and the potentials of using digital storytelling in teaching and learning. The analysis has shown that the use of digital storytelling is more beneficial to the teachers and their students, thus suggesting its implementation in teaching and learning in the classroom. Future research is to conduct an empirical study on oral storytelling and digital storytelling to find out more about their differences and effectiveness, as well as to investigate the teachers’ perceptions of using both strategies in teaching and learning.

REFERENCES

Digital Storytelling vs. Oral Storytelling: An Analysis of the Art of Telling Stories Now and Then

735-750. doi: 10.1080/03004430701377664


Learning Strategies Using Augmented Reality Technology in Education: Meta-Analysis

Mohd Fadzil Abdul Hanid¹*, Mohd. Nihra Haruzuan Mohamad Said², Noraffandy Yahaya²

¹Johor Bahru District Education Office, Johor, Malaysia
²Department of Educational Sciences, Mathematics and Creative Multimedia, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Malaysia

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Abstract The learning environment is changing rapidly with the advent of the Industrial Revolution 4.0. One of the trending technologies in education is Augmented Reality. The Augmented Reality technology allows users to interact with virtual objects that are integrated into the real world and appear in the same space in real-time. The purpose of this meta-analysis is to identify the types of learning strategies that have been implemented using the Augmented Reality technology. The research methodology is based on a systematic literature search in online databases, namely, Scopus, Web of Science, Science Direct, Taylor Francis, and Springer. Keywords used in the search include Augmented Reality in education, learning strategies, integration strategies, as well as Augmented Reality teaching and learning. The results of this meta-analysis reveal that interactive learning, game-based learning, collaborative learning, and experiential learning are the dominant strategies in education that use Augmented Reality. Such findings will provide educators with guidance on the learning strategies that use Augmented Reality and its potential in education, which will subsequently lead to further research on how learning strategies using the Augmented Reality technology can be implemented in teaching and learning effectively.

Keywords Augmented Reality, Learning Strategies, Education, Integration Strategies

1. Introduction

The Augmented Reality (AR) technology has been experiencing growth in tandem with various types of hardware, especially with the development of various types of gadgets and smart device applications. The AR technology can create illusions in the real world through a virtual digital layer in order to improve the spatial visualisation skill. This feature can be utilised and has the potential to be used in the education field [1]. AR can be defined as the technology used to combine virtual world objects into the real world, which then appear together in the same world space [2]. AR is currently becoming a trend in the education field. Research showed significant results where the students that used the AR technology could improve their level of motivation as well as possessing high levels of confidence and satisfaction in using AR-based mobile devices in learning [3]. These findings are consistent with the study by [4] that stated that teaching by using the AR application could attract the attention of students and enhance their learning motivation.

2. Learning Strategies Using the Augmented Reality (AR) Technology

Learning strategies have been given various definitions by different authors. [5] stated that it means the layout of cognitive operations aimed at guiding students to understand problems until they can find the answers. [6] regarded learning strategies as the procedures and techniques used with planning that have objectives and contextually to process new information to try achieving meaningful learning. Creating a good learning process requires a variety of learning strategies that are appropriate for the learning condition or situation. According to the study by [7], some previous studies show that the results of cognitive and spatial learning using AR are influenced by the learning strategies implemented. Learning strategies using the AR technology are important to create a learning environment that can provide students with new methods for interactions by using different devices along with
collaboration opportunities among students and also between students and teachers which can potentially enhance their learning motivation \[8\].

3. Research Questions

This meta-analysis is a structured methodology to synthesise the existing studies in order to identify the dominant learning strategies to promote the integration of AR in different levels of education. Specifically, this paper is aimed at answering the following research questions:

(1) Which learning strategies use Augmented Reality (AR)?

(2) At which levels of education (primary, secondary, or tertiary) do learning strategies use Augmented Reality (AR)?

4. Methodology

In this section, the methods used to retrieve the articles related to learning strategies that use the AR technology are discussed. The researchers employed a method called PRISMA, used to carry out the study using the methods of systematic review, eligibility and exclusion criteria, steps of the review process (identification, screening, eligibility), and data extraction and analysis. The review was guided by the PRISMA Statement (Preferred Reporting Items for Systematic reviews and Meta-Analyses). PRISMA offers three unique advantages, which are 1) it defines clear research questions that permits systematic research, 2) it identifies the inclusion and exclusion criteria, and 3) it attempts to examine a large database of scientific literature in a defined time.

This study is aimed at identifying the learning strategies that use AR. The following keywords were used in the database search: augmented reality, learning strategy, and learning integration. The search was conducted in Scopus, Web of Science, Science Direct, Taylor Francis, and Springer. The search produced 1167 hits, but only 17 were considered relevant to the study based on the following criteria: (1) the study should state that the learning strategy uses AR, (2) the study was published between the year 2015 and 2019, and (3) the study should have empirical data. After analysing using a systematic literature review based on the method adapted from \[9\], this study was summarised as shown in Table 1.

<table>
<thead>
<tr>
<th>Database</th>
<th>Keywords Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scopus</td>
<td>“Augmented Reality” AND (“Learn* Strateg*” OR “Teach* Strateg*” )</td>
</tr>
<tr>
<td>Web of Science</td>
<td>(Augmented Reality) AND TOPIC: (Learn* Strateg*) NOT TOPIC: (Virtual Reality)</td>
</tr>
<tr>
<td>Science Direct</td>
<td>(“Augmented Reality”) AND Learning Strategies AND Integration Strategies AND NOT “Virtual Reality”</td>
</tr>
</tbody>
</table>
Figure 1. The flow diagram of the study. (Adapted from Moher et al., 2009)
### Table 2. Findings of the study

<table>
<thead>
<tr>
<th>Study</th>
<th>Research Purpose(s)</th>
<th>Learning Strategies</th>
<th>Level / Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>[10]</td>
<td>To explore whether integrating AR techniques could support a software editing course and to examine the different learning effects on students.</td>
<td>Blended Learning</td>
<td>Tertiary</td>
</tr>
<tr>
<td>[11]</td>
<td>To determine the feasibility of using AR for applied mathematics learning in primary education for students with special needs (SEN).</td>
<td>Collaborative Learning</td>
<td>Primary Age (6–12)</td>
</tr>
<tr>
<td>[12]</td>
<td>To focus on the standard nonverbal social cues to teach children with Autism Spectrum Disorder (ASD).</td>
<td>Interactive Learning</td>
<td>Primary Age (8–9)</td>
</tr>
<tr>
<td>[13]</td>
<td>To integrate AR technology running on tablet PCs (TPCs), either in the classroom or in a u-learning environment.</td>
<td>Ubiquitous-learning (u-learning)</td>
<td>Secondary Age (13)</td>
</tr>
<tr>
<td>[14]</td>
<td>To investigate the effects of the argumentation-based science learning approach on students’ academic achievements.</td>
<td>Argumentation-based Science Learning</td>
<td>Secondary Age (12–13)</td>
</tr>
<tr>
<td>[15]</td>
<td>To focus on the emotional impact of integrating the AR technology into learning.</td>
<td>Experiential Learning</td>
<td>Secondary Age (11–13)</td>
</tr>
<tr>
<td>[16]</td>
<td>This study developed and compared two AR learning systems for third-grade students to learn English vocabulary in situated surroundings.</td>
<td>Collaborative Learning &amp; Game-based Learning</td>
<td>Primary Age (8–9)</td>
</tr>
<tr>
<td>[17]</td>
<td>This study explored the process of students’ co-construction of knowledge in a digital game-based learning environment using collaborative AR-based mathematics game.</td>
<td>Collaborative Learning &amp; Game-based Learning</td>
<td>Secondary Age (11–12)</td>
</tr>
<tr>
<td>[18]</td>
<td>This study investigated the effects of Problem-based Learning (PBL) assisted with AR on learning achievement and attitude.</td>
<td>Problem-based Learning</td>
<td>Secondary Age (12–13)</td>
</tr>
<tr>
<td>[19]</td>
<td>To present a general technical, creative design teaching scheme that includes AR.</td>
<td>Creative Design Learning Motivation</td>
<td>Tertiary</td>
</tr>
<tr>
<td>[20]</td>
<td>To describe the development and evaluation of an AR system for teaching Euclidean vectors in physics and mathematics.</td>
<td>Interactive Learning</td>
<td>Tertiary Age (18–22)</td>
</tr>
<tr>
<td>[21]</td>
<td>To determine the scope and potential uses of AR in the education of information professionals.</td>
<td>Learning Environment</td>
<td>Tertiary</td>
</tr>
<tr>
<td>[22]</td>
<td>To investigate whether mobile AR affected learning, motivation, and math anxiety differently between students with high and low anxiety.</td>
<td>Mobile learning</td>
<td>Secondary Age (11–12)</td>
</tr>
<tr>
<td>[23]</td>
<td>To integrate AR with concept maps to form a concept-mapped AR (CMAR) scaffold.</td>
<td>Interactive Learning</td>
<td>Secondary Age (10–11)</td>
</tr>
<tr>
<td>[25]</td>
<td>To explore if new mobile AR technologies have the potential to enhance the learning of clinical skills in the lab.</td>
<td>Experiential Learning</td>
<td>Tertiary</td>
</tr>
<tr>
<td>[26]</td>
<td>To demonstrate the influence of AR used as a tool for educational content on student concentration</td>
<td>Interactive Learning</td>
<td>Tertiary</td>
</tr>
</tbody>
</table>

## 5. Results and Discussion

Based on the meta-analysis in Table 2, four key learning strategies that use Augmented Reality (AR) have been identified: interactive learning, game-based learning, collaborative learning, and experiential learning. Among the four types of learning strategies, interactive learning is the most reported in this meta-analysis review. According to [27], interactive learning is a learning process where students use cognitive and metacognitive strategies to interact with the information presented in learning. This statement is supported by [28], who explained that previous studies have proven that the interactive learning strategy is better in terms of creating fun and exciting interactions that boost student motivation.

Next, game-based learning strategy refers to the use of certain game principles and their implementation in learning to involve the users [29]. According to [29], game-based learning can be used in various educational methods across disciplines and has been proven effective in the classroom when designed with the learning principles, which will enable students to increase their motivation, involvement, and learning. The study by [30] reveals that learning that combines AR and game-based learning strategy has been proven useful in learning in the aspects of motivation and interest in the learning activities conducted.

Meanwhile, according to [31], collaborative learning strategy is defined as a situation where two or more people learn or try to learn something together. Collaborative learning strategy is an important educational practice that can be an effective approach when certain cognitive and social processes are supported [32]. [33] asserted that the benefits of collaborative learning strategy are not limited to improvements in performance only but more importantly
in enhancing the processes in learning itself.

The fourth most reported learning strategy in this meta-analysis study is experiential learning, which refers to a learning method that uses experience as a medium for learning. In this study, experiential learning occurs when individuals are involved in cognitive and effective aspects and act to process knowledge, skills, and attitude in learning situations, which is categorised as active engagement at a high level. This statement was proven in a study by [36] that implemented experience-based learning (Experiential Learning) in developing an innovative learning model that showed improvements in creative thinking, which is in line with the opinion of [37] who stated that experience-based learning (Experiential Learning) allows students to actively build their knowledge in learning. Other learning strategies found in this study include blended learning, ubiquitous-learning (u-learning), argumentation-based science learning, mobile learning, and interaction learning. These learning strategies can provide a new dimension in technology integration, particularly AR, which is consistent with today’s rapidly changing learning environment based on the 21st-century learning skills with the STEM elements.

6. Future Suggestions

There is growing interest in integrating learning strategies with the Augmented Reality (AR) technology in education. Thus, prior to using the AR technology in the learning environment, researchers are encouraged to plan well-structured teaching and learning components encompassing (1) students’ needs, (2) learning objectives, (3) the forms of support such as equipment, and (4) the types of learning strategies that suit students’ needs. Also, questions have been raised of whether AR technology can improve the learning process in terms of thinking through problem solving methods.

7. Conclusion

In conclusion, four types of learning strategies that use Augmented Reality are typical in the selection of strategies for the learning process based on meta-analysis, and these strategies are interactive learning, game-based learning, collaborative learning, and experiential learning. Therefore, the technologies used in particular Augmented Reality must be integrated with appropriate learning strategies for the purpose of making an impact on improving the quality of the learning process. The selection of appropriate learning strategies can influence the success and effectiveness of the technology support used, such as Augmented Reality in education.

REFERENCES


Service Learning Approaches Instrumentation to Community Development in the 21st Century

Seriki Mustapha Kayode1,*, Muhammad Khair Bin Noordin2, Nur Husna binti Abd. Wahid2

1Kwara State College of Education (Technical) Lafaiji, Nigeria
2Faculty of Social Sciences & Humanities, Universiti Teknologi Malaysia (UTM), Malaysia

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Abstract The expectation of the society from the institutions of higher learning is to produce sound graduates that fit in directly to the society need. These were among the anticipations of the societies, in the 21st century from graduates. The researcher finds utmost important most especially for our Technical and Vocational Education students to be skilled, not only on the technical aspect but also the employability one’s that is also known as soft skills. The adoption of experiential learning approach in the era of 4th Industrial Revolution seems to be the solution to the demand of the production of graduates of the trend of the time in the higher schools of learning. The research study sought to establish that Service Learning Model of teaching is suitable for impacting both the technical and employability skill for TVE students in other to fits to the needs of their hosting societies at large. A qualitative research approach was adopted for this research study, an interview protocol, where experts from the Department of Technical and Engineering Education were interviewed. Data collected were analyzed. The findings of the study the teaching approach suitable for the 21st century, as students’ centeredness experiential learning. The community gets a better living improvement, long-life learning, the students are confident in knowledge transfer, team working skills, while the institutional got a much more reputable, collaboration and partnership. Based on the findings, it is recommended that as a matter of necessity the TVET teachers/lecturers to adopt service learning in their teaching and learning approach.

Keywords Experiential Learning, Employability Skill, Technical and Vocational Education Training TVET, Service Learning

1. Introduction The future of any nation depends on their education standard, and this includes the quality of the school graduates, whom will later be part of the nation’s workforce. Meanwhile, for a nation’s workforce to be reliable, dependable and technically sound, their education system and not limited to Technical and Vocational Education must be effectively and adequately considered. Largely in the developed countries, this was the case, as priorities were much given to TVE. Maclean and Wilson (2009) stated that the goal of TVET is the acquisition of skills and knowledge of the individual for employment and sustainable living. The expectation of the society in the 21st century demanded for high skilled and intelligent manpower in our industries for the achievement of set goals by our countries. Consequently, this implies that our technical and vocational school must get up to the task of producing graduates to reinforce the workforce, in means of this the teachers need to diversify their model of teaching and learning practices in TVET to the direction of engaging the student in productive educational activities that are relevant in a changing world, these educational activities should leads the students attitude to cultivate social responsibilities inside and outside the school, as this was widely adopted in many developed countries of the World.

Therefore, as an expert in the field TVET, effort should be made to investigate best teaching and learning processes that can lead to the production of graduates that we fits in directly to both the societal needs as well as the industries workforce demand. (Sada, Mohd, Adnan, & Audu, 2015) especially the way students are being taught in classrooms As a teacher of TVET, the task of producing a sound soul student, that will be suitable for the task of the national development depends mostly on the teaching and learning situation in the classroom, this includes the laboratory experience, workshops, field work, field trips and other places where quality education can be obtained through or take place.
2. Literature Review

In the field of TVET many models of teaching have been implemented and work as far as impacting knowledge is concerned, these include problem-based learning Project-oriented based learning, quantum teaching model to mention but a few, but no-one has a direct impact to the community like experiential learning. In light of these challenges, TVET programmes at the tertiary education level in most part of the world employs an experiential learning practice to support and respond to its objectives. Experiential learning practices refer to project-learning, industry - based internships, clinical practices, pre - service teachers’ placements, service-learning, community service numerous to mention but a few (Gamble et al., 2010; Jones et al., 2009; Miliszewska, 2008). This practice of experiential learning (service learning) to be précised is usually integrated into the TVET programme or curriculum in order to support and engage students to acquire practical related skills that can be useful to them in the future career life endeavour. This can make the programme to contribute meaningfully and effectively to the development of the society. Supporting this assertion, it was highlighted that education, specifically TVET must strive to meet the needs of the community through social engineering activities and students’ participatory activities that can lead to the development of the society (Akanmu, 2011; Dasmani, 2011).

According to (Parker et al., 2009), Service learning as a teaching approach employed to the deployment of community services into the school curriculum in such a way that the community is the one benefiting from the service and the students acquired learn skills that are relevant to their future profession. This is in a way that the academic objective of the students is not suffering. In addition, the employable skills or the soft skill will also be gained during the process and this the employable skill is not being learned from the four walls of the classroom, but are being gained through the interaction skill, handling of issue techniques, problem-solving skills acquired from the experiential learning in the community service.

Furthermore, (Prentice and Robinson, 2010), sees service learning as a needed and important composite to the theoretical fact that was learned by the student in the classroom situation that helped the learner to engage in community service by directly applying what was learned in school to real-life situation or practical experience that is provided at school. Service learning practice promotes effective teaching of courses and some concept while engaging students to develop knowledge, skills, and cognitive capabilities to deal effectively with complex social issues. The practical inclusion of experiential learning, particularly, the service learning could have been the most significant approach that can elevate the relevance of TVE in partaking in the academic achievement of teaching and learning, research and community service.

Based on the concept and context of the Service learning, (Ahmad, 2015) stated that service learning as an instructional model or approach, it’s the relevant and adequately suitable way that can enhance the delivery of technical and vocational education. This was concluded as the practical relevance of the service learning in demonstrating the idea of community service is obviously clear. In his statement, there is no doubt, if service learning is properly and effectively implemented in TVE; it could support and promote the delivery of the TVE program while making students to appreciate and understanding the developing knowledge, skills, and other cognitive capabilities that can make them to effectively cope with difficulties of social life, real-life experience, and issues after graduation. Virtually, service learning can help to connect the academic experience learned in the school to real life situation in the community.

3. Research Questions

To the scope of this study, the two main research objectives are, firstly, to determine the teaching approach that influences the acquisition of TVE skills. The second objective is to verify impacts of TVET students on service learning in term of community development.

4. Methodology

The data in this study were collected through a qualitative method, this was to let the researcher explore and get an in-depth view of the research study, as expert who have been implementing Experiential Learning (Service Learning) from the field of TVET and that had more than 10years experiences in the teaching and learning from the higher institution was selected for individual interview sections. While the literature study was sourced from journal articles, textbooks, and other reliable data sources through Universiti Teknologi Malaysia (UTM) library database website. The findings were presented in a meaningful way. Meanwhile, the pattern adopted for the research was illustrated in figure 1, below.

![Figure 1. Showing Research Design](image-url)
5. Research Sampling

Lecturers from the Department of Technical and Engineering Education was chosen for the study, as 4 experts who have been implementing service learning from the field of TVET and that had more than 10 years experiences in the teaching and learning from the institution was selected for individual interview sections. Creswell (2012) stated that the non-probability purposive sampling technique, researchers intentionally decides individuals and places to study or understand the foremost observable fact; the approach utilized in the preference participants is whether they are resourceful regarding the incident. The non-probability purposive sampling is the type of research approach technique whereby interviewees are selected as a sample for an exacting rationale (Mathew & Ross, 2010).

6. Validity of the Research Instrument

The instruments were validated by two (2) experts from the University of Technology Malaysia, in the Department of Technical and Engineering Education.

7. Reliability of the Research Instrument

Peer debriefing approach was adopted; the instrument was given to a more experience researchers who happen to be versatile in the qualitative research studies University of Technology Malaysia. The results of the interview protocol were transcribed, coded, and categorized, to generate a befitting theme for the study. The obtained results from the peer debriefing activities were used to update the result in reflection of principled, interpretive norms and other development issues that a raised in the debriefing session.

8. Result

The research finding shows that service learning helped students to make connections on what they have learned in the class in relation to their daily activities or to the community or how they can contribute the knowledge and skill to the communities. Service learning benefits the students on how important the skills, the knowledge they have learnt during the class courses and how it impacts the society and also as preparation for them when they enter their workplace or to school when they go to school.

Service learning as a teaching model, it was widely accepted that no one single teaching method can be suitable for all teaching and learning situation. Meanwhile, SL had been proven as one of the best teaching model among the teaching method in TVET. According to the result, service learning as a unique model of teaching, has important vital role in Technical and Vocational Education because for Technical and Vocational Education the curriculum itself requires the students to see how their knowledge the skill that they learn in their institution related to their future workplace and related to their community needs and SL provide just that.

The study discovered that service learning focuses on student centered learning. This, according to the findings was by taking the students to the community with the main purpose of knowledge transfer. As the student, goes to the community to teach the community the skills that has been learned from the classroom. The illustration of how service learning benefited all the parties involved was shown in the figure 2.

![Figure 2. Uniqueness of service-learning](image-url)
The study proved that Service learning is about complete circle that includes the practical knowledge transfer connection between the communities, the second of it is about the practical aspect or what is called the skill. The students meet together with the community and respond to the community development needs and the third aspect is about the academic. Academic in the sense that learning take place during the service provided and the gained knowledge through interaction between the students and the community. The skills include communication skill, problem solving skill, thinking skill the team working skill.

Finally, service learning gives very good exposure for the students because they have to engage with the community and sometimes they themselves identify the community that they want to contribute and work with and these opportunities provide them with new knowledge especially on developing their generic skill.

Meanwhile, in the table 1, the participants praised the impact of the service learning on the student positive orientation after the SL activity. The table below summarized students’ performance in relation to service learning.

However, the institution is known to be a provider of attitudinal change to individual as well as enriching the students with a sound academic education for them to be successful and useful to the society that trained them. This was attestation as the study discovered the benefit of service learning to the society. Having gone to the community for service learning development, the community experience quality of live and this also help to promote TVET program to the community, so the community can see what actually the students of TVET is doing and from there maybe it help to a change the community negative perceptions of TVET as second class citizen course. Meanwhile, SL to the community, was seen as a welcome development as the community want to learn i.e. gain ideas from the university, they want to have university brings a name or reputation, so when they have these activities with the collaboration of the university, they are very happy and fulfilled.

Furthermore, SL is also about long life learning, the community wants to learn the new skills from the university, so they need to understand, they need to learn and they can practically do things themselves.

On the impact of service learning to the communities, study findings show that the community can be sustained, self-reliance and self-dependent with the natural resource blessed with them. The methods of exploring the nature was concerns in service learning exercise in the community as the case may be. It was discovered that the communities benefited the most from service learning as latest knowledge, skills, needed by community are always been shared by the students with the community, based on service learning for free.

Table 1. Summary of Qualitative Results on the influence of service learning as a teaching model on student performance

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Participant 1 UL1</th>
<th>Participant 2 UL2</th>
<th>Participant 3 UL3</th>
<th>Participant 4 UL4</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the influence of service learning as a teaching model to student performance?</td>
<td>It assists the students to make connections. It enabled students to be aware of how important the skills, the knowledge they have learned in the class. And prepared them when they enter their workplace or to school when they go back to school after the SL activities.</td>
<td>SL is very good; it’s exposing the students in engaging with the community. In the class and I can see that after the engagement of service learning activities, they became more active in class, their team working is very good and they improve their communication skill and also their confidence in doing the core task in the subject</td>
<td>SL focuses on students centered learning, so in students centered learning. We focus on what project to do. And on all aspects of generic skills</td>
<td>SL is a student-centered learning, we aim to develop our students’ capacity in terms of their leadership skills, in term of managing people, in term of engaging with the community</td>
</tr>
</tbody>
</table>
Table 2. Summary of Qualitative Results on the impacts of TVET students on service learning in term of community development.

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Participant 1 UL1</th>
<th>Participant 2 UL2</th>
<th>Participant 3 UL3</th>
<th>Participant 4 UL4</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the impacts of TVET students on service learning in term of community development?</td>
<td>They implement all the projects and how to solve the problem of community challenges. TVET students engage with the community. I make a plan for the students to do service learning in the community, let say go to houses that need some improvement and install pendaflour, so they have the opportunity of looking the actual problems of pendaflour wiring, on how to apply their skill and their knowledge to install the pendaflour light and at the same time it will help the community to improve their condition like having good lighting in the house.</td>
<td>TVET students go out and to contribute something to the community, such as a school, or village. They demonstrate the exchange of knowledge from the student to the community.</td>
<td>We need to make sure we have a knowledge transfer from the students to the community. The community development is one part that our university in particular volunteer to make life easy for, the community that they involve and solve certain problems if they have a problem.</td>
<td>Student share with other people at the outside in the surrounding, at the community teaching them, for example, they know about the skill. They have to deliver their technology to share with the community they would like to teach the community, to ensure after the teaching, en the community can survive and can monitor the expand the project into commercialized or soon to be self-reliant. The most important thing in service learning is the community, we need to educate the people outside there, and we have the knowledge and skill. But we have to share with others, it is very important for free.</td>
</tr>
</tbody>
</table>

However, table 2, summarized the impact of students engagement in service learning to the community development. Participants expressed the sense of belonging exhibited by their student towards the community the service learning delivery.

Service learning was known for its capital intense sometimes. However in most case this was not a problem, as most of the community were very encouraged to involve in SL because they benefit the most. Meanwhile, in the process the community students who are the service provider teach the community on practical bases and also guide the hosting community on the maintenance of the project.

Lastly and most importantly in this sense, the service learning gave the university to engage the students for exchange of knowledge transfer to the hosting community, creating networking, gain generic skills, and most importantly provide the community the improvement in life, through sustainable development, embedding entrepreneurship skill to the community, and making the needed community a self-reliant economically, commercially through the community untapped available nature and natural resources surrounding them.

9. Conclusions

The findings of the research show that the implementation of experiential learning is the way out to community engagement, where meaningful impact can be exhibited by the student to empower their immediate surroundings (communities). It has also been cleared in the research that the future of any country lies in their education, so therefore the teachers/lecturers should centered their teaching and learning towards students centered learning. After education of any students, their aspirations is to get a good job, with the proper implementation of service learning in the field of Technical and Vocational Education, call for assurance that TVET students will be surely employable in the favour labour market of jobs.

Moreover, service learning benefits to the community is numerous and lastly to the institution that engaged the students in service learning also favoured with more recognition, reputation and enjoy collaborations with NGO’s and also from the hosting communities.

REFERENCE

learning: a case study from urban and regional planning. AsiaPacific Journal of Cooperative Education. 10(3), 203-215.


Integrating Project Based Learning Components into Woodwork Technology Education Curriculum at Colleges of Education in Nigeria

Muhammad Umar Isa¹*, Yusri Bin Kamin¹, Umar Lawal²

¹Department of Technical and Engineering Education, School of Education, Faculty of Social Sciences and Humanities, Universiti Teknologi, Malaysia (UTM), Malaysia
²Department woodwork Technology Education, School of Secondary Education (Technical), Federal College of Education (Technical) Bichi, Nigeria

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Abstract  The main aim of this paper is to investigate project-based learning components suitable for integration into woodwork technology education curriculum (WTE) at Colleges of education (COE) in Nigeria. The study employed an intrinsic case study design. The population for the study comprised 12 respondents involving woodwork technology education lecturers and curriculum planners in north western Nigeria. Semi structured Interview protocol was the instrument used for collecting data for the study, while NVIVO 12 was used to analyse the qualitative data. Findings from the study revealed that the curriculum structure of WTE at COE does not include PoBL. The findings also revealed 21st century skills, inquiry and innovation, publicly presented product among the PoBL components suitable for integration into WTE curriculum at COE in Nigeria. Findings also revealed relevance of integrating PoBL in WTE curriculum, and equally showed from the responses of the participants that involvement of WTE students in investigation, collaboration grouping, and provision of adequate resource facilities as ways through which PoBL components can enhance student skill when integrated into WTE curriculum. Therefore, integrating components of PoBL into WTE curriculum affords students’ the opportunity to enhance their skills in WTE, and bridge the skill gap existing between WTE graduates and the industries.

Keywords  Project Based Learning, Woodwork Technology Education, Colleges of Education, Curriculum, Components of Project Based Learning, 21st Century Skills

1. Introduction

Project based learning (PoBL)) is a student driven teacher facilitated instruction. It is an active learning used in the 21st century for skills and knowledge transmission. Essentially, PoBL as a student-centred learning is useful in learning skills in various courses for achieving 21st century competences [1]. This is why PoBL has been recognised as an instructional model that centres around projects which engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic (real-life) questions and carefully designed products and tasks [2]. However, to achieve a meaningful PoBL in any educational setting, components of PoBL must be made part of the curriculum in order to fulfil its educational objectives [3]. In this regard an educational course like woodwork technology education that emphasises skill acquisition requires PoBL integration in its curriculum.

Woodwork Technology Education (WTE) is a course of study in Technical and Vocational education and Training (TVET) program at Colleges of Education (COE) in Nigeria designed to promote the acquisition of skills and competencies in woodworking in order to enable individuals to become productive and contribute to national economic growth [4]. Accordingly, [5] described WTE as a course offered in COE aimed towards preparing students for gainful employment in the world of work. Further, due to the rapid changes in technology, WTE students need to be equipped with the competencies needed to cope in modern workforce. For this reason, there is every need for tertiary institutions like COE offering WTE as a course to restructure its curriculum towards accommodating changes in work place so as to produce
WTE graduates who can fit in today’s 21st century work-based economy and society [5]. Additionally, these changes in curriculum must also accommodate effective instructional approaches like PoBL which guarantees enhancement of student 21st century skills and competences.

Building on the above, integrating PoBL components in WTE curriculum becomes desirable because of the immense role PoBL plays in enhancing student skills and competency. Therefore, there is a need to explore PoBL in WTE with a view to determining essential components of PoBL suitable for integration into WTE at COE in Nigeria aimed towards improving instructional processes in WTE for efficiency in student skill acquisition.

2. Problem Background

Colleges of education are tertiary institutions in Nigeria that provide TVET beyond secondary school level. TVET programmes at colleges of Education are developed in such a way that it helps the learners to acquire knowledge, skills, values and attitudes that promote self-reliance [6]. Additionally, the philosophy of TVET program in colleges of education as stipulated in the National Certificate in education (NCE) minimum standard for vocational and technical education is to provide TVET (WTE) students with the intellectual and professional background adequate for teaching technical subjects and to make them adaptable to changing situation in technological development not only in the country, but also in the world at large [7]. The NCE minimum standard further stipulated the following as the main objectives of TVET program in COE in which WTE inclusive:

- To produce qualified technical teachers and practitioners of teaching capable of teaching basic technology in the junior secondary schools
- To produce Technical NCE teachers who will be able to inculcate scientific technological attitudes and values into the society
- To produce qualified technical teachers motivated to start the so much desired revolution of technological development from the Nigerian schools.

In pursuance of the above stated objective, the [8] in its national policy on education (NPE) stated that in order to realize the goals of education in Nigeria and gain from its contribution to national economy, tertiary education institutions shall pursue the goals of education through quality teaching and learning by the provision of a more practical based curriculum that is learner centred and relevant to the needs of the labour market. However, a cursory look into the NCE minimum standard curriculum used for WTE shows contradiction to the NPE for not including the learner centred instructional approach in the curriculum of WTE. This indicates a gap in the curriculum that needs to be filled. WTE curriculum in Nigeria COE focuses on a teacher centred approach of instruction without emphasis on 21st century skills and competencies [9]. To this effect, WTE students graduate from colleges without the relevant employability skills needed in the 21st century labour market. Ideally, WTE curricular is supposed to prepare students with 21st century skills to face challenges in the world of work. For this reason, integrating PoBL components into WTE curriculum becomes inevitable in view of the role PoBL plays in enhancing student employability skills.

In Nigeria, there has been persistent report about the inefficiency of WTE graduates in the practice of their field. In this regard, [10] attributed the lack of skills by WTE graduates to the curriculum structure and instructional strategy adopted in WTE. Hence, this study used the perception of WTE stakeholders in determining the components of PoBL suitable for integration in WTE curriculum at COE with the aim of improving instruction for the enhancement of WTE students 21st century skills for effective employability.

3. Problem Statement

Woodwork technology education has continued to impact positively in our daily lives. This is due to the rapid technological development in the wood world of work. The woodwork construction industries have improved over the years due to demand of employers on employees with 21st century skills such as collaboration, creativity, communication and leadership skills. However, the curriculum of WTE at COE in Nigeria seems inadequate for preparing WTE students with the requisite work skill demand for the 21st century. The curriculum of WTE relies more on a teacher centred approach instructions which does not provide opportunity for students to be actively engage in their learning in order to be equipped with 21st century skills. More so, the continued adoption of teacher centred approach like lecture and demonstration method of instruction have resulted to producing WTE graduates without the needed employability skills. Hence, WTE students end up unemployed after graduation from COE.

However, the aforementioned problem will continue to ravage WTE in Nigerian COE unless the curriculum is refocused to adopting a learner centred approach like the PoBL in its instructional approach for imparting knowledge and skill to students. To this end, integrating PoBL components into WTE curriculum could be seen as an approach to improve instructions in WTE and enhance student’s 21st century skills for employability.

4. Project Based Learning Components

Project based learning is an instructional approach that integrate 21st century skills to prepare students to be
productive and gainfully employed. Essentially PoBL is described as a tool used to prepare students to meet the 21st century work skill demand and succeed on employment [3]. Accordingly, [11] asserted that PoBL is designed to prepare students for 21st century skills (critical thinking, communication, collaboration, problem solving) that will help students to be successful after graduating from college. This now explains why PoBL is described as a learning approach that centres on projects which engage students in constructive investigations on real world issues that culminate into a final product or public presentation. PoBL is all about connecting students to learning skills through engagement with activities that expose them to problems that help enhance their critical thinking, collaboration and effective communication skills [12]. Similarly, [13] stated that students who learned through PoBL are more engaged in real world problems solving and are able to guide their learning through hands on experience and also exhibit some proficiency of 21st century skills.

Achieving effectiveness in PoBL implementation entails an integration of the components of the PoBL into the curriculum of a program. In this regard, [14] stated that a PoBL curriculum should incorporate components of PoBL so as to create authentic learning processes, experiences and projects. Further, through the integration of PoBL components into a program curriculum, instructors are able to embed content standards and engage students in creative and innovative experiences with the possibility for enhancing student’s 21st century skills [15]. PoBL components are therefore, seen as essential elements for successful PoBL implementation. To this effect, some PoBL components are briefly explained here. The Buck Institute for Education (BIE) is the main organ that has devoted its efforts to promoting PoBL globally. The BIE recognized “in-depth inquiry,” “driving question,” “need to know,” “voice and choice,” “revision and reflection” and “public audience” all surrounding “significant content” and “21st Century competences” as their key components to project-based learning.

Building on the above, significant content as an essential component of PoBL entails linking curriculum to reflect essential contents which should have much value to student’s interest [3]. Project has to align with the curriculum of a program or course, and has to focus on important knowledge and skills pertaining to specific concepts in the curriculum [16]. This signifies that through significant content student see the connections between the curriculum and real world. Similarly, [17] opined that driving question is a key component in PoBL which guides students in their part of inquiry in exploration of intriguing investigations. Driving question in essence gives students a sense of purpose and challenge, clarifying some of the expected outcomes of the investigation students are carrying out. A good driving question according to [18] captures the heart of the project in clear, convincing language, which gives students a sense of determination. He (Cervantes) further stated that, the questions should be challenging, open-ended, complex, and linked to the core of what students are expected to learn. Further, a Need to know as an essential component of PoBL direct student to understand the importance of knowledge, understanding concepts and application of skills for problem solving and developing projects [16]. Need to know usually introduce the project with information and intrigues through launching of a project that engages student interest and initiates question and curiosity [18]. This gives the students the zeal to wanting to be inquisitive and interested to learn.

Furthermore, [3] listed inquiry and innovation as the essential component of PoBL which seek to engage student in extended rigorous investigation and utilization of resources to develop solutions that promote the ability of questioning and reasoning. Inquiry leads to innovations with a new answer to driving question, a new solution to a problem or a new product [18]. To this effect, engagement of students with activities that will enhance their innovation skills through rigorous inquiry is crucial. Moreover, considering the value of student ownership in learning, voice and choice as a component of PoBL makes learning more meaningful to students [19]. The idea behind voice and choice as a component of PoBL is allowing students to decide on the content of their learning. According to [20], students feel intrinsically motivated when they take responsibility and ownership of their learning. This explains why in PoBL students take ownership of learning while the teacher serves as a facilitator providing scaffolding guidance.

Furthermore, 21st century skill as a component of PoBL are a set of abilities that students need to develop in order to succeed in global economy [21]. Skills that are needed in the workplace environment are the same skills student need in PoBL experience to be successful at school [22]. This explains why PoBL provides opportunity for students to build skills such as communication, collaboration, critical thinking and the use of technology [23]. In this regard, building 21st century skills in students through PoBL helps to develop their skills and abilities for successful work place career. Feedback and revision in the course of learning makes learning meaningful because it emphasizes that creating high quality products and performances is an important purpose and goal [18]. Publicly presented product entails student presenting their work to a public audience beyond class mates [14]. Public presentation of product gives students a greater sense of ownership and make students feel motivated to learning.

5. Research Objective

The main objective of this study is to investigate the perception of stakeholders on the elements of the essential components of PoBL suitable for integration into WTE curriculum at colleges of education in Nigeria.
6. Research Question

What are the perceptions of stake holders on the elements of project based learning essential components suitable for integration into WTE curriculum at colleges of education in Nigeria?

7. Methodology

Methodology describes the procedures involve in carrying out a study. In this regard, the methodology used for this study is described under the following sub headings:

7.1. Research Design

An intrinsic case study design was employed for the study. Intrinsic case study is a type of qualitative study undertaken when the case is unique or is of interest in collecting evidence for the purpose of the study [24]. Additionally, [25] stated that researchers employ intrinsic case study design when studying about events, programs or activities. Similarly, [26] proclaimed that intrinsic case study is best employed when studying about instructional approaches. This explains why this study utilized intrinsic case study as its research design. On this basis, [27] asserted that intrinsic case study is exploratory in nature and preparation about whom to talk with, where to collect data and which events to observe are indispensable.

7.2. Study Area

The study was conducted in the north western zone of Nigeria involving Federal college of education Technical Bichi, Kano state, Federal college of education Technical Gusau, Zamfara state, and National commission for colleges of education (NCCE). The reason for selecting the two FCE (T) was because they are different from other conventional colleges of education and because they were specifically established to run TVET programs and to prepare students on dual competency, hat is prospective teachers to impart TVET (WTE) knowledge and skills to secondary/primary school pupils and work in the industry as well. On the other hand, the NCCE was chosen because it is the organisation responsible for curriculum planning and development, monitoring, supervision and accrediting courses for colleges of education in Nigeria.

7.3. Sample and Sampling Technique

Purposive sampling was employed in selecting the sampled population for the study. Purposive sampling also called judgemental sampling is the deliberate selection of participants because of the qualities they possessed [28]. Purposive sampling is a sampling technique used in qualitative study to identify and select information rich cases for the proper utilization of available resources involving individuals or group of individuals that are proficient and well informed about a phenomena of interest [29]. In this regard, the sampled population in this study comprised 12 participants involving 6 WTE Senior lecturers from FCE (T) with a master degree or above and 15year experience of lecturing, and 6 WTE curriculum planners from NCCE, making a total of 12 participants used as respondents for the study. The reason for selecting these categories of respondents for this study was because WTE lecturers have several years of experiences in imparting WTE knowledge and skills to students, and the curriculum planners have several years of experiences about WTE curriculum planning and development. Table 1 shows the sampled population for the study.

<table>
<thead>
<tr>
<th>College/NCCE</th>
<th>No of WTE Lecturers</th>
<th>No of WTE Curriculum Planners</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- FCET Bichi, Kano state</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>2- FCET Gusau, Zamfara state</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>3- NCCE</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Grand Total = 12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.4. Instrumentation

The instrument used in collecting data for his study was semi structured interview protocol. Semi structured interview is a flexible and powerful instrument used in qualitative study to capture voices and the way people make meanings of their experiences about a particular phenomenon under study [30]. the reason for using semi structured interview is because it gives the respondents the free will to express their views or experiences on the content of the situation under study [31]. Interview protocol was developed based on the specific objective of the study using open ended questions to answer research question that guided the study in order to obtain sufficient information on the components of PoBL suitable for integration into WTE curriculum at COE in Nigeria. Further, in order to obtain the credibility of the interview protocol, the instrument was subjected to validity and reliability checks. In this regard, both content and face validation of the interview protocol was done by experts which included 1 WTE senior lecturer and 1 WTE curriculum planner. The validates were given the interview protocol to make observations and suggestions on the suitability of the structure and question contents in relation to the objective and research question for this study. The final draft of interview protocol was done based on the observations and suggestions made by the validates.

Equally, member check and peer debriefing were used to
ascertain the trustworthiness of the interview protocol. Member check involves giving the transcript of the interview to the participants for verification to ascertain accurate reporting of their responses [32]. In this study WTE lecturers and curriculum planners were given the transcript of the interview to verify accuracy reporting of their presentation. On the other hand, peer debriefing entails a process where a researcher calls upon a disinterested peer not involved in the research to aid in probing the researcher’s thinking about the procedure used to arrive at the outcome of the interview and analysis in order to improve the result [33]. In this study, the interview transcript was given to a qualitative research expert who probed the interpretations and provided additional or alternative interpretations in order to improve the trustworthiness of the result.

The results obtained from the interview session were analysed and interpreted through thematic content analysis using NVIVO version 12. The data were also translated into a bar chart to show the percentage of respondents’ level of acceptability.

8. Findings

Findings from the interview on the perception of WTE stake holders on the components of PoBL suitable for integration into WTE curriculum are presented in table 2. Stake holders here are WTE lecturers and curriculum planners. Sample of extracts from the interview are presented in table 2 using the following codes for representation: RC=WTE curriculum planner as respondent, RL= WTE Senior Lecturer as respondent, P1=Project work, P2 =Project based Learning, P3= PoBL Relevance in Curriculum, P4= Enhancement of Students’ Skill, C1=Curriculum content,C2= Driving question, C3= Need to Know= C4=Inquiry and Innovation, C5= Voice and Choice, C6=21st Century Skills, C7= Feedback and Revision C8= Public product Presentation.

<table>
<thead>
<tr>
<th>Question</th>
<th>Responses</th>
<th>Theme</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could you please tell if project based learning is incorporated into WTE curriculum?</td>
<td>I can’t say precisely but I know projects are part of the curriculum that students must present before graduation (RL) No, but projects are included in the curriculum (RC)</td>
<td>Project work</td>
<td>P1</td>
</tr>
<tr>
<td>Could u please list components of PoBL suitable for integration into WTE curriculum?</td>
<td>learning technology tools, independent learning, creativity, project presentation, asking questions, revision of work, Curriculum standards (RL) Group work presentation, collaboration, artefacts, Content standard, student ownership, authenticity, exploration activities, Investigation (RC)</td>
<td>-Significant content -Driving question -Inquiry and innovation -Voice and choice -21st century skills -Feedback and revision -Public product presentation</td>
<td>C1, C2, C3, C4, C5, C6, C7, C8</td>
</tr>
<tr>
<td>Do you think it is relevant integrating PoBL components into WTE curriculum?</td>
<td>Yes, it is, because it will help prepare WTE students for the 21st century work skill needs (RL) Of course yes, because if it is incorporated into WTE curriculum students’ soft skill will be improved and they will not have problem of skill shortage after graduation (RC)</td>
<td>Relevance of PoBL in WTE curriculum</td>
<td>P3</td>
</tr>
<tr>
<td>How can PoBL enhance students’ skill if integrated into WTE curriculum?</td>
<td>Through the provision of an enabling teaching and learning environment with adequate resource materials for students’ research and learning. Also by engaging students in activities that will involve investigations and Collaboration (RL) Well, I think, if implemented by lecturers, it will help enhance students’ skill, and also adequate facilities like Computers and internet for research purposes if put in place will help students acquire necessary skills. Students should also be group in PoBL class because this will help enhance their interpersonal and leadership skill (RC)</td>
<td>Enhancement of students’ skill</td>
<td>P4</td>
</tr>
</tbody>
</table>
Findings from the interview conducted with WTE stakeholders revealed their perceptions on the questions posed to them. As presented in table 2, themes generated from the interview on the question asked about PoBL if integrated into WTE curriculum. Responses from the respondents as illustrated in figure 1 revealed that 43% of WTE curriculum planners accepted project work as part of WTE curriculum and 34% of WTE lecturers accepted as same, having 23% silence about project work as part of WTE curriculum. However, 28% of both WTE curriculum planners and lecturers accepted PoBL as part of WTE curriculum with over 70% silent about PoBL incorporated in WTE curriculum. This indicated that PoBL is not incorporated into WTE curriculum.

Furthermore, based on the themes generated from the interview on perception of stakeholders on components of PoBL suitable for integration into WTE curriculum. As shown in figure 1, significant content was perceived by 39% of WTE curriculum planners and 37% of WTE lecturers as a component of PoBL suitable for integration into WTE curriculum, having 24% silent. Similarly, driving question was accepted by 30% of WTE curriculum planners and 41% of WTE lecturers as a component of PoBL suitable for integration into WTE curriculum with 29% not accepting need to know as a component to be integrated into WTE curriculum. Equally, 45% of WTE curriculum planners and 38% of WTE lecturers perceived need to know as a PoBL component to be integrated into WTE curriculum while 17% do not perceive as same. Moreover, Inquiry and innovation was accepted as a component of PoBL suitable for integration into WTE curriculum based on the perception of 33% of the WTE curriculum planners and 32% of WTE lecturers. However, only about 35% do not perceive inquiry and innovation as a component of PoBL suitable for integration into WTE curriculum. Additionally, 37% of WTE lecturers and 32% of WTE curriculum planners accepted voice and choice as a component of PoBL suitable for integration into WTE curriculum, having 31% not accepting. Further, 21st century skill was accepted as a component of PoBL suitable for integration into WTE curriculum by 47% WTE lecturers and 45% WTE curriculum planners, having 8% silent. Feedback and revision was accepted by 38% of curriculum planners and 36% WTE lecturers as a component of PoBL suitable for integration into WTE curriculum. 21% were silent about feedback and revision as a component of PoBL to be included in WTE curriculum. Public product presentation was accepted by 40% of WTE lecturers and 36% WTE curriculum planners as a component of PoBL suitable for integration into WTE curriculum having 24% silent. However, from the overall perception of WTE curriculum planners and lecturers, significant content, driving question, need to know, Inquiry and innovation, voice and choice, 21st century skills feedback and revision, and public product presentation were perceived as components of PoBL suitable for integration into WTE curriculum.

Moreover, Base on the perception of stakeholders when asked about relevance of PoBL components in WTE curriculum, 42% of WTE curriculum planners and 40% of WTE lecturers accepted PoBL components as relevant in the curriculum of WTE, having 18% silent. Similarly, perception of stakeholders on how PoBL enhances student skill if integrated into WTE curriculum revealed 44% of WTE curriculum planners and 35% WTE lecturers stating engagement of students in investigation, collaboration grouping, and provision of adequate resource facilities as ways through which PoBL components can enhance student skill when integrated into WTE curriculum.
9. Discussion

Findings from the qualitative data revealed that PoBL has not yet been integrated into WTE curriculum, but evidently proven that project method has been incorporated into WTE curriculum as the instructional approach utilize in imparting WTE knowledge and skills to students. This is in line with the view of [24] who observed that WTE curriculum is undoubtedly challenged with the problem of an integrated instructional curricular which include lecture, demonstration and project method. He further stated that WTE curriculum still poses outdated approaches in instructional processes. Similarly, [9] remarked that, curriculum of colleges of education in Nigeria does not fully acknowledge the new age environment in schools and classrooms in terms of constructivist learning, learner-centred instructions and integrating them into the curriculum and instructional processes. Additionally, the [7] in the revised minimum standard curriculum for VTE explicitly stipulated that the method of instruction to be utilise for WTE shall be lecture, tutorial and project work.

Furthermore, based on the findings on significant content as a component of PoBL to be included in WTE curriculum, it was accepted by 76% of the respondents despite silence by 24%. This implies that significant content is a component of PoBL to be included in WTE curriculum. [3] buttressed this finding because they included significant content as a component of PoBL for curriculum of an educational program. In a similar vein, findings on driving question showed 71% acceptance from participants in spite non acceptance from 29% of the participants. it could be accepted as a component of PoBL suitable for integration into WTE curriculum because [17] posited that driving question is a key component in PoBL which guides students in their part of inquiry in exploration of intriguing investigations. Further, 83% of participants identified need to know as a component of PoBL suitable for integration into WTE curriculum. This indicated that need to know is a component of PoBL aimed towards directing student to comprehend the significance of knowledge, understanding concepts and application of skills for problem solving and developing projects. Moreover, findings on inquiry and innovation, revealed 67% of the participants’ acceptance as a component of PoBL suitable for integration into WTE curriculum despite 33% non-accepting. In this regard, Inquiry and innovation is a component of PoBL suitable for integration into WTE curriculum. This finding is in line with the opinion of [18] that Inquiry and innovation are key components in PoBL.
Integrating Project Based Learning Components into Woodwork Technology Education Curriculum at Colleges of Education in Nigeria

leading students to authentic innovations to derive new answer to driving question, or develop a new product.

Based on the findings from the participants on voice and choice, it revealed that 69% of the participants accepted voice and choice as a component of PoBL suitable for integration into WTE curriculum. Despite 31% silence, voice and choice is still accepted as a component of PoBL suitable for integration into WTE curriculum. This finding was further buttressed by Kolmos [19] who mentioned voice and choice as PoBL component needed for successful teaching and learning which allow students to decide on the content of their learning. 21st century skill was perceived by 92% of the participants as a PoBL component suitable for integration into WTE program. 21st century skill could be accepted as a component of PoBL suitable for WTE curriculum although 8% participants’ silence. This finding is in accordance with the opinion of Harris [21] who listed 21st century as a component of PoBL with a set of abilities that students need to develop in order to succeed in global economy. Findings on feedback and revision showed 74% of the participants accepting it as a component of PoBL suitable for integration into WTE curriculum even though 26% were silent, it is accepted as a component of PoBL suitable for integration in WTE curriculum. In support of this finding, [18] identified feedback and revision as a component of PoBL which enhances ability of students to evaluate their work leading them to revise or conduct further inquiry. Findings on public product presentation revealed 76% of participants accepted it as component of PoBL suitable for integration into WTE curriculum. Public product presentation could be considered suitable for WTE curriculum notwithstanding 24% participants’ silence. This finding is in line with the view of [14] that public product presentation is a component of PoBL which showcase students’ product to classmates or outside audience which the project impacts.

Based on the findings on relevance of PoBL components in WTE, 82% of the participants accepted that PoBL components will have relevance if integrated into WTE curriculum. This finding is in accordance with the view of [15] that integration of PoBL components have much relevance in school instructions especially when integrated into a curriculum that emphasizes skill acquisition. They further stated that including PoBL components in a school curriculum engage students in creative and innovative experiences with the possibility for enhancing student’s 21st century skills. Furthermore, perception of stakeholders on how PoBL enhances student skill if integrated into WTE curriculum revealed 79% of participants stating engagement of students in investigation, collaboration grouping, and provision of adequate resource facilities as ways through which PoBL components can enhance student skill when integrated into WTE curriculum. This finding is in line with [11] who advocated for provision of necessary materials for PoBL implementation in educational institutions as crucial for promoting students’ thinking and learning and help them to be responsible for their own learning. Accordingly, [35] stated that working in group is key factor for a project to be considered PoBL. He (Bender) further lamented that when students work in collaboration group in PoBL they learn social interaction with their peers and also their capacity and learning through shared cognition increases.

10. Conclusions

Integrating PoBL components is crucial in the curriculum of an educational program that emphasizes skill acquisition like WTE. PoBL components serve as driving agents for a successful PoBL implementation. Therefore, integrating these components of PoBL into WTE curriculum guarantees a platform for enhancement of student’s skill, and as well close the skill gap existing between WTE graduates and the industries. Findings from this study has shown that PoBL has not yet been incorporated into WTE curriculum in Nigerian colleges of education. It was also identified from the Findings in this study that an integration of the eight essential components of PoBL is desirable in WTE curriculum. To this end, the study recommends that the Nigerian government should as a matter of urgency restructure WTE curriculum at COE through incorporation of PoBL components into the curriculum and ensure the provision of necessary facilities needed for the implementation of PoBL so as to achieve the overall aims and objective of WTE in Nigerian colleges of education.

REFERENCES


[33] Williams, D. L. (2017). The Impact of Project-Based Learning on Fourth-Grade Students’ Understanding in Reading. ProQuest LLC.


[40] Cervantes, B. M. (2014). The impact of project-based
Integrating Project Based Learning Components into Woodwork Technology Education Curriculum at Colleges of Education in Nigeria

Learning on mathematics and reading achievement of 7th and 8th grade students in a south Texas school district.


Effects of Place-Based and Activity-Based Approaches in Technical Education, Interest and Retention

Alhassan Ndagi Usman¹*, Aede Hatib Musta’amal¹, Hassan Abdullahi Muhammad², Idris Abubakar Mohammed²

¹Department of Technical and Engineering Education, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia (UTM), Malaysia
²Department of Industrial and Technology Education, Federal University of Technology, USA

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Abstract
This study was designed to determine the effects of place-based and activity-based learning approaches on students’ achievement, interest and retention in technical education. A pre-test, post-test, non-equivalent control group, quasi-experimental research design was adopted. The study constituted a total number of 122 subjects, 63 for the place-based education, while 59 for the activity-based learning. Three research questions and three null hypotheses, tested at 0.05 level of significance, guided the study. The instruments used for data collection were Technical Education Cognitive Achievement Test (TECAT), Technical Education Psychomotor Achievement Test (TEPAT) and Technical Education Interest Inventory (TEII). The reliability coefficient obtained was 0.78. Mean was used to answer the research questions; while ANCOVA was employed to test the hypotheses. The study revealed that students taught Technical education using the place-based education instructional approach had a higher mean score than students taught using the activity-based learning teaching method in cognitive achievement test, psychomotor achievement test and test for retention of learning. It was recommended among others that: The National Board for Technical Education (NBTE) should consider a review of technical education curriculum for Technical Colleges with a view to incorporating the place-based education instructional approach into the teaching of technical education.

Keywords
Place-Based, Activity-Based Learning, Technical Education, Interest, Achievement

1. Introduction
Technical education is vital for nation growth and industrialization. Thus, the skills, abilities and competencies the nation needs are rooted in technical and vocational education, which is essential towards the social and economic empowerment of a nation. Consequently, every nation that believes in education as a par excellence instrument for national development must recognize the importance of vocational and technical education and give it the desired attention and support it deserves. It is in this wisdom that the National Education Policy (2014) places significant emphasis on improving vocational and technical education for the nation's overall development. The much talked about vocational and technical growth, however, may not materialize unless the youth acquire the knowledge, interest, aptitude and interpersonal skills needed to build and produce basic necessities of life.

Doolittle (2010) states that one of the goals of vocational and technical education is to make school leavers more employable. Regrettably, however, because of public aversion to vocational and technical education (VTE), the aim seems to have not been achieved, which explains the prevalence of poverty, unemployment, prostitution, drug abuse, hunger, terror, rebellion, armed robbery and other forms of social vices in Nigeria today.

This continued low academic performance most frequently undermines the interest of students and can central to poor holding of skills in technical education as with others negative belongings of technical education aims of the whole programme. Students also hate a course that shows a high rate of analysis failure and retaining of information strongly depends on achievement and desire. Because of such a weak technical education students’ success one is supposed to be concerned. Nonetheless, by implementing education / knowledge methods grounded in a problem-based method to knowledge, teaching and learning in technical education could be improved

Problem-based education (PBL) is also single of the
constructivists knowledge methods that introduces critical contextualized real-world situations, offering learning tools, feedback and instruction as students gain knowledge of material and problem-solving skills. PBL is an interactive, centered on the student, identity-directed and background learning style. Problem-based learning allows students to deliberately discover additional than the teacher's information tools, includes main materials, online resources and people in the communal, and attraction on expertise after different topic parts. Ogbuanya (2008) Therefore, it proposed that undergraduates will assume responsibility for their own learning, and must be those of educators seen additional as counsellors and less as information presenters. Consequently, PBL-rooted Informative approaches can be a certain way of teaching philosophy as well as realistic technical education. This lets the students learn how to read, and eliminates the teaching of the teacher as the learners are actively involved.

Place-based education and activity-based approaches are common amongst teaching and learning methods engrained in problem-based learning. Place-based education, also called place-based pedagogy, place-based learning, experiential education, community-based education, sustainable education, environmental education or, more rarely, service learning, is a philosophy of education. Place-based curriculum is used for various purposes in several training fields. Place-based education applies, according to Woodhouse and Knapp (2010), to community-focused learning, ecological education and bioregional training. While place-based education is rooted in environmental education, this approach can be differentiated from traditional environmental education, since the founders of place-based education concentrated on both social and natural environments (Smith, 2007).

Although the idea of place is rooted in the geography discipline, spot-based projects are generally multidisciplinary and interdisciplinary (Resor, 2010). Place-based education, used in language, humanities, mathematics, social studies, and science education, strengthens the understanding of students regarding local history, community, environment, environments, resources, and interactions with them. It allows teachers and students to make use of the schoolyard, community, public spaces and other unique spaces as tools to transform neighborhoods into classrooms (PEEC, 2010). Furthermore, this instructional approach successfully helps children resolve the disconnection between their lives and school because of their ability to harmonize different location features (Smith, 2012). In short, location-based education helps students learn to care about the world by helping them understand the place in which they live and behave on their own backyards and communities (PEEC 2010). Place-based teaching / learning approach such as Event-Based teaching / learning is aimed at improving the achievement of students in the classrooms of the 21st century. In technical education, however, this is yet to be confirmed.

The concept of Activity-Based learning reflects the constructivist philosophy of education and is pedagogy focused on children. Activity–Based learning can be characterized as the means of teaching, wherever events of changed types, appropriate and appropriate to exact topics were seamlessly combined hooked on the standard teaching resources and approaches for involving undergraduates in teaching–learning or teaching activities and involve them productively (Suydam and Higgins, 2012). An Activity – Based approach to learning requires that students become active participants rather than passive learners. An Activity-Based learning methodology includes three elements, according to Haury and Rilero (2014): (i) hands-on; students are actually allowed to carry out physical tasks while they create meaning and gain understanding; (ii) minds-on; exercises concentrate on the core concepts, allowing students to establish processes of thought and encouraging them to challenge and seek answers that improve their awareness and thus acquire a real world understanding; and (iii) authentic; problem-solving students are presented, which integrates real-life questions and issues in a way that promotes collaborative effort, discussion with teachers or experts, and generalization to wider ideas and implementation. Throughout Activity-based teaching, students not only communicate with resources or make observations, but also engage throughout creating processes of learning and constructing meaning to gain understanding. It is believed that direct encounters with natural phenomena can offer attention and thinking (Lumpe & Oliver, 2011). However, it is not yet known which of those teaching methods will be best aimed at enhancing the achievement of the students in technical education.

Academic achievement has been defined as viewing how well a person has performed their cognitive tasks (Avoseh, 2015). The author is also of the opinion that academic achievement can also be the general skill of students in relation to a defined level called Pass Marks for their offered subjects. This pass mark is relative to him and can be described arbitrarily as 40% or 50%. Sometimes, this can be called the criterion of quality (Aremu & Adika, 2010). The word also means the attainment of a student's achievement with his peers in his school work. Achievement in technical education means success in the subject of school as score symbolized or marked on the test in accomplishment of technical education. Anene (2009) noted that the cognitive or psychomotor performance of the students is quantified in comparison to that of other students of his age by a calculation of the academic standing of the students.

Retention of learning is a repeat performance of the activity learned earlier, elicited after a time interval by a learner (Damire, 2014). Among other things, it is influenced by the degree of initial learning, the learning process and the memory capacity of the learner (Demmert,
2. Statement of the Problem

The services required in technical education training to students are becoming increasingly complex. This is due to the rapid technological growth rate in the industry. Technical education has terms of technology changed particularly in the 21st century as proprietors in the creation of technical education are they searching for qualities like critical thinking skills, innovation and problem-solving services for workers with workplace competencies.

The traditional teaching approaches adopted by greatest technical education educators in higher institutions (such as lecture and presentation methods) seem insufficient to equip the technical education with job services such as versatility, adaptableness, innovation, high-order thought and problem solving. Such teaching / learning approaches are educator-centered; therefore, they don't offer alumni ample chances to purposeful and engage for everyone vigorously in the learning procedure. The brief advent of these teaching approaches might be partially answerable for the deprived presentation of technical education undergraduates in inspections in the Niger State over the years. It has been observed that most technical education craftsmen from technical schools frequently leave their profession even after employment or have their focus split over a particular vocation and even take up jobs such as petroleum vending, unlawful external conversation marketplace sector and party-political tuggers that do not fit into that preparation they undergo have established. Accordingly, instructional methods needed to be more successful in refining not only undergraduates’ theoretical and psychomotor accomplishment but also students’ interest in technical education technology. Therefore this analysis is conceived for the ambition of impacts of Place-based and Activity – Based learning methods on higher institution students’ accomplishment, gender, interest besides retaining in Technical education skill in Niger State.

3. Purpose of the Study

1. Place effect– Functional and activity-based approaches to learning on the academic performance of the students in technical education.
2. Place impact – Focused and experience-based learning strategies on sustaining learning in Technical Education for students.
3. Place – Learning approaches focused on activity and centered on the students’ interest in pursuing Technical Education.

4. Research Question

1. What is the impact of Place-based and Activity-based approach to learning on the cognitive accomplishment of students in technical education?
2. What is the impact of Place-based and Activity-Based Learning Approach on maintaining learning in technical education for students?
3. What is the impact of Place-based and Activity-based method to learning on the interest of students in pursuing technical education?
5. Hypothesis

HO1: The mean impact of Place-Based and Event-Based learning approach on the academic accomplishment of students in technical education does not differ significantly.
HO2: There is no significant difference between the mean impact of gender on students’ academic achievement in technical education (male and female) once imparted by means of the place-based and Activity-based method to learning.
HO3: The mean interaction impact of treatment given to students taught using Place-Based and Activity-Based learning method and gender (male and female) by admiration to their mean scores in the cognitive accomplishment trial for technical education is not important.

6. Methodology

This research relies on a quasi-experimental approach. The proctored exam, the most post haste architecture remained working specifically for the study. The study remained carried out at Federal University of Technology, Minna, Niger State, Nigeria because the school is one of the schools in Niger State which offered technical education. The populace for this study is comprised of the 122 participants in second year from Federal University of Technology in Department of Industrial and Technology Education, Minna, Nigeria. The sample was chosen using simple random sampling. Second year students were used because in their first year they studied Technical Education and a basic understanding of the vocabulary, materials, and tools of trade would have been given. Populace circulation was done rendering to colleges. Respectively complete class contains male and female undergraduates who were used for the analysis for the entire population of 122.

The methods used to collect data for this analysis consist of a cognitive performance test in technical education (TECAT). TECAT held both content and face validation. To ensure the validity of their material, a specification table was built for the TECAT. A total of 82 numerous high-quality objects were pinched for the TECAT based on the specification table. Expert from ITE Department, FUT, Minna and two Technical Education educators on or after tech. institution in Niger State. The TECAT remained verified on 40 second year scholars at Niger State College of Education Minna, Nigeria’s Technical and Vocational Education Students using reliability test retest technique. TECAT’s reliability has been calculated using the Pearson Product Moment Correlation Coefficient and has been Recently discovered to be .78.

Aimed at the educators who remained used as investigation helpers, a three-day comprehensive training was planned. Prior to the therapy exercise, pre-test was given to the two sets by means of TECAT to assess the equality of the topics allocated to the Place-based learning set and Activity-Based learning set. Formerly, care in all the sets began. Place-based learning group was taught technical education with PBE Learning Plans thus technical education was imparted in the Activity-Based learning community using the ABL teaching tactics. Which Eight weeks.

The statistics composed from the pre-test, post-test, remained examined by means of mean to answer the study questions while Covariance Analysis (ANCOVA) remained used to trial the significance level of null hypotheses at 0.05.

7. Results

What is the impact of Place-based and Activity-based approach to learning on the cognitive accomplishment of students in technical education?

The mean of pre-test scores and post-test scores of the two groups are presented in table 1 below.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest N</th>
<th>Pretest Mean</th>
<th>Post test Mean</th>
<th>Gain Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBE</td>
<td>63</td>
<td>31.66</td>
<td>66.69</td>
<td>35.03</td>
</tr>
<tr>
<td>ABL</td>
<td>59</td>
<td>28.98</td>
<td>62.54</td>
<td>33.56</td>
</tr>
</tbody>
</table>

The data obtainable in Table 1 indicates that the PBE method set had a Mean score of 31.66 and a SD of 9.63 in the pre-test and a Mean score of 66.69 and a SD of 9.84 in the post-test resulting in a pre-test gain of 35.03 after-test. Activity-based learning method required a mean score of 28.98 and a SD of 10.08 in the pre-test and a mean after test of 62.54 and a standard deviation of 10.19, by a mean pre-test gain of 33.56 in the post-test. By these findings, together the learning based on problems and the learning based on events successful in refining the cognitive accomplishment of students in technical education, nevertheless the impact of PBE Method on refining the cognitive accomplishment of students in woodworking expertise is greater than that of ABL Method.

7.1. Research Question Two

What is the impact of Place-based and Activity-Based Learning Method on maintaining learning in technical education for students?
Table 2. Mean and standard deviation of PB approach group and ABL approach group Post-test and retention results in cognitive thinking test retention.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Post-test ( \bar{x} )</th>
<th>SD</th>
<th>Retaining score ( \bar{x} )</th>
<th>SD</th>
<th>Mean loss ( \bar{x} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBE</td>
<td>63</td>
<td>66.69</td>
<td>9.84</td>
<td>54.08</td>
<td>8.43</td>
<td>12.61</td>
</tr>
<tr>
<td>ABL</td>
<td>59</td>
<td>62.54</td>
<td>10.19</td>
<td>49.00</td>
<td>9.98</td>
<td>13.54</td>
</tr>
</tbody>
</table>

Table 2 displays that the PBE method set required a mean score of 66.69 and a SD of 9.84 in the post-test and a mean score of 54.08 and a SD of 8.43 in learning retaining allowing a mean loss of 12.61 in the post-test, retaining trial. ABL method set had an average score of 62.54 and a SD of 10.19 in the post-test and a retention test mean of 49.00 and SD of 9.98, with a post-test, mean loss of 13.54 with the result, PBE method set retaining of learning is higher than retaining of set learning in ABL. Consequently, the results indicate that the community teaching woodworking expertise with a method to PB maintained their learning improved than those imparted with ABL.

7.2. Research Question Three

What is the impact of Place-based and Activity-based method to learning on the interest of undergraduates in pursuing technical education?

The mean of pre-test scores and post-test scores of the two groups are presented in table 4 below.

Table 3. Mean and Standard Deviation of Pre-test and Post-test Interest Scores of undergraduates imparted using PBE and ABL methods.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pretest scores ( \bar{x} )</th>
<th>SD</th>
<th>Posttest scores ( \bar{x} )</th>
<th>SD</th>
<th>Mean gain ( \bar{x} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBE</td>
<td>63</td>
<td>60.30</td>
<td>10.38</td>
<td>86.36</td>
<td>8.78</td>
<td>26.06</td>
</tr>
<tr>
<td>ABL</td>
<td>59</td>
<td>68.64</td>
<td>9.20</td>
<td>86.49</td>
<td>7.53</td>
<td>19.85</td>
</tr>
</tbody>
</table>

The data presented in Table 3 indicates that the PBE approach category required a Mean interest score of 60.30 and a Standard Deviation of 10.38 in the pre-test and a Mean score of 86.36 and a Standard Deviation of 8.78 in the post-test resulting in a pre-test gain of 26.06 after test. ABL method had an interest Mean score of 68.64 and a standard deviation of 9.20 in the pre-test and a post-test Mean score of 86.49 and a standard deviation of 7.53, by a pre-test Mean gain of 19.85 after test. With these findings, the PBE approach and ABL method remain successful in stimulating the student interest in Technical Education but the effect of PB Approach on stimulating the awareness of students in technical education is greater than the ABL impact method.

8. Hypotheses

HO1: The mean impact of Place-Based and Event—Based learning approach on the academic accomplishment of students in technical education does not differ significantly.

HO2: There is no significant difference between the mean impact of gender on students’ academic achievement in technical education (male and female) once imparted by means of the place-based and Activity-based method to learning.

HO3: The mean interaction impact of treatment given to students taught using Place-Based and Activity-Based learning method and gender (male and female) by admiration to their Mean scores in the cognitive accomplishment trial for technical education is not important.

Summary of Analysis of Covariance (ANCOVA) test for hypotheses 1, 2 & 3 remain obtainable in table 4 below.

Table 4. Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Effect of Treatments (PB and ABL), their Gender and Interaction Effect with Respect to their Mean Scores on Technical education Cognitive Achievement Test.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>116029.049</td>
<td>1</td>
<td>116029.049</td>
<td>2505.394</td>
<td>.000</td>
</tr>
<tr>
<td>METHOD</td>
<td>3963.837</td>
<td>8</td>
<td>495.480</td>
<td>10.699</td>
<td>.000</td>
</tr>
<tr>
<td>GENDER</td>
<td>7.731</td>
<td>1</td>
<td>7.731</td>
<td>.167</td>
<td>.684</td>
</tr>
<tr>
<td>GENDER * METHOD</td>
<td>82.602</td>
<td>5</td>
<td>16.520</td>
<td>.357</td>
<td>.877</td>
</tr>
<tr>
<td>Error</td>
<td>4955.352</td>
<td>107</td>
<td>46.312</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>336096.000</td>
<td>122</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>10974.656</td>
<td>121</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. R Squared = .548 (Adjusted R Squared = .489)

The statistics obtainable in Table 4 indicates F-calculated values for three effects: diagnosis, gender and care and gender communication outcome on the academic accomplishment of the students in technical education. The F-calculated treatment value is 10.699, with an F-significance of a lesser amount of than 0.05 at.000. Therefore, the null-hypothesis that there is no important mean change amongst the influence of the PBE method and the ABL approach on the academic accomplishment of students in technical education is dismissed at the level of significance of 0.05. The result suggests that the mean variance amongst the PB method effect besides the ABL method remained important. As shown in Table 9, the F-calculated value for gender is .167 with a significance of F at.684 that is larger than .05. The null hypothesis that there is no significant difference from mean impact of gender (male and female) on the academic achievement of students in technical education is therefore agreed at the equal of significance of 0.05. This indicates that in technical education there wasn’t one substantial mean
difference between the effects of gender on the academic achievement of the students. Treatment and gender interaction have a F-calculated value of 0.357 with a value of F at 0.877 greater than 0.05. Therefore, the null hypothesis that treatments and gender have no major interaction impact is acknowledged. This indicates that therapies given to students imparted with PB method and ABL learning method and their gender did not have a major association effect in terms of its mean scores on cognitive performance test for technical education.

9. Discussion of the Results

This research aimed to evaluate the effects of place-based and activity-based learning strategies on the accomplishment, participation besides retaining of technical college students in technical education, as well as their effect on gender. The discoveries which developed from the analysis are deliberated here.

The data obtainable in Table Submitted an answer to Question one of the studies. It has been exposed that PBE method and PB are successful in refining the cognitive accomplishment of students in technical education, but the impact of PB method in refining the perceptive accomplishment of students in technical education is greater than ABL method. Covariance scrutiny remained used to evaluate the first hypothesis (Table 4) at the measured F-value (10.699), Significance of F (.000) and level of confidence of 0.05. The outcome highlights the difference in mean in academic achievement in technical education amongst the impact of the Activity-based learning method and Place-based learning method was statistically significant. This means that in raising the academic performance of the students in technical education, PBE is more successful than ABL approach.

The above discoveries are constant with the discoveries of Kabiru (2010), Ade (2011) and Umar (2012) Who, in their distinct studies in other topics, originate that the guidance of PBE had a significant impact on the cognitive accomplishment of the students compared to other formats of instruction. The discoveries of this study too provision some works data, such as Araz (2010), who claimed that when learners are uncovered to original concepts introduced by various brainpowers, they will have a improved coincidental of learning, remembering the knowledge and adapting their learning knowledges to added circumstances that may lead to advanced accomplishment. Consequently, the outcome of this study regarding the cognitive achievement of the students is due to the care assumed to students in the PBE community. The discoveries might be described by the fact that the implementation by teachers of numerous instructional systems (such as active learning, collective learning, and self-assessment) in the PBE & ABL laboratory interested to the changed intellects of the students and involved the undergraduates in the learning progression which enlarged their incentive to learn and improve their remembrance. The findings might also be described as follows: allowing students the chance to engage vigorously in the class by free contact take the educator and their nobles and enabling them to learn in sets and evaluate their success by including the undergraduates themselves in the learning process; thereby enhancing their capability to discover problems and express their personal thoughts. This in effect better-quality their learning and thoughtful capabilities that resulted in a profounder Intelligence of the ideas and ideologies of difficult technology related with technical education. It means that PBE approach undergraduates unstated and implemented more of their Technical Education learning than the added set of undergraduates that were imparted by ABL method.

The statistics obtainable in table 2 providing an answer to question 2 of the study. Outcome shows that students imparted using PB method had a higher mean score than those teaching with the ABL in the learning retention trial. These results stem from the element that PBE promotes hands-on activities that put learning in the students’ fingers. Providing an engaging learning environment in which undergraduates can be involved and actively contribute in lesson discussion enhances the willingness of the undergraduates to address topics and express their personal thoughts. In addition, the teacher's use of open-ended questions lets the students participate in higher order thoughtful activities such as analysis, synthesis, and assessment. Consequently, these boost the academic performance and retention of the students. This affirms the views of Shri-Krishna & Badri (2013) that the active learning method promotes vigorous information building, improves higher directive thoughtful skills, enhances remembrance and enhances information transference to another condition. He has proved that when the students start to think, they'll be capable of dealing creatively with all kinds of new issues and gain certain trust.

In any enlightening performs, by way of students work or learn to use bitmap image in communities collaboratively, to each one got to think critically about making logical contributions in order to be a successful participant. In addition, as undergraduates learn in classes, the cheerful ones often aid the slow realize the subject matter they are studying. It reinforces Omeje (2013)’s view that collective learning increases serious thoughtful skills and, ultimately, academic performance and learning retaining.

The data obtainable in Table 3 providing an answer to question 4 of the study. Findings revealed that PBE and ABL are effective in enhancing student interest in technical education, but PB’s effect on enhancing student interest in technical education is higher than PBE.

This outcome, especially that PBE is current in stimulating the interest of students in studying Technical Education, tends to support Charif’s (2014) writings, which
wrote that learning in the classroom makes lessons more interesting, allowing students to pay more attention to what is taught and then learned. As also stated by Anandala Kshmi (2012), by means of numerous entry opinions to introduce new material into an activity-based learning classroom would allow teachers to specifically target multiple intelligents. This will stimulate the attention of students and engage them in the learning process as well as give them more access to the gratification of the lesson, and additional opportunities to interact with the material. Therefore, the discoveries might be described by the fact that teaching the strengths of the students (intelligences / learning styles) includes the students in the learning progression. As a result, their self-confidence and interest in pursuing Technical Education increased.

Similarly, the finding that the PBE experiential knowledge model is successful in inspiring the attention of students in studying technical education ropes writings by Umar (2012), which claimed that experiential learning is an excellent way to give students control over their progress in learning. This also means the higher the concentration, the greater the inherent incentive for learning. The result could be explained by the fact that this group's experiential knowledge model betrothed students in the learning procedure by having positive effects on the interest of undergraduates in pursuing technical education.

10. Conclusions

This research evaluated the impact of place-based and activity-based learning strategies on the accomplishment, attention, and retaining in technical education of students at higher institutions. The place-based learning method used in this study significantly exaggerated Technical Education learning among students. That was reflected in the academic, successes and learning performance of the students. In other words, students learned better technical education and psychomotor skills because they used to be able to actively contribute in teaching and learning in the classroom by communicating with instructor, learning atmosphere and their classmates, working and learning in groups together. Students often maintained the lengthy thinking, while they were permitted to reason about potential resolutions to a problem while interacting with real objects, resources and machines in practical activities. Therefore, it is expected that if the place-based learning method is considered in the training of technical education in higher institutions, skilled craftsmen will graduate from higher institutions with information, Psychomotor competencies, good problem-solving skills, original thoughtful, cooperative work and self-governing policy making skills.

11. Recommendations

The following suggestions are made, built on the discoveries of this study;
1. Teachers of technical education will follow the use of the place-based learning approach to technical education teaching.
2. The National Board of Technical Education (NBTE) will deliberate reviewing the curriculum for the Technical Education Program to implement the Place-based Learning Method in Technical Education Teaching.
3. The Ministry of Education and Technical Education administrators should always arrange seminars, and meetings to raise awareness among practical educators about the use of the place-based learning method.

REFERENCES


Effects of Place-Based and Activity-Based Approaches in Technical Education, Interest and Retention


Challenges in Integrating New Teacher Development Program in Schools: A Systematic Literature Review

Zuliani Kamaruddin*, Yusof Boon

School of Education, Faculty of Social Science & Humanities, University Technology of Malaysia, Malaysia

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Abstract Education transformation will be more effective if a particular focus is placed on efforts to improve student achievement and at the same time emphasis is placed on initiatives to continually build teacher capacity throughout their careers. In line with this, the National Key Result Areas (NKRA) Teacher Quality ruled that the New Teacher Development Program (NTDP) was one of fifteen initiatives to be implemented to ensure excellence in the teaching profession. The New Teacher Development Program (NTDP) is a school based structured learning program to support the development of new teacher professionalism to improve teacher quality in the teaching profession. The NTDP is also a socialization process for the teaching profession that helps new teachers to make adjustment between existing knowledge and skills they have learned before with school systems, procedures and effective teaching skills and classroom management skills. However, there are many obstacles and challenges in integrating New Teacher Development Program in school. This study provides an overview of the challenges faced by the schools in integrating the program for new teacher’s professional development. Selected research papers, published from 2012 to 2019, were downloaded from Springer Link, Science Direct, Google Scholar, Taylor & Francis Online, SAGE, JSTOR, Web of Science and Emerald. Findings from this review showed that the new teacher commitment is the main challenge to initiate, develop and integrate New Teacher Development Program in schools. It is also beneficial to school administrators and educators to cater and understand the teacher attitude and readiness, both before and during the implementation phase of the program.

Keywords Challenges, New Teacher, New Teacher Development Program, New Teacher’s Professional Development

1. Introduction

The New Teacher Development Program (NTDP) is a school based structured learning program to support the development of new teacher professionalism to improve teacher quality in the teaching profession. It is also a socialization process for the teaching profession that helps new teachers to make adjustment between existing knowledge and skills they have learned before with school systems, procedures and effective teaching skills and classroom management skills [1].

The New Teacher Development Program (NTDP) is one of the programs that supports the development of new teacher's continuing professionalism, which is the first-time teachers enter the education service and are housed in schools. This program is implemented on a school-based basis through structured guidance and includes Orientation Phase, Teaching Phase and Professional Development Phase. The duration of implementation of this program is between one to three years. An experienced mentor teacher will guide the new teachers to learn about the school environment and culture and gain a deeper understanding of the system and aspirations of national education.

The NTDP can have a positive impact on schools, teachers and pupils while fostering an excellent work culture for new teachers to be able to perform tasks and responsibilities more systematically. Guided by mentor teachers through the mentoring system, experienced teachers and school administrators, it is hoped that new teachers will be able to implement teaching and learning more effectively and professionally so that this practice will improve the teaching profession in the country. This program has already been implemented in the teaching profession in developed countries to improve teacher quality. In addition, dynamic and global education requires teachers who are ready to continuously improve the quality of education [2].

There are still many issues faced by new teachers in schools although there have been strong efforts by the ministry to address issues and problems of new teachers [3].
The challenges and issues involving new teachers are not limited to classroom issues only as they face other challenges as they begin to become teachers, especially on issues related to their attitude, competency, motivation, stress and emotion and their commitment to the organization.

The question is, how far are new teachers responding to and implementing change in the school and classroom? Is the change just passing through in the form of documentation and not on teacher implementation and practice? This is because, if the teachers that are the main drivers and players of this change and transformation but do not play an effective role with proactive involvement and commitment, efforts and actions of the Ministry of Education Malaysia in realizing the philosophy of national education will be interrupted [4]. The school administrators must put an effort to guide and give motivation and guidance to new teachers in implementing New Teacher Development Program in order to perform well and successfully.

2. Research Question

The objective of this study is to gain an overview of the main challenges faced by school administrators or educators in integrating and implementing New Teacher Development Program in schools. This study also reviewed the dimensions or features towards the program. This study is also aimed to answer the research questions stated below:

- What are the main challenges faced by school administrators or educators to integrate and implement New Teacher Development Program in schools?
- What are the main dimensions or features associated with New Teacher Development Program?

3. Methodology

In this study, the systematic literature review was employed. Selected research papers from 2012 to 2018 were downloaded from Springer Link, Science Direct, Google Scholar, Taylor & Francis Online, SAGE, JSTOR and Web of Science and Emerald. Most of these articles are basically from the social science journals, for instance the Journal of Educational Research, Journal of Teacher Education, Journal of Education and Practice and Educational Leadership Journal.

Using these prominent databases, it provides good research platforms where multi-disciplinary issues can be found. In light of this, for this study, integrating and implementing New Teacher Development Program in schools and the challenges faced by the school administrators and educators were used as references in the database searching platform. Based on the searching result, most of the research papers in the databases showed the dimension relating to the issues of challenges in integrating New Teacher Development Program in schools.

During the initial stage, the search found a total of 98 papers which were related to teacher’s development program in schools. During the second stage, the number of articles found were reduced to a total of 29 which fulfilled these criteria: (1) The selected papers were limited to only those published from 2012 to 2018 in order to obtain the latest reviews regarding the integration and implementation of New Teacher Development Program in schools, (2) The studies were related to challenges in integrating and implementing New Teacher Development Program faced by school administrators and educators. The studies also were analyzed and summarized according to the research questions, as presented in Table 1 and Table 2.
### 3.1. Tables

Table 1. Analysis on the challenges faced by school administrators and educators in integrate and implement New Teacher Development Program in schools.

<table>
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<th>Author(s), Year</th>
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### Table 2. Analysis on the dimensions or features associated with New Teacher Development Program in previous studies

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</table>
Table 1 showed various types of challenges faced by school administrators and educators in integrate and implement New Teacher Development Program in schools. The result from the analysis showed that there are twelve challenges to integrate and implement the program; attitude, self-efficacy, motivation, commitment, teacher professionalism, emotional stress, perception and perspective, competency, readiness, class management, communication and support structure.

Table 2 displayed the analysis on the dimensions or features associated with New Teacher Development Program in previous studies. The dimensions are achievement enhancement, responsibility, classroom management, emotional relationship and management, problem-solving skills, support and guidance, self-confidence, transparency communication, skills and knowledge, commitment and intention to change, transformation and intervention, collective work and teamwork and also ethics & personal development.

4. Results & Discussion

4.1. Challenges Faced by School Administrators and Educators to Integrate and Implement New Teacher Development Program in Schools.

The results will be discussed based on the challenges that were mentioned most frequently from the review. From Table 1, there were twelve challenges faced by the school administrators in the process of integrating New Teacher Development Program in schools; attitude, self-efficacy, motivation, commitment, teacher professionalism, emotional stress, perception and perspective, competency, readiness, class management, communication and support structure. Findings from this review showed that the new teacher commitment, attitude and readiness are the main challenges to initiate, develop and integrate New Teacher Development Program in schools. A study conducted by [6] reported that new teachers are a distinctive group of learners that experience adverse work conditions that may result in their leaving the profession. New teachers are a distinct professional group that experiences their jobs differently, different instruments and methodologies may be needed to attain a better understanding of their experience and commitment to the profession. According to [7] even though facing with many challenges, new teachers may need to be even more effective and give commitment than their more experienced colleagues.

Researchers by [8] showed that although have high impact on these new teachers, aspects related to work commitment, emotional intelligence and work stress amongst the new teachers are less researched on. In order to improve new teacher’s work commitment in the teaching profession, work stress should be managed efficiently. It also will help to develop and maintain human capital amongst teachers and to undergo dynamic changes in the education.

The teacher’s attitude could either be positive or negative.

The teacher is only a setter of the stage, a supplier of material and opportunities, a provider of an ideal environment, a creator of conditions under which natural development takes place. Attitude is a degree of positive or negative affect associated with some psychological object. It is also a latent variable rather than an immediately observable variable. Teachers are different in their attitude and also differ in their methods to supply the pupil’s deficiencies. There may be a definite relationship between teachers’ attitudes to home background and their attitude to what is termed as reading readiness. Frequent changes are likely to develop indifferent attitudes among teachers towards their profession [9].

According to [10] readiness for change is a concept approached at either organizational or an individual level in organizations in various areas. Their level of readiness for change will be high if the teachers feel that they have a voice in making decisions. When the relationship between teachers’ level of readiness for change and the prevalent school culture at schools where they work is considered, there was found a positive and significant relationship between cognitive readiness and all dimensions of school culture, and also between intentional readiness and support, bureaucratic and task culture while there was a negative significant relationship between emotional readiness and achievement culture and bureaucratic culture.

4.2. Dimensions or Features Associated with New Teacher Development Program

Table 2 showed the analysis on the dimensions or features associated with New Teacher Development Program in previous studies. The dimensions are achievement enhancement, responsibility, classroom management, emotional relationship and management, problem-solving skills, support and guidance, self-confidence, transparency communication, skills and knowledge, commitment and intention to change, transformation and intervention, collective work and teamwork and also ethics & personal development. Emotional relationship and emotional management were most frequently mentioned from previous studies by six authors out of twenty-nine.

Teachers’ work is relating with emotional, social, and dynamic in character. Educators put on view their personality when teaching and it is considered to be a significant factor in influencing teachers’ work. The sphere of personality can be divided into thought, will, and emotion[11].

A teacher social-emotional competence is considered essential for creating a healthy classroom environment. It is
characterized by high-quality student-teacher relationships and positive classroom management. A study conducted by [12] suggest that teachers’ ratings of their own social and emotional skill positively relate to how they manage stress and their levels of burnout. When a teacher develops a positive relationship with their mentor, they are motivated to try new techniques or to reveal implementation challenges. The mentor-teacher relationship is a source of social support that positively impacts teachers’ emotional functioning.

5. Conclusions

From the result of the systematic literature review, it is significant to understand the challenges and obstacles in implementing and integrating New Teacher Development Program in schools especially for the teacher’s professional development. There were many challenges faced by the administrators and educators comprising of new teacher attitude, self-efficacy, motivation, commitment, teacher professionalisms, emotional stress, perception and perspective, competency, readiness, class management, communication and support structure. Based on the discussion, new teacher commitment, attitude and readiness were found to be the most significant challenges in order to integrate the program in schools and emotional relationship and emotional management are the main dimensions or features associated with New Teacher Development Program.

Teachers play an important role in the educational system including the new teachers. They are the key persons to carry out the teaching and learning session and develop the young generation. A positive educational environment will enhance teachers’ job satisfaction and commitment to work, contribute to the construction of a positive school culture and help administrators considerably on readiness for change in schools. Teacher education and induction need to provide the new teachers with skills that can be applied in classrooms. Developing and maintaining positive and constructive relationships with students, parents, and colleagues to maximize and ensure relevance in learning outcomes require skills of communication, teamwork, and conflict resolution that need to be developed by novices.

It is necessary to analyze the situation at school before any educational planning is done. Every change should not be viewed in a vacuum and separate from the reality of school life. Bureaucratic rules, coercive strategies and administrative pressures will be the main obstacles to effective policy implementation. This is because the new teachers are important individuals who are directly involved in the process of implementing an education policy, thus ignoring teacher’s readiness, commitment, ignoring teachers' needs and underestimating teacher resentment are not a wise action [4].

Acknowledgements

The author would like to thank the anonymous reviewers for their constructive feedbacks and also like to thank Associate Prof. Dr Yusof Bin Boon for reviewing this manuscript.

REFERENCES

Proficiencies in Curriculum Aspects among School Improvement Specialist Coaches Plus (SISC+)

Noel Jimbai Anak Balang*, Zamri Mahamod, Nor Aishah Buang

Faculty of Education, University Kebangsaan Malaysia, Malaysia

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Abstract As being maintained by District Transformation Program 3.0 (DTP 3.0), both skills and knowledge in curriculum aspects are being established by the purposes of School Improvement Specialist Coaches Plus (SISC+). Accordingly, this research endeavoured to recognize the level of competency of SISC+ in curriculum viewpoints. This study adopted a quantitative approach by employing the survey method. Before being examined by utilising SPSS version 23, the data were amassed through a set of questionnaires. Those questionnaires were disseminated to 128 SISC+ throughout the nation. For this research, descriptive statistics concerning frequency, mean score, standard deviation and percentage were employed. With the mean score of 4.23, sd=0.561, the results unveiled that SISC+ competency level in curriculum knowledge is at a high standard. From the curriculum viewpoints of the subject being taught, the outcomes of this research proved that SISC+ is accountable and proficient. Besides, the conclusions of this research afforded discernment into the SISC+’s capacity in training teachers in school and their implementation of quality Teaching and Learning (T&L). Hence, the authority needs to grant support and cooperation to ensure SISC+ remains to be competent in rendering quality coaching to teachers.

Keywords School Improvement Specialist Coaches Plus (SISC+), District Transformation Programme 3.0(DTP 3.0), Teaching and Learning (T&L), Malaysia Education Blueprint 2013-2025 (MEB), Instructional Coaching (ICs)

1. Introduction

Osman & Jaafar (2017) proposed that coaching and knowledge abilities among SISC+ concern contemporary Malaysia’s millenary educational remoulding [30]. The SISC+ must diversify their steering and coaching methods for teachers (Hilmi, Jamil 2017, Radhiah, Brahim & Sabil 2016) in reconstructing T&L [23,34]. In order to inspire the teachers to continue adding new knowledge following the position of SISC+ as an instructional coach, SISC+ must equip themselves with the most advanced curriculum and a variation of the robust pedagogical ingredient (Allen et al, 2011[1]. The most advanced curriculum and pedagogical knowledge designate the high measure of professionalism among teachers (Sarabiah & Mahamod, 2016; Balang,N, & Mahamod 2019)[33,5,6]. Working as the impetus for teacher quality, among the hurdles encountered by SISC+ is to ascertain the potency of the coaching manoeuvring (Knight.J, 2019, Joyce & Showers 2018, Chong & Mahamod 2017)[17,20,24].

The arena of instructional coaching functions as the catalyst for quality T&L systems ( Nieto 2014, Nor Asimah 2010, Beth 2009)[23,22,7]. The teachers dramatically improved their proficiency in classroom[21] T&L since the SISC+ profession begun in 2012 (Saemah & Mahamod, 2016)[37]. SISC+ facilitates the teachers in the advancement of professionalism to encourage pedagogical capacities and curriculum quality (Knight 2019, Jake & Knight 2008)[17,19]. Additionally, practical education in the context of coaching entails two parties; principally, the teacher who lead (supervisor/mentors/ coaches) and those who undergo coaching (mentee/coachee/ protégé (Jack & Chee 2013,Holland & Adam 2012, Jack & Knight 2008)[18,14,19]. Teachers must recognise the pedagogical skills of reliable T&L mechanism[4]. Teachers too must furnish themselves with relevant attitudes, behaviours, skills and knowledge as being recommended by the Planning and Policy Research Division (Hilmi & Jamil, 2017,Somasundram & Mahamod 2016)[15,32]. Additionally, in an attempt to satisfy the demands of 21st-century education, SISC+ must render satisfactory coaching programs (Ahmad,S,. et, al 2016, Ahmad & Mahamod 2015)[2,3]. With this basis, the researchers intend to recognise the competency level of curriculum and
pedagogical [4] aspect among SISC+ in Sabah and Peninsular Malaysia, which is in accordance with the SISC+ task drive; to administer coaching in curriculum and pedagogical aspects (Zubaidah et al 2018)[3].

In 2012, SISC+ program was introduced to support teachers in improving classroom T&L with coaching (Balang, N., & Mahamod 2017, Radhiah, Jamian & Sabil 2016)[6,28]. Further, the equivalent position performed by the instructional coach who is linked to training teachers to make T&L more productive and pleasant was introduced too, in other countries ( Desimone & Pak 2016)[12]. The duties of SISC+ comprise the leading and advising the efficacy of the implementation, coaching teachers on pedagogical skills, practising contemporary curricula and most advanced pedagogy to the classroom as following the District Transformation Programme 3.0 (Malaysia’s Education Blueprint (MEB) 2013)[21]. Each District Education Office will be authorised to customise the assistance necessitated by the schools, which covers the hiring of full-time teachers coaches. In low-performing schools, SISC+ will oversee and help teachers (MEB, 2013). It is anticipated that the number of tiers associated in curriculum and pedagogical control will be reduced and continuous professional development (CPDs) will be provided to teachers with SISC+ foundation (Norhasma & Yusoff, 2019, Bitty & Pang, 2017) [37,10].

In Malaysian Education Blueprint (MEB) 2013, the SISC+ program covers coaching and mentoring components; and it is believed to be the impetus to promote T&L. It is feasible by intensifying teachers skills and knowledge in comprehending and executing the most advanced education assessment, pedagogy, curriculum and reforms. SISC+ must perform the task as an instructional coach for the teachers ( Peter et al, 2018,Nieto 2014, Syed 2014)[23,23,34].

2. Materials and Methods

Among the aspirations of the SISC+ program is the responsibility of presenting teachers with guidance in curriculum, pedagogy and assessment to deliver high-quality teachers who can utilise their expertise in classroom pedagogy (District Transformation Program Management Guide, (DTP), 2017). It means that ideally, the SISC+ competency level and coaching practice need to exceed the quality of the teachers they train[21]. Nonetheless, in actuality, DTP asserted that there is SISC+ that performs unsuccessfully in mentoring because they are not skilful in curriculum, pedagogy and assessment [21]. Some SISC+ mentors are less accountable to oversee, so it is not very easy to get an authentic view of an aspect that teachers need to develop based on the Teacher Development Plan form. A review of the literature attended by the researchers discovered that pieces of knowledge on the SISC+ program are still lacking[2,6]. Most researchers concentrate plainly on teachers’ perceptions of SISC+ such as the study managed by Radhiah et al. 2015, Sarabiah & Mahamod,2016; Balang,N., & Mahamod, 2017][33,6]. Radhiah et al 2016 did studies; Bitty & Pang (2017); and Zubaidah et al. (2018)[10,29,39] focus only on the purpose of SISC+ in the context of rendering supervision and mentoring to teachers. The research of Tshabala,T, (2013) and Peter et al. (2018)[35,26] conducted in a case study particularly examined the potency of SISC+ guidance and function in Kluang, Johor and Tuaran, Sabah. The conclusions of these works of literature positively do not afford a complete summary of SISC+ coaching competencies and its best practices. There is only one objective and one research question in this research, which is to identify SISC+ competency in the aspects of curriculum knowledge and what is the SISC+ competency in the aspect of curriculum knowledge?

This descriptive study utilised questionnaire instruments distributed through goggle form and developed based on The District Transformation Programme (DTP 3.0 Management Book, Ministry of Education Malaysia (MOE). A total of 23 items for curriculum aspects were reviewed, namely curriculum knowledge were randomly distributed. A total of 128 SISC+ in Sabah and Peninsular Malaysia responded to the questionnaire distributed. The data of the study were analysed employing Statistic for Social Science (SPSS) version 23. The findings of the study involved only descriptive analysis consisted of mean, standard deviation, frequency and percentage. The mean score details were based on Cresswell, 2005 and Ware & Katsanis, 1994)[11,38].

3. Results

Table 1. Respondent Demography

<table>
<thead>
<tr>
<th>Respondent Demography</th>
<th>n=128</th>
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<tbody>
<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
<td>52</td>
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<td>Female</td>
<td>76</td>
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<tr>
<td>Years As A SISC+</td>
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<tr>
<td>2013-2015</td>
<td>114</td>
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<td>2016-2018</td>
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<tr>
<td>Experience as SISC+</td>
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<td>Less than 1 years</td>
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<td>1-3 year</td>
<td>9</td>
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<td>4-7 year</td>
<td>113</td>
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<td>Degree</td>
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<td>Masters</td>
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<td>PhD</td>
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</table>
Based on the demographics in table 1, 128 respondents answered the questionnaire and found that 52 (40.6%) consisted of male respondents, while 76 (59.4%) were female. The year of appointed as SISC+ was found in 2013, 21 respondents (16.4%)) Most selected were in 2014, 85 (66.4%) appointed while in 2015 8 (6.3%) followed in 2016 4 (3.15), 2017 8 (6.3%) and in 2018 2 (1.6%). 17 (13%) did not have a coaching certificate, and 111 (87%) did not have a certified coach certification from Aminuddin Baki Institute.

In terms of experience as a SISC+, it was less than one year, only 6 (4.7%) while 5 (3.9%) experienced for one year. The highest SISC+ experience was 5, and 6 were 48 (37.5%) while the lowest was SISC+ which was only two years 1 (0.8%). The highest teaching experience was that of 21-25 years (29.7%) second-highest teaching experience was 11-15, and 16-20 years were 27 (21.1%). A total of 49 (38.3%) were regular academic teachers before SISC+, and 45 (35.2%) were excellent teachers.

### Table 2. Proficiencies in Curriculum Knowledge

<table>
<thead>
<tr>
<th>No</th>
<th>Items</th>
<th>V. Incompetent</th>
<th>Incompetent</th>
<th>Less Competent</th>
<th>Competent</th>
<th>Mean</th>
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<tbody>
<tr>
<td>B1</td>
<td>Knowing the Curriculum and Assessment Standard Document (DSKP) of the Primary School Curriculum (KSSR) and the High School Standard Curriculum (KSSM) are well-guided subjects.</td>
<td>1 (0.8)</td>
<td>0 (0.0)</td>
<td>8 (6.3)</td>
<td>53 (41.4)</td>
<td>66 (51.6)</td>
<td>4.43</td>
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<tr>
<td>B2</td>
<td>Understand the KSSR and KSSM subject matter well</td>
<td>1 (0.8)</td>
<td>0 (0.0)</td>
<td>6 (4.7)</td>
<td>54 (42.2)</td>
<td>67 (52.3)</td>
<td>4.45</td>
</tr>
<tr>
<td>B4</td>
<td>Provide a description of the skills elements contained in the KSSR and the KSSM subject matter that are guided</td>
<td>1 (0.8)</td>
<td>0 (0.0)</td>
<td>13 (10.2)</td>
<td>54 (42.2)</td>
<td>60 (46.9)</td>
<td>4.34</td>
</tr>
<tr>
<td>B6</td>
<td>Know the syllabus of a well-conducted subject</td>
<td>1 (0.8)</td>
<td>0 (0.0)</td>
<td>13 (10.2)</td>
<td>52 (40.6)</td>
<td>62 (48.4)</td>
<td>4.36</td>
</tr>
<tr>
<td>B8</td>
<td>Planning the curriculum activities of the subject subject</td>
<td>3 (2.3)</td>
<td>6 (4.7)</td>
<td>17 (13.3)</td>
<td>56 (43.8)</td>
<td>46 (35.9)</td>
<td>4.06</td>
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<tr>
<td>B10</td>
<td>Implement an intervention program that is within the capacity of the Guided Teacher (GT)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>9 (7.0)</td>
<td>57 (44.5)</td>
<td>62 (48.4)</td>
<td>4.41</td>
</tr>
<tr>
<td>B12</td>
<td>Resolve problems related to curriculum programs at district level</td>
<td>1 (0.8)</td>
<td>7 (5.5)</td>
<td>25 (19.5)</td>
<td>59 (46.1)</td>
<td>36 (28.1)</td>
<td>3.95</td>
</tr>
<tr>
<td>B14</td>
<td>Evaluate the effectiveness of curriculum programs conducted at the district level</td>
<td>2 (1.6)</td>
<td>6 (4.7)</td>
<td>24 (18.8)</td>
<td>59 (46.1)</td>
<td>37 (28.9)</td>
<td>3.96</td>
</tr>
<tr>
<td>B16</td>
<td>Guiding GT oversees the curriculum process created by the committee</td>
<td>1 (0.8)</td>
<td>3 (2.3)</td>
<td>16 (12.5)</td>
<td>65 (50.8)</td>
<td>43 (33.6)</td>
<td>4.14</td>
</tr>
<tr>
<td>B18</td>
<td>Provides up-to-date curriculum input to enhance TnL</td>
<td>0 (0.0)</td>
<td>1 (0.8)</td>
<td>6 (4.7)</td>
<td>55 (43.0)</td>
<td>66 (51.6)</td>
<td>4.45</td>
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<tr>
<td>B20</td>
<td>Guiding GT identifies the use of teaching resources that promote HOTS based on the KSSR and KSSM curriculum</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>8 (6.3)</td>
<td>62 (48.4)</td>
<td>58 (45.3)</td>
<td>4.39</td>
</tr>
</tbody>
</table>
What is the SISC+ competency in the aspect of curriculum knowledge?

Descriptive statistics concerning mean, standard deviation, have been used to determine SISC+ competency in curriculum knowledge. Based on table 2, the overall mean score for SISC+ competency level in curriculum knowledge was very high (M=4.23,SD=.561). Based on the items given, items B1, B2, B4, B6, B10 and B18 are scoring very high mean for the SISC+ competency level. Whereas for items B8, B12, B14, B16 and B20, the mean score is only competent.

4. Discussion

The conclusions reveal that SISC+ competency level in the curriculum is high. It is good that SISC+ can maintain the momentum of excellence in providing quality guidance to teachers. Overall, this strengthens the conclusions of Radhiah et al. 2016, Sarabiah & Mahamod,2017,Balang, N, & Mahamod (2019) that SISC+ demands strong curriculum and pedagogical skills in order for teachers to have high confidence in SISC+’s capability to provide guidance [28,33,6]. To strengthen SISC+ professionals, the conclusions of Hilmi and Jamil (2017) research support that the quality of mentoring is one level or the ability of SISC+ to guide quality coaching practice [15]. It is relevant that the KPM institute this position with a focus on guiding curriculum, pedagogy and assessment [21]. Through robust coaching systems, schools under band five can be assisted, and teachers will be granted guidance in terms of ideas, concepts, organisations, procedures, teaching procedures of the 21st century (Bradley,W,.2017)[9].

Inferences from the research also uncovered that SISC+ pedagogical knowledge was at a high level. It has implications for the planning and implementation of the SISC+ program. The judgments of this research are in line with Hilmi & Jamil’s 2017 study which asserted that SISC+ needs to focus on the fitness of leadership, timeframe, area of guidance and facilities in the guidance discipline [15] and declared that the suitability of a mentoring session is essential throughout the mentoring session.

According to Radhiah et al. (2016), the components of teachers and schools are the spur for school potency and student accomplishment [28,29]. Duessen,T., et al (2018) argued that SISC+ professionals are not merely relating to the professional nature of the educational organisation but are exhaustive[13]. Being a great quality SISC+, it unites three fundamental ingredients, specifically curriculum knowledge, pedagogy and assessment, forming a more credible SISC+ and recognised as a mentor (Deussenn,T., et al 2018)[13]. For valuable leadership, SISC+ must employ the best skills to make the knowledge shift easily. Employing values in coaching practice is also indispensable for SISC+ to be an exemplary model for teachers (Knight & Jake, 2007)[16].

Nevertheless, by holding instructional coaches in schools, it advances students’ accomplishment but at an insignificant level. It is because, there is a shortage of data connecting coaching immediately to innovations in teacher preparation and student accomplishment, weak regularity in the purpose of SISC+, inadequate documentation of what happens throughout coaching communications, and an expert advancement is a new event (Borman,IF 2006)[8]. Meantime, Duessen, (2018) discovered that instructional coaches serve differently in schools and completed extra duties than just coaching [13]. Also, SISC+ plays its role as instructional coaching partially during working weeks. There are insufficient records on what these instructional coaches do and ways in which they engage with teachers that may result in student’s progress and attainment (Knight 2019, Peter et al, 2018)[17,26].

In an attempt to produce more productive SISC+, they must become proficient in questioning abilities, knowledge quality, coaching methodology, self-directed professional learning, contemporary curriculum, pedagogical capabilities, learning interest and present a diversity of workshops and courses to establish their characters in terms of communication (Thomas, 2015)[36]. Reflections on the purpose and efficacy of SISC+ leadership should be administered to comprehend Malaysia coaching further.

The research on this particular domain would grant practical knowledge for parents, holistic community and the Ministry of Education. Besides, it serves as an impetus for educators in schools and education discipline to keep abreast and endeavour solutions for a more satisfactory method. (Desimone & Pak 2016, Shaun, 2009)[12,31]. It is observed that when SISC+ is adroit with significant components such as curriculum, content standards, and everyday teachings, it is undoubtedly to be fully realised. Such a systematic system allows SISC+ to guide teachers with more specific courses, in comparison with to let the teacher blend innovative approaches and methods into their pedagogy. In fact, it is proven that the achievement of SISC+ is correlated to the curriculum productiveness that the teachers were utilising (Balang,N,. & Mahamod, 2019, Zubaidah et al 2018) and the content and standards that teachers were teaching.[6,39].

5. Conclusions

SISC+ refers to the people who are full-time professional developers, positioned in districts or on-site in schools[17]. SISC+ operates with teachers to assist them in consolidating research-based instructional systems. When SISC+ engages with students, they aim to illustrate brand-new dominant modes to teachers. Working as executive coaches, SISC+ has to be proficient in cooperating with teachers goals and learning their clients’ demands[17,18]. It is necessary so that they can assist teachers in designing a plan for accomplishing their
professional intentions, SISC+ is a manifestation of a repertoire of exceptional communication abilities and can sympathise, hear, and constitute bonds and assurance[21,25]. Additionally, similar to cognitive coaches, SISC+ have to be extremely skilful at improving teachers’ reflection about their classroom methods. Ultimately, similar to literacy coaches, SISC+ have to recognise a large number of scientifically validated instructional applications. SISC+ focuses on a more extensive expansive of instructional issues, shares a diversity of powerful exercises that present content improvement, particular teaching applications, classroom administration, or formative evaluation. In order words, the SISC+ cooperates with teachers so they can pick and perform research-based interventions to support students to study more efficiently (Knight 2019, Holland & Adam 2012) [17,14]

The researchers have examined ways in which SISC+ through instructional coaching is harmonious with research-based concepts of active professional growth, particularly with its realisation of five crucial characteristics of competencies[21]. These competencies are span, consistency, progressive education, collective partnership and content focus. The researchers too recognised the inclination for irregularity and proposed its reasons to be alleviated. The readers should not be astounded to learn the influence and advantages of SISC+ instructional coaching. Ergo, more extended empirical studies must be administered to resolutely suggest coaching as a relevant professional advancement chance for teachers to advance their T&L ( Wan Norhasma & Nurahimah, 2019, Richard, 2016, Ware & Katsanis, 2015, Shaun, 2009)[37,27,38,31].

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REFERENCES


Proficiencies In Curriculum Aspects Among School Improvement Specialist Coaches Plus (SISC+)


[34] Syed Ismail Syed Mustapa. Online available from: https://www.ukm.my/jurfpend/jurnal38/7SYEDISMAILSYEDMUSTAPA.pdf.


[38] Ware & Kitsanis. E.D. Supervising Instruction: Differentiating for Teacher Success. Norwood, Christopher Gordon Publisher, Norway, 2015.

The Impacts of Learning Analytics on Primary Level Mathematics Curriculum

Izzat Syahir Mohd Ramli*, Siti Mistima Maat, Fariza Khalid

Faculty of Education, Universiti Kebangsaan Malaysia, Malaysia

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Abstract Mathematics is important for the academic life of students. The Fourth Industrial Revolution has transformed the Mathematics education landscape and how students learn mathematics. As such, students today use ICT as a tool to help them understand mathematics in easy way. This is because ICT has an increasing influence on the way students interact, learn and live. The advancement of technology has triggered a revolution in data generation by the devices used. Hence, learning analytics (LA) is very useful and significant in today’s teaching and learning. LA is a fast growing area in academia and helps teacher on collecting, analysis, processing and visualization of data to help them understand students deep. This study aimed at identifying the impact of LA in mathematics curriculum. Hence, this article was drawn from previous works of literature to create an overview of the issue pertaining to LA on primary level mathematics curriculum. The application of LA in Mathematics is effective in helping teachers to understand students’ potential thus improving the overall quality of the teaching and learning process. The application of technology within this approach will enable teachers to build an effective learning process. In future, the application of the LA and GBL approaches in Mathematics is an approach that can be explored in-depth to assess its effectiveness to improve students’ mastery in Mathematics.

Keywords Mathematics, Learning Analytics, Technology

1. Introduction

The development of technology and multimedia in today's daily life has slightly affected the way in teaching and learning Mathematics in schools. Technological application especially the use of multimedia courseware has become common in today’s education, stimulating innovative approaches in teaching and learning Mathematics. Moreover, today's students are also the digital generation. They are also the generation who are more likely to choose digital tools as learning materials and play learning [19]. With the development of this technology, teaching and learning of Mathematics in schools has also been affected. This situation is due to the changes in the current Mathematics curriculum which emphasizes the application of technology in the teaching and learning of Mathematics in creating a conducive and fun learning environment.

However, the development of information technology has sparked a revolution in the production of data by technological. But, the richness of data are not managed and analysed properly to help provide meaningful and useful information for users [7]. Hence, learning analytics (LA) is significant in the field of education because it helps teachers interpret the data obtained from students via technology. LA focuses on collecting, cleaning, processing, visualization and analysing teaching and learning related data [18]. LA in Mathematics allows teachers to interpret the data to predict both students’ achievement and the risk of dropouts. This enables teachers to visualize the mathematics learning process with the benefit of data in helping to improve the effectiveness of the mathematics teaching and learning process. Moreover, it also provides valuable information to teachers to improve their quality of teaching [8]. As a result, teachers will understand students learning environment better via LA.

As such, teachers should possess productive roles and responsibilities to create a dynamic learning environment. Reports show that academics in Europe and the United State apply LA to help students succeed in classroom learning [9]. Therefore, the application of technology and LA is very much needed by today's teachers because the task load of teachers is currently constrained by teachers to effectively monitor pupils' behaviour and learning. So that, teachers should be more creative and innovative with the design and implementation of lessons in classrooms.
2. Materials and Methods

This study aimed at identifying the impact of LA in Mathematics curriculum. Researcher uses the PRISMA method which includes resources from Scopus and Web of Science that used to run the systematic review, determining eligibility and exclusion criteria, and the systematic review process. Several eligibility and exclusion are specified. First selection criteria are the type of literature selected, only journal articles with empirical data selected. This means that review journal articles, book series, chapters in books and conference papers are excluded. Second, selection criteria are an article journal written in English. Journal articles written besides English are excluded. This is to avoid any problems and mistakes in translating and understanding the article journals well.

3. Results and Discussion

The finding show the impact of LA in Mathematics curriculum and how to implement LA in Mathematics. The results and discussion as below:

3.1. Learning Analytics (LA) in Mathematics Education

Mathematics curriculum today stresses that students should not be merely judged based on their grades. Nevertheless, there should be a holistic and in-depth approach when it comes to assessing students throughout the process of learning and teaching. Besides that, the transformation and development of the Mathematics curriculum have also changed the goals of teaching and learning Mathematics. The current curriculum emphasises the application of technology in the process of teaching and learning Mathematics. It is done to create a conducive, fun learning environment, to promote higher learning and support the acquisition of basic digital skills among students [13] at the primary level.

According to [16], the LA approach is divided into two namely visual analytic and automatic actuators. Visual analytic approach aims to provide students with visualization as self-reflection and provide teachers with visual information so that teachers can interpret and make informed decisions in assisting the teaching and learning process with the help of visual information. Next, automatic actuators approach is intended to implement automated actuators such as recommendations or expectations that consider different variables in the teaching and learning process [16]. This automated actor does not require intervention of a teacher or a student but is usually restricted to meaningful specific clues.

In the teaching and learning of Mathematics, LA helps improve students’ learning skills [11] through its ability to anticipate their achievements [7]. As a result, teachers will be able to take proactive steps to improve pupils' understanding when it comes to learning. Moreover, the expected results will also encourage students who are at risk of dropping out or performing poorly in class to improvise their learning strategies [6]. It will also enable teachers to review all the teaching methods that have been implemented. Besides that, students will also have the opportunity to evaluate the effectiveness of the lessons. As a result, the teaching and learning process will always evolve to ensure learning the objectives are achieved and students continue to exhibit progress in Mathematics. Therefore, it reduces the risk of students giving up on Mathematics.

Besides, LA is widely applied in Mathematics to improve the quality of teaching and learning. In general, there was an improvement in the quality of teaching materials, teachers’ ability to identify students’ academic progress and students’ attitude and behaviour towards Mathematics as a subject. These factors had simultaneously improved the quality of teaching. LA in Mathematics enables teachers to leverage on the wealth of information which will then provide accurate feedback to students and valuable information for teachers in order to improve the quality of teaching [17] and develop a better understanding of the learning environment [18].

3.2. Implement LA in Mathematics

We already know the potential of applying LA in Mathematics. But how to implement LA in Mathematics? The findings of this previous study provide the impression that in order to implement LA elements, a new learning material needs to be developed. However, there are also past reviewers who have only improved existing learning materials by implementing LA as an innovation. Table 1 below summarizes the purpose of the study and the category of learning materials used.
The findings from this research report indicate that the combination of GBL and LA can give a more positive effect on the process of teaching and learning Mathematics. This will help elevate students’ mastery of the subject. GBL and LA approaches enable teachers to leverage on the wealth of information and help them provide accurate feedback to students and improve their teaching quality [17] to gain a better understanding of the learning environment [18]. Thus, the integration of LA and GBL in the course of teaching and learning Mathematics helps improve teaching quality and enhance students’ learning skills.

### 3.3. Applying Game-based Learning (GBL) Approach with LA in Mathematics

To implement LA in Mathematics, teacher should construct new learning material or improved learning material. However, game-based learning (GBL) approach also can be use in implement LA. GBL is seen as one of learning medium that can attract students to master’s in mathematics. It is also more effective with clearly defined learning objectives that work in tandem with a curriculum that emphasises student-centred learning. As a result, the application of GBL has succeeded in improving students confidence and increasing their interest for learning [5]. This will enhance students’ competency and ability as well as help improve students’ achievement in Mathematics.

Hence, [3] asserted that GBL has the potential to improve students' progress in Mathematics. They further justified their claims by saying that students will apply basic Mathematical, reading and problem-solving skills while playing to ensure that the given assignment is accomplished. Moreover, GBL also has the potential to cultivate a positive attitude and behaviour among students. This is because a well-designed game-based learning approach can draw in students into activities that create a meaningful learning environment. As a result, students will learn to collaborate during the process of learning [2] to achieve set learning objectives. Additionally, a healthy competition during lessons will create excitement among students. They get to learn while playing. This will eventually shape a positive attitude towards the learning of Mathematics.

The benefits of GBL should not be disregarded. The combination of GBL and LA is used to predict pupils’ progress in learning especially predictions regarding student achievement. In addition, learning materials improved with the implementation of LA are used to improve the quality of learning. This enables the teacher to obtain the data resulting from the application of the learning materials developed for analysis and help the teacher utilize all the data obtained in improving the quality of teaching and predict student’s performance.

### 3.4. The Application of Theory in LA in Mathematics

However, teacher should apply some learning theory to get the better result. The theory of planned behaviour [1] should be insert because this theory will help teacher to visualise student behaviour and understand students in deep when they use GBL. According to [1] students’ behaviour can be planned and predicted based on elements that can influence a person’s desire to engage in behaviour. This is because pupils' behaviour in Mathematics will determine the learning opportunities and levels of achievement in Mathematics based on their perception and feelings towards Mathematics. Hence, this theory is suitable to apply in LA because it’s allowed teachers to interpret the data to predict both students’ achievement and behaviour.

Besides, the application of GBL in LA requires that teachers emphasize the application of cognitive load theory [20]. The application of this theory enables the cognitive load factor of students to be considered in developing GBL applications. Cognitive load is the amount of mental activity that is used by working memory while processing information where the cognitive load during the learning process is at a minimum to enable effective learning [21]. This is because a good and effective learning process occurs when the learning materials used are in line with students' cognitive design [20]. Therefore, if the cognitive load received by a large student exceeds the cognitive level, then the learning process implemented will not achieve its objectives and will fail. Therefore, teachers need to focus on organizing learning information according to students' cognitive needs. So that students can apply their cognitive resources more effectively.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Learning Materials</th>
<th>Material Category</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romero et al. (2012)</td>
<td>Cognitive tutors</td>
<td>New Material</td>
<td>Predict student achievement</td>
</tr>
<tr>
<td>Kim et al. (2016)</td>
<td>Cognitive tutors</td>
<td>Improvement Material</td>
<td>Improving the quality of teaching</td>
</tr>
<tr>
<td>Roman et al. (2018)</td>
<td>Cognitive tutors</td>
<td>New Material</td>
<td>Predict student achievement</td>
</tr>
<tr>
<td>Molenaar &amp; Campen (2018)</td>
<td>Cognitive tutors</td>
<td>Improvement Material</td>
<td>Improving the quality of teaching</td>
</tr>
<tr>
<td>Tomkin, West, &amp; Herman (2018)</td>
<td>Cognitive tutors</td>
<td>New Material</td>
<td>Predict student achievement</td>
</tr>
</tbody>
</table>

Note: *Cognitive tutors* (special software materials for research purposes)
4. Conclusions

Applying LA in Mathematics education brings great benefits that will improve the quality of teaching and learning in classrooms. The use of LA also helps teachers visualise students’ progress throughout the lesson. This will in one way or another refine teachers’ teaching skills too. LA also allows teachers to gauge students’ achievement and predict their dropout rates. These expectations allow teachers to identify students who face learning difficulties and further help them improve to prevent dropouts. LA is also closely related to the quasi-experimental study because it has the potential to report the existing knowledge of students and describe their experiences throughout the learning process [4]. In future, the application of the LA and GBL approaches in Mathematics is an approach that can be explored in-depth to assess its effectiveness to improve students’ mastery in Mathematics. This is because the data from GBL approach can be manipulated to help teachers understand students in deep. Teacher also suggested to apply some learning theory like theory of planned behaviour [1] and cognitive load theory [20]. This theory should be injected because it will help teacher to visualise student behaviour and understand students in deep.

References


Scaffolding the Development of English Language and Communication Skills of Engineering Students

Mimi Nahariah Azwani Mohamed¹*, Zarina Othman², Suzilla Jamari¹, Nor Fadhilah Ahmad Powzi¹, Nurzarina Abd Samad¹, Nurul 'Ain Othman¹

¹Department of English Language and Linguistics, Centre for Language Studies, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia
²Pusat Citra Universiti, Universiti Kebangsaan Malaysia (UKM), Malaysia

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Abstract Teaching English in higher institutions is becoming more challenging in this globalised era. With the demand for communication skills in English as one of the important recruitment criteria, future graduates need to be equipped with sufficient English language and communication abilities relevant for their respective fields. This suggests that English language educators need to teach specialised English language such as engineering which may be beyond their expertise. Having trained as English as a second language educators, most of them may have limited knowledge in engineering. This paper is part of a larger research that explores the development of cross-disciplinary curriculum. This study examined the extent to which English language educators addressed the language needs of engineering students academically and professionally. A total of ten language educators from two Malaysian public universities participated in a focus group where they discussed their teaching practices and experiences in teaching engineering students. In addition, six English for Specific Purposes (ESP) practitioners from European universities were also interviewed to obtain information regarding the practices in teaching ESP at their universities. The results show that there is a gap between the development of engineering students' English language abilities in English language classrooms and its maintenance in engineering classrooms in Malaysia. The study highlights the key considerations to develop a framework that scaffolds the development of English language abilities and communication skills among engineering students within engineering education.

Keywords ESP, English for Engineering, English Language Teaching, Language and Content, Inter-Disciplinary Teaching, Curriculum Development, Designing English Course

1. Introduction

English language teaching in higher education has shifted from teaching general English which focuses on grammar and language structure, to specific English which focuses on language usage in contexts [1]. As such, English language teaching needs to cater to the language needs of students within a particular context or discipline. In order to make learning meaningful, English language teaching needs to be linked to students' disciplinary context, academically as well as professionally. In other words, English language teaching and learning needs to be content-based rather than mere language input classrooms [2].

Recent development in English language teaching in higher education institutions has shown a growing demand for the integration of language and content, focusing on communicative competence [3-5]. Structuring teaching and learning that integrates language and content can be challenging. Arnó-Macià and Mancho-Barés [6] examined the implementation of content and language integrated learning in English for Specific Purposes (ESP) classrooms. The purpose of this approach was to improve students' English language proficiency by learning language in context. The findings showed that the ESP practitioners tend to focus more on the content and less language support. The main issue raised through this study is the challenge for ESP practitioners to balance between content and language in their teaching.

The need to integrate language and content has triggered initiatives to develop and provide ESP-type courses that are domain-specific, such as for engineering [7-9]. In framing their teaching, ESP practitioners need to consider the
disciplinary variation in the use of English needs to be considered [10]. In other words, English language teaching needs to be domain-specific to enable students to relate to their field of study and participate in their language learning process [11, 12]. This raises the issue of teaching language discourse appropriate for a particular discipline.

Gilmore and Millar [8] conducted an investigation to identify words commonly used for civil engineering to determine how specialised the words need to be. In their study, they highlighted the discourse commonly used within civil engineering field, particularly in written communication. In another study, Noguera-Díaz and Pérez-Paredes [13] examined the noun phrase modification patterns in a corpus of English for military navy submariners. They found that the English language used for the military navy submariners has distinctive linguistics features, particularly in professional writing and communication. The findings in both studies suggest that language discourse differs from one domain to another and having the knowledge about the "specialised" language for a specific discipline can assist ESP practitioners in managing their language teaching and learning. This raises questions in relation to how much knowledge about the "specialised" language discourse is required of the ESP practitioners. In order to develop knowledge on language discourse for a particular discipline, such as engineering, ESP practitioners should have some basic knowledge about students’ field of study [14]. Saliu [15] conducted a study on the challenges that ESP practitioners in one of the European universities faced in teaching ESP. From the interview data, it was found that the ESP practitioners had difficulties in providing the language discourse for engineering as they were not specialists in the students’ field of study. In addition, the ESP practitioners were not able to select appropriate materials to address students’ language needs in their field of study.

In Malaysia, English language educators who teach at higher learning institutions are generally trained as teachers of English as a second language [16-19]. With the demands for teaching ESP, these English language educators would have to shift from teaching general proficiency to ESP. This shift from English as a second language (ESL) teacher to an ESP practitioner may cause tensions among these English language educators. In their study, Mohamed, Moni and Mills [20] investigated ways in which English language educators positioned themselves when teaching in higher learning institutions. A total of four English language educators from one technical university were interviewed individually. The findings showed that three of the participants struggled in positioning themselves within a discipline-specific context, either to position themselves as an ESL teacher or as an ESP practitioner. They acknowledged the need to integrate English with engineering but lacked confidence in dealing with content knowledge as they were not the experts in that field. This raises questions about the extent to which students’ English language needs within their specific fields have been addressed. In addition, there are also questions about the ESL teachers' readiness in teaching the language discourse appropriate for engineering students' academic and workplace contexts.

This study is part of a larger research that aims to develop a framework for cross-disciplinary curriculum between English language and engineering. In this study, the researchers aimed to determine the extent to which English language educators were able to scaffold engineering students in developing English language abilities and communication skills for engineering contexts. In order to achieve this purpose, the experience and teaching practices of English language educators were examined.

2. Methodology

This study showcased the complexity of developing engineering students’ English language and communication skills for engineering contexts from the English language educators’ perspective. The complexity was unpacked through the analysis of the English language educators’ experience and teaching practices in addressing the need to teach English for engineering. To achieve this purpose, qualitative approach to data collection was employed as it provided a platform to explore how the English language educators interpret their experience and frame their teaching and learning English for engineering [21].

The study was conducted at three different locations and the participants were English language educators who were second language speakers of English. Two locations were in Malaysia while one location was at a university in Sweden where a group of ESP practitioners gathered for their annual meeting and seminar. The participants were recruited as they were native speakers of English teaching ESP to either English speaking or non-English speaking engineering students. Their experience may provide invaluable insights on teaching ESP from the perspective of native speakers. Five of the participants were from one Malaysian technical university, three of the participants were from one Malaysian public university and five participants were from European universities.

The selection of the participants was through non-probability sampling method where these participants were recruited on a voluntary basis. This sampling method is relevant for this study because the study aimed to provide deep understandings of the issue being investigated and not making generalisation [22]. Although the recruitment of the participants was on a voluntary basis, the researchers also considered the group of students that they teach. In this case, the participants need to be those teaching engineering students. Each participant went through a face-to-face semi-structured interview where the
questions obtained information related to the participants’ conceptualisation of ESP, as well as their experiences and practices in teaching ESP to develop engineering students’ English language and communication skills. Each interview lasted for about 45 minutes to one hour. The interview data were transcribed, coded and analysed using thematic analysis. Thematic analysis was employed as it captured the patterns of theme across the dataset [23]. The responses were coded using the coding described in Table 1 below.

Table 1. The description of the code used for the responses

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Participant</td>
</tr>
<tr>
<td>E</td>
<td>Europe</td>
</tr>
<tr>
<td>TH</td>
<td>Participants from the technical university</td>
</tr>
<tr>
<td>KM</td>
<td>Participants from the public university</td>
</tr>
<tr>
<td>MPU</td>
<td>Malaysian public university</td>
</tr>
<tr>
<td>MTU</td>
<td>Malaysian technical university</td>
</tr>
</tbody>
</table>

3. Findings

In scaffolding the development of their English language and communicative abilities, engineering students need to be able to see the relevance of these skills in their field of study. This requires all stakeholders, particularly the English language instructors to provide meaningful English language learning where students can relate what they learn in an English language classroom to their field of study. Providing such meaningful learning suggests that the ESP courses taught at both universities were general that could be applied to various disciplines for academic or workplace purposes. The ESP courses taught at both universities did not have expertise in the field. As a result, their teaching focused more on general skills which could be applied to various disciplines for academic or workplace purposes. The participants also acknowledged that the language or the sentences used need to be specific for engineering contexts.

In both [P3KM1] and [P1KM3] above, the participants, I think we are not expected to know everything. [P1KM3]

One of the participants also indicated that ESP should contain engineering content. However, the above responses were based on their theoretical understanding of what ESP courses should be.

In these responses, it could be observed that there is a gap between what is conceptualised and what is implemented. The ESP courses taught at both universities were found to be general that could be applied to various disciplines. There seems to be a mismatch in translating the concept of ESP that they have understood into their teaching.

We are not required to understand all the engineering stuff. [P3KM1]

I think we are not expected to know everything. [P1KM3]

In both [P3KM1] and [P1KM3] above, the participants, who were from the public university, did not prefer teaching English that included engineering content as they did not have expertise in the field. As a result, their teaching focused more on general skills which could be applied to various disciplines for academic or workplace contexts.

The language for engineering should be straightforward... they would need language like passive sentences when they talk about process. [P1KM1]

They were aware that English for engineering may differ from English for other contexts.

The courses should focus on developing English communication skills in a specific area such as engineering. [P3TH1]

In addition, the communication skills developed need to be appropriate for engineering field.

...they actually need some input (for example engineering terms) on engineering part... [P1KM2]

One of the participants also indicated that ESP should contain engineering content. However, the above responses were based on their theoretical understanding of what ESP courses should be.

The ESP that we teach is not quite ESP because we tailored our English course for all students (not for specific discipline). We are supposed to tailor the courses to the language needs of their programme.. [P4TH1]

For our course, we do not have ESP in that sense even though this course is for engineering. [P2KM1]

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context.

The participants from the technical university, however, demonstrated a different perspective.

*I think that the English that we should teach at this university should be tailored to the needs of their programme, in this case, engineering.* [P4TH2]

*Why should we teach the same English? We should move from easy to difficult because this is the type of English that they are going to use when they go to workplace.* [P5TH2]

The two participants above indicated their willingness to teach ESP that is specialised for engineering fields. This indicated their readiness to take up the challenge of including engineering materials or information in their teaching. There was a sense of dissatisfaction for not able to provide the language knowledge and skills that their students need in their field. Based on this finding, it could be observed that the participants intend to translate the way they conceptualise ESP into practice. However, an issue arise on the extent to which this intention has been realised. This issue is discussed in the next section.

### 3.2. Translating ESP into the Course Content

In the previous section, the participants of both Malaysian universities illustrated the complexity in translating their conceptualisation of ESP into practice. They conceptualised the ideal ESP, which is to contextualise the English course into engineering, but reported the reality of ESP teaching at their university. This reality is evident in the ESP courses that are available at their universities.

*English for engineering, the content is not engineering content...it’s not really technical because we are not engineers...* [P2KM3]

In this excerpt, it could be seen that the conceptualisation of an ESP had not been realised. Instead, the content of the courses were common components applicable for various disciplines.

*We have English for medical but the content is more on oral presentation.* [P2KM5]

*We teach them the language input which will be required when they participate in meetings at workplace.* [P3KM3]

The common components covered in the ESP courses focused more on communication at workplace such as oral presentations and meetings. This illustrates a mismatch between their belief of an ideal ESP and the courses that they teach or design.

*We don’t really teach them technical English.* [P1KM3]

*We don’t have expertise in students’ field of study.* [P3KM2]

...*in terms of the engineering terms, I think it is best taught by content lecturers themselves... the (English) course is not so much on technical stuff.* [P2KM2]

The participants believed that their role was just to provide the language input as they don’t have the expertise in students’ field of study. On the one hand, it could be seen that these participants were reluctant to go out of their comfort zone to gain knowledge beyond their expertise. On the other hand, they believed that going beyond the comfort zone was redundant as the content would be covered by the engineering lecturers themselves.

### 3.3. Translating ESP into Teaching and Learning

In the previous two sections, the findings have highlighted the complexity of implementing ESP teaching which is contextualised for engineering. This complexity has led the English language instructors to focus more on general communication skills and language input that are applicable to various disciplines. This suggests that the English language abilities and communication skills developed by the engineering students may not be specifically for engineering contexts. One of the ways to address this issue is to provide teaching and learning that could integrate language and content.

The MPU has started a teaching collaboration between engineering lecturers and English language instructors. This collaboration was initiated by one of the top officers at the university, who were of engineering background.

*...this collaboration was a top-down recommendation by our Vice Chancellor...the engineering faculty members were positive about this collaboration. They were also very keen to improve their students’ language ability...they wanted their students to perform better.* [P3KM2]

This initiation has also inspired the engineering faculty members to participate in the collaboration. In other words, the main players in this collaboration are the engineering faculty members.

*I have collaborated with a number of (content) teachers. As long as everyone involved is clear about the intended learning outcomes and who the students are, it works well.* [P1E1]

This type of collaboration is also practised by ESP instructors at European higher learning institutions. The main issue that is highlighted by the participant above is clear intended learning outcomes.

*I am going to teach with an engineering lecturer soon. And right now, I am excited about it because I like cooperating with this colleague who has been helping me with the dictionary (for engineering students) project.* [P3E1]

In [P3E1] above, it could be observed that the ESP instructor from a European university was positive and
willing to implement this collaboration. He demonstrated the agency to change his teaching approach from teaching "general" ESP to domain-specific ESP. This is to help his students improve their English language and communication skills.

The participants of the MTU, on the other hand illustrated a different perspective when asked about conducting collaborative teaching with the engineering lecturers. 

"This (collaborative teaching) is actually a good idea on paper but we as language teachers also need to be familiar with their field." [P4TH3]

It sounds very ideal but we need to see the practicality of it. We need to get information about what they are doing in their field...but it is a good idea to do this. [P5TH3]

Although the participant viewed the collaboration as a good idea, she raised the issue of familiarity of the students’ field of study. This is different from the participants from MPU who were not concerned about familiarity of engineering knowledge.

They (engineering lecturers) will look at the content. We will give them input in terms of the language. [P4KM1]

The above excerpt illustrates that both the English language instructors and engineering lecturers at MPU are clear of their roles and the learning outcomes. Within this context, the English language instructors do not need to familiarise themselves with students’ field of study. Instead, they only need to understand the language needs of the engineering students.

"(If we were to have this collaboration) we have to meet several times...we have to know the aim...so we are clear of our roles." [P4TH4]

The participant emphasised the importance of understanding the roles of both parties before the collaboration could be conducted and the time needed to set up the collaboration. The issue of time is acknowledged by one of the participants from one European university.

"A great deal of time is needed beforehand for the content teacher and I to agree on how the lesson aims would best be reached. It is not so much about disagreeing on what to teach, but about having clear expectations." [P2E1]

Thorough discussions are required for both the engineering lecturers and the ESP instructors to agree on the learning outcomes that can address students’ learning needs of both disciplines. Without the thorough discussions on what are expected of the students to perform and the roles of each instructor, the teaching and learning process may be disrupted.

I remember going to this meeting with people from different engineering departments...at the end of the semester, the students are required to present their projects to the content lecturers and their English instructors. But the engineering lecturers did not discuss with us in terms of the timetable for the presentations. [P2KM3]

The content lecturers also did not consult us about the way the students were expected to present. Some students had to do poster presentation, some had to rap, some had to present in a poetic way and so on. It was difficult for us because on our part we need to assess their oral presentations. [P2KM3]

In the responses above, it could be seen that the collaboration conducted at MPU was biased towards the engineering faulty members. Although there was a meeting conducted to discuss the collaboration, the English language instructors seemed to have limited autonomy over the implementation of the collaboration.

While creating a new practice in teaching and learning is valuable, there is a challenge in sustaining this practice. The people who are directly involved in the collaboration need to be available all the time.

"It is not always sustainable...it is a problem when someone is not available." [P1E2]

Bringing in new partners in the middle of the collaboration may disrupt the teaching and learning process as the partner may not have a clear understanding of the intended learning outcomes.

Another challenge in terms of sustainability is the change in the top management organisational structure. It is a common practice when a new person takes over the management, new policies or practices are introduced while old ones may not be emphasised.

One of the challenges is when the top management changes and the focus on collaboration will also change. And when new instructors join the faculty, they don’t know about the collaboration. [P1KM4]

Within this context, a collaboration that was initiated by the previous management may be overlooked or discontinued. Apart from that, new faculty members may not be aware of the existence of the collaboration.

This section has highlighted several issues that need to be considered in creating the eco-system to scaffold the development of English language abilities and communication skills among engineering students. The next section discusses these issues and draws the conclusion.

4. Discussion

Providing meaningful English language learning which is contextualised according to learners’ field of study such as engineering is complex. The English language educators need to consider ways in which the ESP courses and their teaching could encourage students to engage in meaningful exchanges and facilitate their language learning. Based on
the findings, there are two main issues that have been highlighted. Firstly, the English language educators may have an understanding of what an ideal ESP course is but may have challenges in translating this understanding into reality. Secondly, designing English language courses and conducting English language teaching which integrate language and content require the English language educators to go beyond their English language expertise and familiarise themselves with engineering knowledge.

When attempting to design ESP courses and frame teaching and learning that integrates language and content, English language instructors may consider applying the 4C’s framework of communication, content, cognition and culture [24]. Within this framework, language is the medium to express the content, promoting the development of language skills (communication) and construction of knowledge (content and cognition) through social interactions [25]. It is possible to use this framework as the underpinning for a cross-disciplinary curriculum. Nonetheless, the effectiveness of such curriculum lies on the educators’ understanding of the main purpose of curriculum. The intended purpose of a curriculum may change through the influence of educators’ understandings of the curriculum.

Another alternative to achieve the integration between language and content is to perform collaborative teaching and learning between the English language instructors and the Engineering lecturers. Nonetheless, the findings have raised several key considerations when conducting such collaborations. Firstly, top-down as well as bottom up support is required in order to ensure the continuity of this collaboration. As indicated by the participants at MPU, their collaboration was initiated by the top management and at the same time both the members of the engineering faculties and the English language instructors accepted the initiation positively and implemented the collaboration.

Secondly, both the engineering lecturers and the English language instructors need to be clear about their roles in teaching and learning, and the intended learning outcomes. This requires both parties to conduct thorough discussions and planning to come to a consensus. Biggs [26] has highlighted three key areas that need to be considered when planning to integrate language and content. These key areas are intended learning outcomes, the teaching and learning process and the assessments. Within this model, English language teaching can have learning outcomes, teaching and learning activities and assessment that are aligned with the content of engineering. The cross-disciplinary collaborative teaching and learning can be made possible with English language and content courses existing separately but with aligned learning outcomes, teaching and learning activities and assessments.

Thirdly, the findings have highlighted the issue of sustainability where one of the people involved in the collaboration are not available, the teaching and learning may be disrupted. As such, a Community of Practice (CoP) needs to be established. According to Lave and Wenger [27], an individual does not learn by himself but through social process that is situated within a cultural and historical context. In other words, educators should learn from one another to frame their teaching better. The establishment of the CoP can provide a platform for the engineering lecturers and English instructors to share their experience and provide information to those who are not directly involved in the collaboration but may be involved in the future. It can also become the platform for newly recruited lecturers or those who have just returned from their study to get updates on what is happening at their faculties.

Lastly, and most importantly, both the English language educators and engineering lecturers need to have the agency to change their approaches in framing their teaching outside their comfort zone. Agency is the element for the instructors to negotiate their practices, and make pedagogical decisions about teaching and learning [28, 29]. In this case, both the English language instructors and engineering lecturers, negotiate their practices and make pedagogical decisions to frame their teaching beyond their expertise.

5. Conclusion

This study has highlighted that the key issues that need to be considered when English language instructors attempt to integrate language and content in ESP courses. The discussion on the issues has highlighted the need to consider the aspects of communication, content, cognitive and culture. Apart from that, when there is a need for collaborative teaching, both English language instructors and engineering lecturers need to be clear of their roles in teaching and learning, as well as in assessment. In addition, both parties need to have a clear understanding of the intended learning outcome. On top of that, there is a need to establish the Community of Practise (CoP) to provide a platform for the lecturers to share their experience and to keep updated on what is happening at their faculties in terms of teaching and learning.

In developing English language abilities and communication skills applicable to engineering contexts, engineering students need to have the opportunity to continuously use the English language beyond the English language classrooms. The role of various parties which include the English language educators, engineering lecturers, curriculum and syllabus designers, university administrators, industrial administrators and students is crucial in contributing towards this ecosystem.

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REFERENCES


[27] J. Lave, E. Wenger, Situated learning: Legitimate peripheral participation, Cambridge: Cambridge University Press,


English Language Learning Beyond the Borders: Constructing E-Collaborative Learning between Students of Different Regions

Mimi Nahariah Azwani Mohamed, Nurizah Md Ngadiran*, Nurzarina Abd Samad, Nor Fadhilah Ahmad Powzi

Department of English Language and Linguistics, Centre for Language Studies, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia

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Abstract The continuous claim about the unsatisfactory performance of Malaysian graduates during interviews and at workplace in relation to their communication skills in English is alarming. This raises questions about the extent to which future workforce is prepared for this globalised world which requires them to interact and collaborate with individuals not only from their own country but also from other countries. At higher learning institutions, many English language educators face challenges in creating language learning environment that supports intercultural communication. In preparing future workforce for international communication, English language teaching and learning needs to go beyond the four walls of a classroom, over to other regions. An alternative to provide such language learning environment is by designing e-collaborative learning that provides opportunities for language learners to learn the language with students from other countries in a meaningful way. This paper showcases the impacts of e-collaborative English language learning conducted between engineering students of one technical university in Malaysia and one higher learning institution in Bordeaux, France for about one semester. At the end of the semester, the students from both countries wrote a reflection of their experience. The data from the reflective writing were analysed using thematic analysis to highlight the impacts of the e-collaborative learning on students' intercultural communicative competence. This study highlights key considerations to structure e-collaborative language teaching and learning among students of different regions.

Keywords Collaborative Learning, Intercultural Communication, Peer Learning, E-Collaboration

1. Introduction

Higher learning institutions hold the responsibility of preparing future graduates who are competent and able to function effectively at workplace. In this millennium, there is a demand for professionals to correspond with individuals from various regions. In terms of the correspondence, English is likely the language preferred as it is a commonly accepted language to be used as lingua franca. This demand requires the English language educators to develop students' communication skills in English which would enable them to communicate with people around the world. This raises the issue of the extent to which English language teaching in higher education institutions in Malaysia provides the platform, not only for the development of English language abilities, but also for intercultural communication skills of their students.

This paper showcases the implementation of e-collaborative teaching and learning to enhance English language learning and promote the development of intercultural communication skills. The key issues highlighted in this study can be used to develop a framework to structure e-collaborative teaching and learning. It is hoped that this framework should be able to encourage English language educators in higher education in Malaysia to conduct e-collaborative teaching and learning with educators from around the world.

2. Literature Review

Electronic collaboration or e-collaboration refers to collaboration among individuals which involves the use of technologies such as computers or phones to complete a task [1]. In English language teaching and learning,
e-collaboration has high potential in engaging students in their learning and provides language learning beyond the language classrooms. There are a number of studies that have been carried out to examine the impacts of e-collaborative learning among native speakers of different universities [2], among diverse English language learners of the same university [3,4], between native and non-native speakers [5,6].

Chang and Hannafin [3] explored the effectiveness of peer collaborative distance learning. A total of 305 undergraduates, divided into 74 small groups were involved in group activities using technologies as the means to perform the activities. All the participants were from the same institution, ranging from high to low performers in terms of content knowledge and higher order thinking. While the high performers’ learning achievements improved, the low performers did not benefit from this approach. Nevertheless, both groups of students raised several issues in relation to online collaborative learning. Firstly, the participants found it difficult to understand what was expected of them as there was lack of face-to-face interactions. Secondly, the activities were not graded and therefore, the participants did not understand the purpose of the online activities. Thirdly, the participants were more concerned about the completion of the tasks given rather than engaging in their learning. Fourthly, the collaboration was not benefitting participants who were high achievers as they were expected to play the role as the facilitator to the low achievers.

The first and second issues highlighted in Chang and Hannafin’s [3] study, suggest that there is a need for instructors to provide clear instructions and objectives of the collaboration. This is because students depend mostly on what was provided online as face-to-face interactions were not available. In the context of e-collaborative teaching and learning of English as a second or foreign language, the role as the facilitator is generally assumed by native speakers. Generally, these non-native speakers are expected to facilitate their non-native speakers of English in their language learning. This could be observed in a study conducted by Angelova and Zhao [5]. In their study, the researchers examined collaborative learning between native and non-native English language learners of two regions, America and China. A total of twenty-three American students from an ESL teaching programme facilitated the language learning of twenty-six Chinese first-year English-majors in terms of their grammar structures. They communicated through a discussion board, email and Skype. The results showed that the Chinese students gained more benefit in terms of language learning compared to the American students. In this study, the American students were the knowledge provider while the Chinese students were the recipients of the knowledge about the language. This raises questions related to designing e-collaborative teaching and learning that could benefit both partners.

In another study, Bokhari [4] explored the use of online board discussion to enhance graduate students’ academic writing skills. The participants, who were of four different regions, were enrolled in the same university and went through a fully online course. The findings showed that this approach provided opportunities for the participants to improve their intercultural competence where they were able to increase their knowledge about other’s culture. In this study, although the students were non-native speakers from different countries, they were situated within an environment familiar to each other as they were in the same university. In addition, the interactions analysed were on written entries on the discussion board. There is a need to observe the impacts of online collaborative learning on students who are situated in different regions, involving face-to-face online communication where the interactions would be live and spontaneous.

E-collaboration may become unsuccessful when not monitored thoroughly. Muuro, Wagacha, Oboko and Kihoro [7] investigated the factors that may lead to unsuccessful e-collaboration. A total of 183 students from two public universities and two private universities in Kenya were recruited for this study. The results showed that the biggest challenge in e-collaboration is to get the students to participate in the activities set up online. Apart from that, lack of time to participate and lack of feedback from peers were also identified as the main challenge that could lead to unsuccessful e-collaboration. This raises questions about how e-collaborative teaching and learning needs to be designed thoroughly to ensure participation from the students involved. One interesting finding reported in this study is that the difference in knowledge or skills level among the students is not perceived as a big issue. This finding is different from the finding in Chang and Hannafin’s [3] study where the participants with high level of knowledge or skills felt that they did not benefit from the e-collaboration as they needed to facilitate those with low level of knowledge and skills. This issue requires further investigation.

Apart from providing a platform for English language learners to improve their English language abilities, e-collaborative learning also provides a platform for learners to experience intercultural communication. O’Dowd [8] argues that online intercultural exchange provides opportunities for learners to learn about culture in ways that could not be found in textbooks. In her study, Helm [2] conducted a survey to explore the current practices and attitudes towards online intercultural exchanges. The participants included 131 students from universities across European countries. The study highlighted uncertainty regarding issues that students need to discuss during their interactions. This finding shows that it is crucial for the students to have a clear understanding of the intended learning outcome and for the instructors to select appropriate type of tasks in relation to intercultural communication.
In achieving the intended outcomes, the instructors need to consider the type of activities designed for this purpose. When the activities require a student to facilitate his or her partner, the exchanges between the two students may focus largely on students’ metalinguistics awareness instead of developing intercultural competence [9]. When the task requires the students to produce multimedia product such as video, both students in the partnership need to give full participation or the project may fail [10]. As such, there is need to design tasks which not only develop students’ metalinguistics awareness, but also their intercultural communication skills, as well as trigger their interests to participate in the activities of discussions.

The literature review has raised some questions related to e-collaborative learning that leads to one main issue, which is, how e-collaborative learning should be structured in order to improve students’ English language abilities and develop intercultural communication skills.

3. Methodology

3.1. The Participants

This study investigated the impacts of e-collaboration on engineering students' English language learning and intercultural communication skills. Based on the key issues highlighted, the study would propose a guideline to structure e-collaborative teaching and learning. To achieve this purpose, qualitative approach to data collection was employed as it provided a platform to explore students' experience in communicating with their partners who were on the other side of the world [11].

The participants recruited for this study were 30 students from one technical university in Malaysia and 30 students from one learning institution in France. Both groups of students were non-native speakers of English. The Malaysian students were in their first year, attending an English course while the French students were in their second year. Each Malaysian student was paired up with a French partner and a total of 30 pairs were formed. Their mean of communication was mainly online and the platforms used for online communication were WhatsApp, Skype and Google document. There was a time difference of seven hours with Malaysia being ahead of France.

3.2. The Project Design

The two instructors who conducted this project, one from Malaysia and the other from France met and discussed the design of the collaboration through Skype. Each instructor chose one English course offered at their institutions and designed four tasks that could fit the syllabus of these two courses. In the first task, the participants were required to produce a three-minute video introducing themselves to their partners. This video served as an ice-breaking for the students to get to know their partners. This activity provided them with the opportunity to understand who their partners were.

The second task was about describing words and pictures associated with their country. Two Google documents were set up for the word and picture association task respectively. The participants were required to post a question on any word or picture related to the other country on the Google document. In other words, the Malaysian students would post questions on words or pictures related to France while the French students would post questions on words or pictures related to Malaysia. This task was open to all the participants where they did not only respond to their partners’ entries or questions but also to other participants’.

For the third task, the participants were divided into groups of four which consisted of two Malaysian students and two French students. Each group was required to produce a video. The video would contain information about their partners’ country based on the themes listed. Google documents were set up for the participants to write their discussions and structure the storyline of their video. The purpose of this Google document was to monitor the participants’ progress and ensure that there was no overlapping of titles. The video production was uploaded to YouTube and the link was shared with the students in Malaysia as well as in France. Upon completion of the video project, the participants viewed each video, wrote feedbacks about the videos and their reflections on the video production project. The feedbacks were written on a Google document set up for this purpose.

Throughout the implementation of this project, the participants were required to have at least three face-to-face interactions with their partners.

3.3. Data Collection and Data Analysis

At the end of the project, the participants were required to write an individual reflection of their experience on a Google document. In their writing, they were expected to write about their strategies when communicating with their partners, and when working with their partners to complete the given tasks. In addition, they were also required to write about the challenges that they faced when communicating with their partners and completing the tasks. The data from the reflective writing were analysed using thematic analysis.

4. Findings and Discussions

This paper is part of a larger study that examines the impact of e-collaborative learning between 30 Malaysian students from one public technical university and 30 French students from one public higher institution. This paper showcases the findings from eleven French students’
reflective writing with some instances from one Malaysian students’ reflective writing to highlight contradictory views on this project.

4.1. Increasing Motivation in Language Learning

The analysis of reflective writing of the French students showed that the collaboration was viewed largely as a platform to have intercultural exchanges. In other words, their main objective was to improve their intercultural competence. The Malaysian students, however, had a different view.

“It is a very good experience for me to practise speaking in English with people from another country. Although they are not native speaker of English, for me, it’s a very good opportunity. I don’t have much chance to speak in English because we use more Malay in our communication.” [P1M1]

In this excerpt, it could be observed that the participant viewed this collaboration as an opportunity to practise communicating in English in real life. This suggests that both members of the partnership may have different learning outcomes. The findings in Chang and Hannafin’s [3] study discussed in the literature have highlighted the need to have a clear purpose when conducting an e-collaboration as the communication is totally online. Having different aims in a partnership may affect the effectiveness of the collaboration.

On the part of the French students, the responses related to English language learning were mainly on managing their confidence in meeting a person they had never met before and communicating in English.

“I need to overcome my shyness to make the first contact.” [P1E]

In this instance, the participant seemed keen to make the first contact. She may have her own goal in language learning that has encouraged her to overcome her shyness. Gardner [12] argues that having the desire to achieve language learning goals and positive attitudes towards language learning increases learners motivation in learning the target language.

“I am able to talk with my partner, not as a student, but as a friend.” [P2E]

In this excerpt, positioning his partner as a friend may suggest that the participant is keen in socialising with his partner. Language learners’ motivation may increase when they position themselves as the one who wants to socialise with people who speak the target language [13]. In addition, positioning a partner as a friend may also make a learner relaxed, creating enjoyment in using English as a medium of interaction and thus, increasing motivation in language learning [14].

“It was challenging to talk to someone you have never met. I was afraid of my language and my accent (my partner might not understand me). But in the end, I succeeded.” [P3E]

According to Gardner and Lambert [15], learners who think of themselves as competent and have experienced more success than failure are more likely to be motivated in their learning. The participant above thought of himself as incompetent in the English language, increasing his language anxiety level. Such pre-conception may hinder the participant from having effective communication with his partner. However, the participant was able to manage his language anxiety and complete the tasks given.

Similarly, the Malaysian student also felt that his speaking skills were not good.

“...we will feel like our speaking skills are not good but they are also learning English as a foreign language. So, it is a very good opportunity for us to speak up and not hesitate to speak because we don’t feel inferior if we communicate with them.” [P1M2]

According to this excerpt, although the participant perceived that he was not competent in the language, he viewed the collaboration as an opportunity to use the language. He positioned his partner as equal, that is, as a non-native English speaker who was also learning the language. This position has raised his confidence.

Studies such as that by Melchor-Cuoto [16] has found that online communication is able to increase self-confidence and decrease nervousness, hence reducing language anxiety. The suggests that the implementation of e-collaborative teaching and learning can help students with language anxiety issues in their learning. Nevertheless, instructors need to consider designing some preliminary activities prior to the implementation to prepare the students for the e-collaboration.

4.2. Understanding Own Identity

In this study, the majority of the participants had not had any experience communicating with people from outside of the European region. The findings showed that the e-collaboration raised students’ awareness of their own culture and identity.

“I didn’t realise how French I was in my thinking. I am surprised with myself.” [P4E]

Through the interaction process with a person from another cultural background, participant P4E started to realise his own cultural identity.

“I didn’t realise how culture matters.” [P5E]

The response above suggests that the participant may have taken his culture for granted until he has to explain about his culture to a person who is not familiar with his culture.

The two instances above show that the e-collaborative learning not only provides opportunities for language
learners to discover the culture of people from other regions but also rediscover their own cultural identity and recognise its significance.

“I now understand how culture can affect the way we speak. It is important to know the implicit meaning when communicating with people of different culture.” [P6E]

From the project, the participants understood the relationship between culture and communication. Thus, they need to know how to communicate with people from different cultural background.

“It is funny and interesting to see another point of view about things that French people take for granted.” [P7E]

“It is surprising that when we (French students) think of something as very normal, it can offensive to them (Malaysian students).” [P8E]

In the excerpt above, the participants realised that people of different cultural background may view their culture with different perspectives. The interaction with their partners also made him appreciate their culture.

Understanding own and others’ culture is the key to effective intercultural communication. The e-collaborative learning has provided the platform for the participants, not only to know about the culture of their partners, but also rediscover their own culture that they have taken for granted. In discovering (or rediscovering) the culture of both partners, it is inevitable to find ways to manage the differences between these cultures. The next section discusses how these differences are negotiated.

4.3. Negotiating Cultural Differences

When communicating with people of different cultural background, interlocutors need to be aware of the differences between the cultures. The way they perceive these differences could affect the way they communicate with people of different cultural background [17].

“We need to make acceptable choice for the topic and, at the same time, be neutral and respectful.” [P9E]

In this instance, there are two stages of negotiation. First, the participant and her partner need to make a decision on a topic. Second, the participant and her partner needed to negotiate the cultural differences when making a decision without offending each other’s culture.

“We need to be flexible when dealing with 2 different points of view.” [P10E]

Dealing with two different points of view is challenging. This finding highlights the need to be flexible in order for the communication to be successful.

“Trying not to make judgements when my partner told me that she was “too busy” to Skype.” [P11E]

Based on the excerpt above, the negotiation involved setting the time to meet and dealing with the partner’s behaviour.

The ability to negotiate cultural differences is crucial in communication between people of different cultures and regions. The success of such communication depends on the interlocutors’ ability to be flexible and demonstrate behavioural adaptation [18]. These are the aspects of intercultural communication that needs to be emphasised.

The discussions in this section have raised several key considerations when structuring e-collaborative teaching and learning. These key considerations are discussed in the next section.

5. Conclusions

This study examined the impacts of e-collaboration between students of different regions on their English language learning. The findings highlighted two key considerations to structure e-collaborative learning between students of various cultural backgrounds. These key considerations include the concept of peer learning and preparing the students prior to the e-collaboration.

In the literature, the researchers have discussed that when conducting a collaboration involving native and non-native speakers of English, or high and low achievers, the non-native speakers and the low achievers may benefit more. As such, students who perform well in English and who are high achievers may be reluctant to join this collaboration. The study has reported that when a partnership is between two students who are both non-native speakers, the students perceive themselves as equal. Apart from that, the study has also reported that when the students perceive their partners as a friend, the interactions would be interesting and meaningful. This not only motivates the students to participate, but also raises students’ confidence and reduces language anxiety. Thus, when structuring e-collaborative teaching and learning, instructors need to establish a clear purpose of the collaboration and lay out the benefits that students of both institutions perceive the relevance of the collaboration. In addition, instructors would need to carefully match the students with suitable partners.

Interactions between students of different region require the students to understand and negotiate cultural differences. In this study, the participants demonstrated anxiety prior to meeting their partners whose culture they were not familiar with. In addition, they lacked awareness of their own culture. Since the majority of them had not had any experience communicating with people from outside their region, they did not expect that there would be cultural differences. In addressing this issue, there should be some preliminary activities where they could rediscover their own cultural identity and understand that the communication would involve negotiation of cultural differences. This would require adaptation of behaviours.
and flexibility which are crucial elements in intercultural communication. Such preparation could reduce language anxiety and avoid culture shock.

Structuring English language learning beyond the borders creates meaningful learning as it provides opportunities for language learners to use the language in context. In addition, it also provides opportunities for students to develop their intercultural communicative competence as they need to deal with people of different cultural background. It is hoped that this study could contribute to the literature on e-collaborative learning. It is suggested that further research be conducted to measure students’ English language abilities and intercultural communicative competence at the end of an e-collaborative teaching and learning session.

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REFERENCES


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