

# Students' Perceived Effectiveness of Educational Technologies and Motivation in Smart Classroom

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**Abstract** – The smart classroom incorporates many different types of IT hardware including tablet computers, interactive white boards, work stations and many other integrated uses of these IT technologies which are used for instructional purposes. Conducted with 40 students majoring in Communicative Arts who participated in a technology-supported learning environment, this study investigated the perceived effectiveness of technologies, learner motivation, participation and learning outcome in the smart classroom. Research findings show that the students' perceived effectiveness of educational technologies was at a high level while their learning motivation was at a moderate level. In addition, a positive relationship was found between students' learning outcome and participation, but motivation and perceived effectiveness of technologies in the smart classroom were not related to their learning outcome. Responses from open-ended questions can be used to support the acceptance of the new learning environment since the use of various media equipment by first time users allows for the exploration and the presentation of ideas not achieved in a traditional classroom setting. It can be concluded that learning in a technology-supported environment like the smart classroom can foster a more inquisitive approach.

**Keywords** – Smart classroom, learning process methodology, learning motivation

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## 1. Introduction

Chang and Lee (2010) state that the smart classroom has become a preferred type of classroom because of its integration of so many types of media and IT technologies [1]. The term “smart classroom” can be misleading because by itself the classroom is not smart in any sense of the word, nor are students who are taught in a smart classroom necessarily going to become smart by learning lessons in one. That being said the question to be asked is what in fact does the word “smart” mean in the context of a smart classroom? The assumption is made that because of the various IT devices that are included in a smart classroom it will, therefore, lead to a more informed and hopefully a more learned student. In truth a smart classroom is a much more complex innovation for the educational community.

The concept of a smart classroom has been around the educational community ever since new forms of media technology began to be used for instructional purposes. Probably the earliest form of technology used in a classroom was the overhead projector whereby by placing an image or text under a lens it would then be projected onto a screen. The evolution to an interactive white board connected to a computer would have sounded like something out of the future. But we are now in the future and not only are there smart classrooms but an entire suite of newer technologies on the horizon that are fully integrated into a seamless system of other connected technologies. [2] Addressing those new changes to the classroom with technology, the concept of “built pedagogy” was suggested because of how the design of a smart classroom influences how one teaches (Bautista & Borges, 2013). The thinking here with using a “built pedagogy” takes into consideration the design of the smart classroom both ergonomically and architecturally to create a new learning environment. When teaching in a smart classroom, there are considerations to be made. For instructional purposes the need for efficient connectivity goes without question. Figure 1. shows an interactive lectern along with desktop computers in a smart classroom.



Figure 1. Interactive smart classroom

## 2. Literature Review

### 2.1 Teacher's Digital Pedagogy

The Queensland Government in Australia sees the elements within a smart classroom as centering on digital pedagogy, digital content and e-Learning spaces (Queensland, 2008) [3]. Most significant was what constituted digital pedagogy or how a teacher makes a decision to use one form of instructional technology over another. Digital pedagogy can be thought of as the convergence of technical skills, pedagogical practices and determining what is best for digital learners. Along with a perspective of digital pedagogy is the inherent quality of the teaching method to instill a sense of digital literacy for the students whereby they are able to evaluate the digital content which each media technology is designed to deliver (Van De Bogart, 2014) [4]. The impact of smart classroom technologies cannot be underestimated. According to the Dublin Institute of Technology in Ireland, a smart classroom is a pseudo intelligent room that can reconfigure itself for specific purposes (O'Driscoll, 2009) [5]. The key question asked at the Dublin Institute of Technology was why a smart classroom was used in the first place. The consensus was there is a definite learning paradigm shift whereby new educational perspectives on learning methods have evolved necessitating alternative teaching approaches. Interactivity is one of the key components of a smart classroom.

The most important aspect, therefore, that has to be addressed is the teacher's perspective of a smart classroom. [6] In an extensive report from the Henrietta Szold Institute in Israel, it was found that teachers who use interactive white boards are able to develop new pedagogical strategies for their lessons (Manny-Ikan et al, 2011). Importantly it was found that in order for the teacher to effectively use the

smart classroom equipment, stages in adaptation to the equipment took place. In the early stages of use, the teachers tried to match the technology with previously developed pedagogy, but after more familiarity were able to find new opportunities until in the final stage the use of the technology became intuitive. Another component in the effective use of a smart classroom is developing collaborative learning cells. [7] This approach has been developed at the University of Toronto by carefully designing complex collaborative activities that can help in not only using the technology, but putting it into perspective to better understand how to solve problems (Lui et al, 2011). Figure 2. demonstrates a student cell developed by the author to give the students more understanding with their IT tools.

However, for effective use of the smart classroom, the concepts of e-Learning in a digital environment using a digital pedagogy need scaffolding through several semesters so students can approach the smart classroom with a more intuitive mindset rather than one of trying to figure out how the equipment needs to be used and operated in order to accomplish solving problems and providing solutions to lessons provided by the teacher. [8] How to implement a new pedagogical teaching methodology was introduced with Shulman's model of Pedagogical Reasoning and Action (PRA) which describes six processes to help teachers understand what is to be taught (Shulman, 1987, p.17). However, Smart et al (2014) assert that this model has now been upgraded so that the pedagogical outline provided by the PRA model is being modified to explain to teachers how to accommodate technology in the teaching process referred to as Pedagogical Reasoning with technology (PRT) [9].



Figure 2. Smart classroom student learning cell

### 2.2 The Learning Process Methodology (LPM)

Since the smart classroom is equipped with many types of IT equipment, the first step is to show the function of each technology. By the time a student enters the university most will have had functional experience with smart phones, iPads, laptops, and desktop computers. The student will also have developed their own personal habits in organizing

information that they are most interested in, which usually is their favorite songs and photographs of their friends. Consequently, although a smart classroom will be different than that of a traditional classroom, the many different IT technologies available to the student in a smart classroom will already be somewhat familiar to them. The objective in using a smart classroom is to integrate the various technologies in order to strengthen and support the student's ability to gather data and be able to understand it. Digital literacy is the ability to be dexterous in selecting a medium or IT tool that will better help the students' own way in which ideas are constructed. So the initial goal that a teacher should accomplish is seeing that the ideas of the students are expressed by using any combination of the production tools to explain or show something of interest. Once exposure of the capabilities of the smart classroom has become known, an intuitive level develops on which technology will be used. The next level in the use of the smart classroom is to begin to show how the integration of the tools can be used to support the students' ability to better explain an idea or help in solving a problem or making a problem become more understandable.

As Redfield and Lawrence (2008) put up, the Learning Process Methodology (LPM) incorporates three stages of learning including 1) preparing the environment to learn, 2) being active in a learning environment, and 3) assessing new knowledge acquisition [10]. There are many learning methods that can be incorporated in the LPM approach and it is up to both the students and the teacher to find the best solution for each. The problems facing the teacher when planning to use a smart classroom are how to combine the various elements which constitute the smart classroom into an effective lesson plan. [11] This is an issue of instructional design and instructional decision making that comes about from integrating the many paths to achieve a learning goal (Koedinger et al, 2013). In a study conducted at Carnegie Mellon University (CMU) dealing with instructional complexity there were recommendations which were advanced for a better understanding of the space in which the learning was taking place. The key factor in the study was being able to determine assessment outcomes. What this means is the ability to transfer knowledge to new contexts. The goal was to determine just what exactly might be the best memory support to increase long term retention to be able to transfer knowledge into newer contexts. This function space, whereby activities are conducted using learning technologies, was the focus of the CMU project with recommendations in understanding how to bring new

science and technology to optimize educational outcomes.

### **2.3 The Applied Process Methodology (APM)**

The field of process methodology is controversial because it focuses more on allowing the students to explore their own interests in a complex IT environment such as a smart classroom and not focusing on whether a specific idea was understood. Process methodology is an active approach to letting students use prior interests and find ways to incorporate those interests within a new learning environment. The teacher allows the students to explore any and all combinations of using the IT equipment to search for ways to express ideas. Coupled with process methodology is using active research methodology to better understand the patterns of usage the students are familiar with as they produce works based on their new experiences with the IT equipment. How students learn by the process method is to gain experience in constructing their ideas by using the IT equipment. According to Ip (2003), the concept of processing information versus retaining information is an approach which relies on using short term memory [12]. Professor Ip outlines three processes using the process method. The first process involves focusing attention in the short-term memory on relevant pieces of information of the students' experiences while the second process involves organizing and building connections among the selected pieces of information and thirdly process involves integrating, or building external connections between the organized new knowledge and organized existing knowledge in the long-term memory. Only minimal suggestions are made by the teacher when using the process method so as to help guide the student in adding prior knowledge in building results using the smart classroom hardware. Once a production is accomplished using the process method the end results can be more critically analyzed, shared with the class and future lessons can then be placed into a more structured learning exercise to build upon retaining knowledge.

### **2.4 Related Research Studies**

A previous study analyzed the effectiveness of smart classroom teaching on the achievement in chemistry of secondary school students. [13] The results revealed that students achieved higher when taught in smart classes as compared to conventional mode of instruction (Menon, 2015). Another study incorporated a smart classroom 2.0 Speech-Driven PowerPoint System (SDPPT) into university teaching. A total of 46 undergraduate students participated in the pilot testing of the system. Students' general perceptions towards learning in an

Information and Communication Technologies-Supported Learning (ICT-SL) environment were analyzed using paired sample t-tests. The results indicated that students' learning motivation and learning effectiveness have increased after experiencing the SDPPT system. [14] In addition, students also revealed that they enjoyed the interactions provided by this new system and anticipated the development of the SDPPT would facilitate better learning in classroom environments (Chen et al., 2015). In another study, Balamurugan and Pazhanivelu (2014) explored the value of educational technology to students. A small study was done focusing on students using assistive technology, either Smart Class or Interactive White Board, to enhance students learning experience [15]. Quantitative and qualitative data was collected and analyzed. Researchers analyzed assessments, informal observations, and surveys in this study. The study found common themes within the data and proposed that technology did in fact improve the students' learning experience. Furthermore, motivation in a language-learning setting was found to be of particular importance in predicting outcomes (Delialioglu, 2005 [16]; Tuan, 2012 [17]). The research objectives guiding this study are as follows:

1. To investigate the students' perceived effectiveness of educational technologies in a smart classroom.
2. To explore their learning motivation in a technological support learning environment.
3. To study the relationships between students' learning outcome (grade) and other factors including participation, perceived effectiveness of technologies, and learner motivation.

### 3. Methodology

#### 3.1 Participants

The participants in this study consisted of 40 students who were majoring in Communicative Arts. They were enrolled in EN340 course at a private university in first semester of 2014 academic year. All of them studied in a smart classroom where they were divided up into 8 groups of five students each and each group had use of an iPad. The students were informed right from the beginning about the learning style and test design to be implemented, and that they were expected to participate in the research study. If they should feel disinclined to do so, they were free to transfer to other sections.

#### 3.2 The English Course Taught in the Smart Classroom

The course offered Thai students to use the smart classroom for the first time to complete the assignments that were well-designed in the course content. The use of the smart classroom for this course was a first time experience for both the teacher and the students. It took several weeks to become familiar with the operation of the smart classroom so that the functions were understood. What was not known was how the students would respond to using the smart classroom. The Learning Process Methodology that was used in this study was a combination of active research and group work. When a student is exposed to multiple forms of media the concept of integration is nonexistent. Not only was the student disoriented but the teacher allowed free exploration in the use of the equipment in order to see the approach the students will take. Therefore, the Applied Process Methodology (APM) was also taken into account. The reason for initiating this free exploration is to give the student a chance to apply the experiences they already have from using their own cell phones, iPads and other equipment that is probably unknown to teachers. The students have grown up in a digitally based environment and seeing how they adapt is the most important thing to do.

#### 3.3 Evaluating Students' Learning Outcomes

How to evaluate the learning experiences of students in a smart classroom included many factors that needed to be considered especially when using a rubric to assess the student's work. [18] By using the technique of "qualitative enquiry" developed by (Eisner, 2011), it was possible to observe more clearly how the students were performing when using the smart classroom's digital tools. The main criterion was to determine how well the students were able to execute their ideas using smart classroom tools to satisfy the course syllabus. According to (Niemeyer, 2003) there are seven main design principles that ought to be considered when using a smart classroom for instruction [19]. Of the seven, two were emphasized for our students. The first was to encourage interaction within the smart classroom when using the digital tools. The second principle employed was stressing simplicity of use so the students could easily improvise and be spontaneous with expressing their ideas. Each electronic device in the smart classroom including the computerized white board, iPads and the interactive lectern all contributed to the way the students were asked to complete their assignments. With using Eisner's technique of qualitative enquiry the BU students were evaluated on each of their

assignments as to how well they executed their ideas using the infrastructure of the smart classroom. [20] Following evaluation guidelines, as reported in Columbia University's "Smart Classroom Learning Evaluation Report" (Sommer & Pinto, 2001), it was possible to evaluate all the student's work to comply with the requirements of the university's course syllabus of which a total of 100 points were allocated for the completion of all assignments.

### 3.4 Instruments

The current study employed a three-part questionnaire to collect data from 40 students. The first part explored their perceived effectiveness of educational technologies in a smart classroom when they were to study and do the assigned project. The items were in a form of five-rating scale as follows: 1= very little, 2 = little, 3 = moderate, 4 = much, 5 = very much. The second part investigated students' learning motivation in a technology-supported learning environment. The participants were asked to rate the response in a form of five-rating scale as follows: 1= very little, 2 = little, 3 = moderate, 4 = much, 5 = very much. These two parts were adapted from the questionnaire in the study of Chen et al [14]. The third part contained open-ended questions. The arrangement of the environment and the pedagogical practices of learning were the key features that were found to be important to the students. Therefore, after implementing the new learning experience to them, we intended to investigate their opinion on two issues: 1) doing the smart classroom project and 2) the smart classroom.

### 3.5 Data Analysis

Data were collected from the questionnaire and the assessments of the students' assignments in the form of a score report. As for the quantitative data, the effectiveness of educational technologies and learning motivation were analyzed using means and standard deviations and interpreted in tables based on the following ranges: 1.00-1.50 = very low, 1.51-2.50 = low, 2.51-3.50 = moderate, 3.51-4.50 = high, 4.51-5.00 = very high. Participation was counted from how many times the students joined in the activities in the smart classroom. Pearson's Correlation coefficients were used to find out the relationships among the perceived effectiveness of technologies, motivation, participation and learning outcomes. The acceptable statistical significance level was set at alpha ( $\alpha$ ) < 0.05. Regarding qualitative data, the responses gained from open-ended questions were analyzed and described using graphs.

## 4. Results

### 4.1. Quantitative Data

Regarding demographic characteristics of the participants, 42.5 % of them were male while 57.5 % were female. In terms of the grade students received in EN034 course, nearly one-third of them (32.5%) got grade A while 30.0% got grade B and 15% got grade C+. In addition, 5 of them or 12.5% got grade B+. 10 % got grade C and D+. No one got grade D and F.

As shown in Table 1., the results indicated that the overall mean score of students' perceived effectiveness of educational technologies ( $\bar{x}$  = 3.90) and all items were at high levels. The most three chosen instructional technologies in the smart classroom was searching information online ( $\bar{x}$  = 4.15), followed by mobile devices ( $\bar{x}$  = 4.13), and chat ( $\bar{x}$  = 4.05). The least score of their perceived usefulness was video conference ( $\bar{x}$  = 3.58).

Table 1. Perceived effectiveness of educational Technologies in a smart Classroom

Educational Technologies	Mean	SD	Level
1. Electronic whiteboard	3.95	.71	high
2. PowerPoint presentation	3.83	.75	high
3. Multimedia (clips, animation, graphics)	3.95	.60	high
4. Assessment tool in LMS	3.68	.66	high
5. Chat	4.05	.71	high
6. Email	3.93	.66	high
7. Mobile devices	4.13	.65	high
8. Searching information online	4.15	.86	high
9. Online exercise	3.78	.73	high
10. Video conference	3.58	.26	high
Total	3.90	.26	high

The results shown in Table 2. indicated that the overall mean score of students' learning motivation in the smart classroom was at a moderate level. ( $\bar{x}$  = 3.29). When considering all items, it was found that six out of eight were at moderate levels while two items were at high levels. The mean scores could be arranged from most to least as follows: writing down answers or questions on the electronic tablet ( $\bar{x}$  = 3.85), retrieving and showing relevant information on the screen ( $\bar{x}$  = 3.51), and online discussion and chat ( $\bar{x}$  = 3.40). The lowest mean score was displaying materials simultaneously with double/multiple screen projection ( $\bar{x}$  = 2.90).



Table 2. Learning motivation in a technology-supported learning environment

Motivation	Mean	SD	Level
1. I like retrieving and showing relevant information including documents, pictures, and video clips on the screen.	3.51	.72	high
2. I try to share materials with the whole class.	3.37	.70	moderate
3. I want to write down questions or answers on the electronic tablet device to share with the whole class instantly on the electronic whiteboard.	3.85	.83	high
4. Searching for videos/text information from class databases.	3.20	.72	moderate
5. I try my best to do quizzes and answers in automatic assessment tools.	3.18	.84	moderate
6. I try to send instant messages to the teacher at the lecture podium to raise or answer questions.	2.93	.80	moderate
7. I enjoy displaying materials simultaneously with double/multiple screen projection.	2.90	.78	moderate
8. I like online discussion and chat.	3.40	.93	moderate
Total	3.29	.47	moderate

In this study, the students' learning outcome was grade that they got from the course. Pearson Correlation Coefficients were used to find out the relationships between students' learning outcome and other factors including participation, perceived effectiveness of technologies, and motivation. From Table 3., it was found that there was a positive relationship between students' participation and their grade (.421,  $P < .01$ ). This means that the more the students participated in class, the better grade they would receive. However, grade was not correlated to perceived effectiveness (.165,  $P > .05$ ) and motivation (.148,  $P > .05$ ). In this study, no relationship was found between participation and motivation (.145,  $P > .05$ ) or between participation and perceived effectiveness (.251,  $P > .05$ ). Also, perceived effectiveness was not found to have a relationship with motivation (-.011,  $P > .05$ ).

Table 3. The relationships between students' learning outcome, participation, perceived effectiveness of technologies, and motivation

	P	E	M	G
Participation	1.00	.251	.145	.421**
Effectiveness		1.00	-.011	.165
Motivation			1.00	.148
Grade				1.00

\*\* Correlation is significant at the 0.01 level (2-tailed)

#### 4.2 Qualitative Data from the Open-ended Questionnaire

##### The Story Project in Smart Classroom

Students are asked what they think or plan before doing the story project. It is found that twelve of them learn to link iPads to TV and Whiteboard. While seven of them mention planning to do something using media and only a few write a story in a book. Only one student plans to use social media since he thinks it can make the project more motivating.

The second question asks whether it is difficult to use the equipment in the smart classroom. Twenty students do not find it difficult while seven of them find it hard and only three students have no ideas about equipment. Among those who accept they might encounter difficulties in using smart classroom, five of them state that they like the media, the room, the atmosphere, and advanced technologies. Majority of those who reply "yes" state that iPad is hard to use and they have no knowledge of smart classroom. Those who reply "don't know" mention that this is the first time they experience this learning, so they have no idea.

When students are asked whether they think the smart classroom is a good place to learn how to do assignments, all of them reply "yes". The explanation that ten students used to support their replies is about being an ideal place for presentation while seven students mentioned having more freedom to think. Five students mention effective learning aid since they can access encyclopedia, dictionaries and use word processor applications for viewing and editing assignment. However, a few see the importance of sharing details with others. It is also found that one student get new ideas every time he studies in this room and one student states that she can connect for new learning easily such as connecting media.

##### Smart Classroom Survey

According to the replies, what students like the most about the smart classroom is its modern technology followed by a relaxing atmosphere or

environment. Nine students like chairs that can be moved and are also comfortable. Three of them feel enjoyable while two of them get better ideas when compared to the traditional room. Only one student likes interior design of smart classroom which is rather motivating to learn.

Students are asked to specify what they dislike about smart classroom. The findings reveal that nine students mention the cold temperature. This is probably because the room and air conditioners are new. Seven of them state that there are not enough seats. The room provides thirty-five seats, but there are forty students in this class. If students come late, they will have no seats. Three students mention that the chairs are little while the other two students state that they are not familiar with studying without books. Only one student points out that the room is too far and difficult to find.

The third question asks whether they can learn a lesson better in a smart classroom, and it is very interesting to find that all of them reply “yes.” When looking into the reasons, it is found that nine students specify that the smart classroom is happier and fun to learn while seven students mention that technologies help them learn better. Five of them focus on creatively designed room. A few students specify modern teaching. Two students think that good interaction between teacher and students makes a better learning while only one student gives the reason of active learning they experience in the smart classroom.

Students are asked whether they still want to use the smart classroom in the future courses. Twenty students choose “yes” while the other four students choose “no.” The reasons behind the intention to use it are arranged from most to least based on the findings as follows: modern classroom, better equipment than the other rooms, creative design, more technologies, convenience, new feeling, and happier learning. As for the reasons behind saying “no,” three students mention that the room is far away, and one student states that it is not necessary to learn there.

## 5. Discussion

There are many issues that should be brought for discussion. The first issue is about students’ perceived effectiveness of technologies used in the smart classroom. The results revealed that the overall mean score of students’ perceived effectiveness of educational technologies and all items were at high levels. This might be because the teacher was able to develop new pedagogical strategies for their lessons

using those technologies. This made students feel that they could learn better in a technology-supported learning environment than the traditional classroom. Therefore, digital pedagogy of the teacher is deemed important. The results from the open-ended questions were very revealing and can be used to support this discussion. Question no. 3 in the smart classroom story project asked the students if they thought the smart classroom was a good place to learn how to do an assignment. When all responses were tabulated it became evident that all students replied “yes”. Also, when they were asked whether they could learn a lesson better in a smart classroom, it was very interesting to find that all of them replied “yes.” However, although perceived effectiveness is an important factor to be explored, no relationship was found with other factors including grade, motivation, and participation. This is probably due to the fact that students have good digital literacy skills. When they encountered any technical problems with the equipment or technologies in the smart classroom, they could fix them. Moreover, when they were informed that the course design would allow them to study in a technology-support learning environment, they agreed to do that without questions. Based on class observation, we noticed that the atmosphere was full of students’ curiosity to learn new things around them.

The second issue to be discussed is on their learning motivation. In the current study, although students perceived that the smart classroom is very effective, they expressed a moderate level of motivation. So, learning motivation was not correlated to learning outcome. The current finding was not in accordance with the previous studies (Delialioglu, 2005; Tuan, 2012) [16, 17]. This is probably due to the fact that students feel excited to be in a more technology-supported learning environment. However, this is the first time for them to use a variety of equipment, and some difficulties may occur. This is especially true when they had to do a project in groups and learned to present it using technologies in the smart classroom. Based on responses gained from open-ended questions, it was interesting to see that the smart classroom gave the students more freedom to think; it was an effective learning aid. However, these attitudes are not readily understood when using the smart classroom but now that the survey has been completed it is apparent the students were exploring freely and were learning. These answers are very important building blocks for when another course is offered in the smart classroom. However, it must be stressed that a onetime usage is not going to give the student the full potential on the reason the smart classroom has been designed. The objective of the smart classroom is to

support the students learning. From the current study, it can be seen that the smart classroom was fulfilling that objective but more time is needed for both the teacher and the students to learn how to maximize expressing ideas. Obviously, all of the students tried to use new technologies. Although their motivation was at a moderate level, when they were asked whether they still wanted to use the smart classroom in the future courses, their responses indicated a good sign that a smart classroom may be implemented in the future course. Twenty students choose “yes” while the other four students choose “no.” The reasons behind the intention to use it are arranged from most to least based on the findings as follows: modern classroom, better equipment than the other rooms, creative design, more technologies, convenience, new feeling, and happier learning. As for the reasons behind saying “no,” three students mention that the room is too far to travel to, and one student states that it is not necessary to learn there.

The last discussion lies in a positive relationship between students’ participation and their grade or learning outcome. Based on the findings, their success is a result of frequency of joining the class. This is probably because students have chances to acquire knowledge through a variety of learning technologies. How lessons are taught using the smart classroom as well as how the smart classroom leads to a new learning methodology referred to as the “Learning Process Methodology” (LPM) play a significant role. Although the learning process methodology applied in their study are somewhat guided by the teacher, students’ digital literacy and background of using technologies have a lot to do with how they learn and gain new knowledge. In this regard, the Applied Process Methodology allows students to use prior interests and find ways to incorporate those interests within a new learning environment. This enables students to have more involvement in developing ideas. The smart classroom is not a static traditional classroom but a very lively environment with new programming and new content always being added for the student and the teacher to choose from. When it is found that participation has an impact on students’ success, it is necessary for the teacher who plans to use the smart classroom to pay more attention on how the Learning Process Methodology can be incorporated into a smart classroom. It is good that our university administrators see the importance of technology usage in teaching; they have provided various tools and rooms that support the creation of knowledge. This is in accordance with what Atef and Medhat (2015) state that both learning objectives and university drivers are two main factors when selecting the method [21]. If resources are not

provided enough, it is rather difficult to design the course to meet the set goal.

## 6. Suggestions for Further Research

Further research is needed in investigating teacher orchestration and student learning during the class lessons. Another area of investigation is how best to introduce the smart classroom into curriculum design so that the educational material that is needed to be transmitted to the student can utilize the various digital technologies within the smart classroom’s inventory of digital technologies. Lastly, a study can be conducted to survey any needs in training for teachers in terms of digital pedagogy before using the smart classroom. Useful training can lead to a better understanding on how lessons can be integrated into a smart classroom.

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