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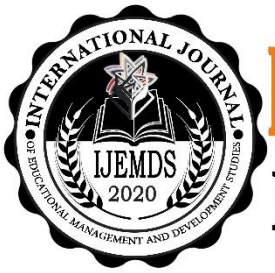

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The Impact of Interactive Conceptual Instruction on Students in High School Physics

[1]Padauk Win & [2]Swe Swe Nyunt

Abstract

The paper evaluated the impact of the interactive conceptual instruction in studying physics at the basic education high school level. The research used an experimental design through the pretest and posttest control group. The randomly selected samples were high schools students from Sagaing, Mandalay and Nay Pyi Taw regions. The ANCOVA results showed a statistical significant difference between the performance of the students who received interactive conceptual instruction and those who did not. Moreover, the qualitative data also supported the quantitative findings. The research findings proved that interactive conceptual model has positive contribution to the teaching of physics at the high school level. As the study explored effective ways to learn physics, the results were valuable inputs in the teaching and learning. It serves as a guide in constructing interactive conceptual instruction lessons in the effective teaching of physics.

Keywords: *interactive conceptual instruction, physics, concept, interactive*

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1. Introduction

No teacher education program is complete without a course on educational philosophy. To have a philosophy, one must be a philosopher, a "lover of wisdom" pointed out by Stoff and Schwartzberg (n.d.) as cited in Khin Zaw (2001). The two key words, "love" and "wisdom" are particularly applicable to education at this point in its history as being heard less frequently. This was supported by the teachings of Jean Piaget on the prerequisite of progressive education to provide a diverse methodology based on the combination of the learning and independent work activities with the cooperation, group learning and interdependent work activities. From the multitude of teaching methods, teachers focused on the interactive ones because the modern ways of stimulating learning and personal development had dramatically changed. These interactive methods foster the interchange of ideas, experiences, and knowledge.

The implementation of certain modern teaching tools involves a set of skills and capabilities of the teacher such as receptivity to novelty, teaching style adaptation, mobilization, desire for self-improvement, reflective and modern thinking, creativity, and intelligence to accept novelty and flexibility in the way of thinking (Atanasescu & Dumitru, 2005). To obtain an effective teaching-learning process, interaction between teachers and students applied with the suitable teaching method is vital to raise the standard of learning. Similarly, to address the challenges of the knowledge economy, teachers need to learn the appropriate technology. These can be applied in the teaching of different subjects specially science.

In the teaching of science, teachers can use different ways for developing scientific attitude among the pupils. By teaching physics concepts for example, teachers aim at bringing about a desirable behavioral change among the pupils. In order to make students learn effectively, teacher has to adopt the right method of teaching for a given situation. Every teacher must be familiar with different methods of teaching. Moreover, there are also plans to make language learning more student-centered by using more interactive methods to develop scientific attitude. Therefore, teachers need to apply interactive conceptual instruction in the effective teaching-learning process.

The study of physics is crucial to the understanding of the world around, inside, and beyond (Gibbs, 2003 as cited in Buabeng, 2015). In many respects, physics is the most basic and fundamental natural science as it involves universal laws and studies behaviour and relationships among a wide range of important physical phenomena (Cutnell & Johnson, 2007 as cited in

Buabeng, 2015). It encompasses the study of the universe from the largest galaxies to the smallest subatomic particles. Moreover, it is the basis of many other sciences such as chemistry, oceanography, seismology, and astronomy. Therefore, learning experiences of physics concept in schools provided by physics teachers are very important.

A study on physics classroom engagement by Dewey and Dykstra (2008) cited in Khwanda (2009) stated that a teaching based on the folk theory failed in engaging students to develop new understanding which suggest for new alternative models of instruction that are student understanding-driven. Dewey and Dykstra (2008) cited in Khwanda (2009) further suggested that teachers should change the teaching to make use of new models of instructions that engage students in constructing their own knowledge in order to enhance the students' conceptual understanding in physics. The gap between the expected achievement and the actual achievement in physics is due to the weakness of students in physics. This major factor causes underachievement due to lack of interactive instruction in studying physics. Therefore, interactive conceptual instruction should be applied effectively for effective teaching-learning process.

In the present "age of science", knowledge of physics is essential to take up certain professional and applied courses such as engineering, medicines, technology and space among others. It is essential for everybody because of its immense value in everyday life (Kumar, 1995). Therefore, physics is the key to many doors of opportunity that open up to challenging, meaningful, rewarding careers in industry, government, academia, and the private sectors (Dayal, 2012).

Given the gap in the teaching of physics and the various applications of the physics knowledge, this study aims to:

1. Construct an interactive conceptual instruction model for learning physics concept;
2. Apply interactive conceptual instruction as a central aspect in teaching physics at the high school level;
3. Investigate the impact of interactive conceptual instruction in studying physics; and
4. Highlight the difference between the performance of the students with interactive conceptual instruction and those who do not.

The study hypotheses include:

1. There is a significant difference between the achievement of Grade 10 students in physics with and without the interactive conceptual instruction.

2. Students taught with the interactive conceptual instruction have positive attitudes towards the method.
3. The teachers who taught the experimental groups have positive attitudes towards the interactive conceptual instruction.

2. Literature Review

2.1. Theoretical Framework

All learning theories deal with the areas of capacity to learn, role of practice in learning, motivation, understanding and insight, transfer of learning and retention and forgetting (Hilgard, 1986, cited in Khin Zaw, 2001). These theories pointed that meaningful materials and tasks are learned more readily than materials and tasks not understood by the learner. Moreover, McConnell (1942) as cited in Khin Zaw (2001) finds that the success of the individual learning is dependent upon the ability to discriminate between differences and generalize between similarities.

Constructivist theories encourage the development of critical thinking and understanding of big ideas rather than the mastery of factual information. These contend that students who have a sound understanding of important principles that were developed through their own critical thinking will be better prepared for the complex, technological world. The nature of constructivist learning is active. It is the interaction of ideas and processes. New knowledge is built on prior knowledge. Learning is enhanced when situated in contexts that students find familiar and meaningful. According to Collins (2002), cited in Biggers (2013), it is augmented when students engage in discussions of the ideas and processes involved.

Constructivism is an educational theory that emphasizes hand-on activity-based teaching and learning that students develop their own frames of thought. It focuses on the personalized way a learner internalizes, shapes or transforms information. Learning occurs through the construction of new personalized understanding that results from the emergence of new cognitive structures. The constructivist teacher proposes situations that encourage students to think. Rather than leading students toward a particular answer, the constructivist teacher allows students to develop their own ideas and their own pathways. In the constructivist class activity, the nature of the learner is active, the nature of the subject matter is authentic to real life, and thinking approach is divergent.

2.2. The Instructional Model

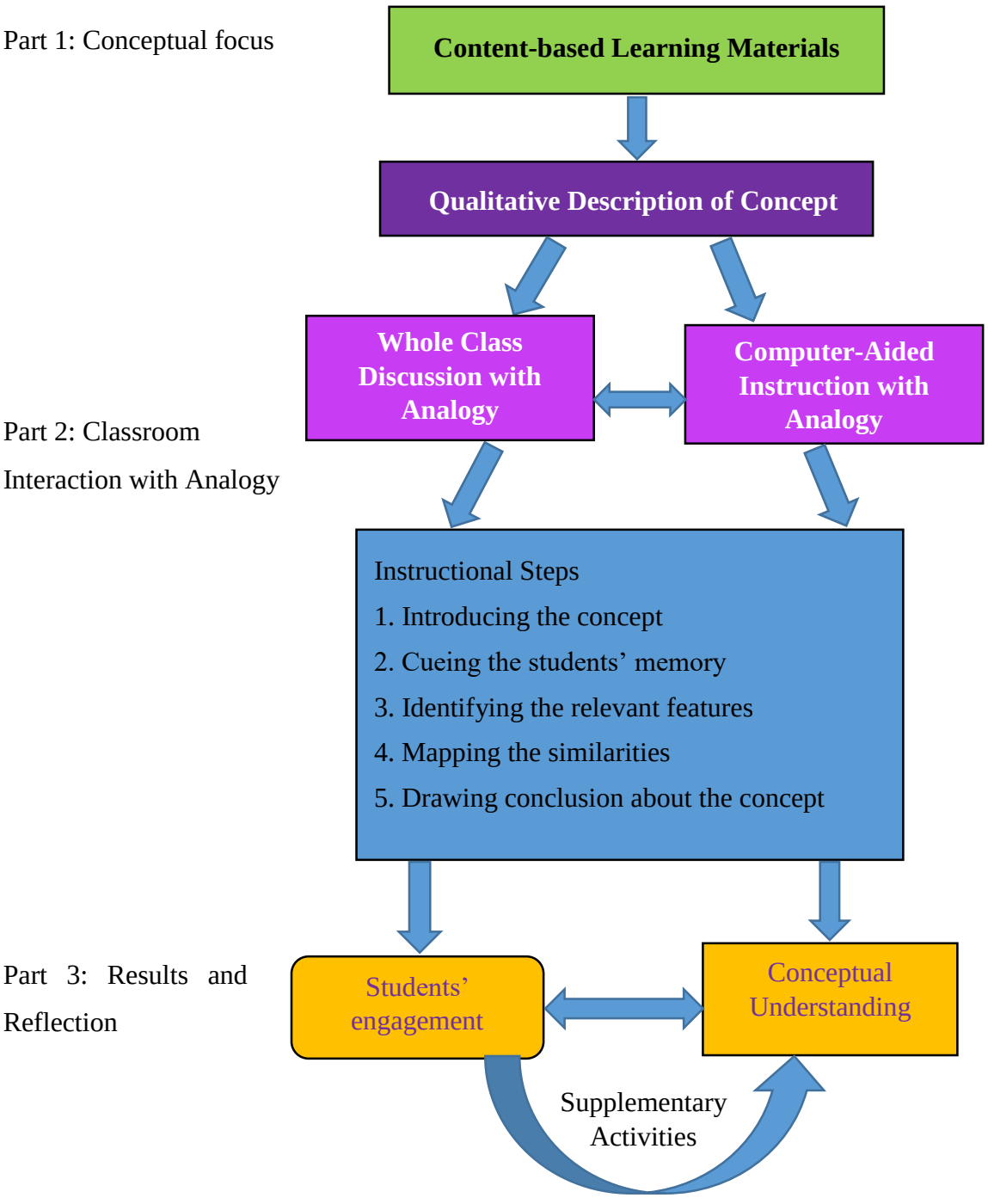
Learning is also the process of acquiring new information, whereas memory refers to the persistence of learning in a state that can be revealed at a later time (Squire, 1987, cited in Gazzaniga, et al., 2002). Learning and memory can be subdivided into major hypothetical stages: encoding, storage, and retrieval. Encoding refers to the processing of income information to be stored. It has two separate steps: acquisition and consolidation. Acquisition registers inputs in sensory buffers and sensory analysis stages, while consolidation creates a stronger representation over time. Storage, the result of acquisition and consolidation, creates and maintains a permanent record. Finally, retrieval utilizes stored information to create a conscious representation or to execute a learned behavior like a motor act (Gazzaniga, et al., 2002).

Transfer of learning between tasks is enhanced where the teacher cues learners into the specific skill being learned and encourages them to reflect on its potential for transfer. Meanwhile, pupils are enhancing their thinking process. The activities are designed to create 'cognitive conflict', that is a dissonance which occurs when a child is confronted with an event which she or he explains when using his/ her current conceptual framework or method of processing data (Adey, 1992:138, cited in Bartlett & Burton, 2012). Moreover, the proposed model is constructed taking the elements of Glaser's basic teaching model, Talyzina's psychological cybernetic model, Stolurow and Davis's computer-based model, Flanders's interaction analysis model, Dr Khin Zaw's multimodal model, and Gredler's selecting instructional events and theories of memory.

The integrated interactive conceptual instruction model by Khwanda, et al. (n.d.) was adapted to form the interactive conceptual instruction. In this model, research-based learning materials are replaced by content-based learning materials in part one of the conceptual focus. Moreover, classroom interaction is linked with analogy during the part two. Meanwhile, teaching with analogy (TWA) model by Alice (2011) is adapted for interactive conceptual instruction in part two. From the six-step TWA model, the five steps were considered to enhance conceptual understanding of the whole course of physics in the high school level. Finally, results and reflection were included to highlight the students' engagement and conceptual understanding. In this part, supplementary activities were discussed for interactive conceptual instruction.

Figure 1

Teaching Model for Interactive Conceptual Instruction



Based on previous models and a set of instructional events, the new design was constructed with three parts in the figure 1.

In part one, conceptual focus is presented and discussed with the students. A different colour is used for the content-based learning materials to understand clearly and choose the content-based learning materials prescribed in basic education curriculum. The aim of this part is to develop conceptual understanding using content-based learning materials as the link. Content-based learning materials are prescribed at the high school level in order to promote students' conceptual understanding about physics. The contents of Grade 10 covers the whole course for a student in physics at the upper secondary level of basic education. The division and order of subject content in separate fields presented in the whole course of upper secondary level physics are mechanics, heat, waves and sound, (4) optics, electricity and magnetism, and modern physics. The contents of chapters were also chosen systematically and were regarded as indispensable for the future understanding of other topics. Without initiating to study mechanics, it is not easy to study other topics. Thus the contents of Grade 10 are overlapped and linked with one another. This part deals with gaining the entering behaviors of students by using content-based learning materials and concept tests, questions and demonstrations to initiate classroom discussion in line with cognitive conflict strategies.

In part two, classroom interaction with analogy is considered for interactive conceptual instruction. The violet colour is used for qualitative description of concept and lilac colour for the others words. Different colours are used to be distinct the concepts of physics and the instructional steps for gaining these concepts. This stage is to promote classroom interactions by using whole class discussion with analogy and computer aided instruction with analogy. Students' interaction is the key element of constructivist theory and therefore students' prior knowledge has to be taken into account. In this stage, a concept is discussed with analogy and computer aided instruction to gain more qualitative understanding. The reversible arrow shows the relationship between whole class discussion with analogy and computer-aided instruction with analogy. This suggests the use of one of them to gain the qualitative description of the concept. Some of the lessons such as mechanics, heat, waves and sounds, and optics are suitable with the whole class discussion. The lessons of Pascal's law, transfer of heat, resonance column and organ pipe, refraction of light and laws of refraction, refractive index and formation of images by lenses are prepared by whole class discussion with analogy. However, other concepts such as electricity and magnetism and modern physics are suitable with computer-aided instruction. The lessons of electric lines of force, lightning conductor, electric potential of the earth, capacitance, current and electric circuit, electronic logic gate, and X-rays are prepared by computer aided instruction with analogy. If

necessary, teachers should use both whole class discussion and computer-aided instruction in order for students to understand the explanations more according to the time and circumstances of the school and to draw students' attention. The qualitative description of the concept and teaching with analogy can be done to draw the conclusion about the concepts. The five steps of analogy were considered to develop the qualitative description of concepts. There are five steps in this part as follow:

(i) Introducing the concept

This step is a brief introduction to a full explanation depending on how the analogy is to be utilized. If the analogy is to be used as an advanced organizer, then the concept would be introduced. The analogy may also be used for reviewing the concept(s) in which case, the concepts is fully taught at this stage.

(ii) Cueing the student's memory

This step involves the introduction of the analogy and determines the student level of familiarity through questioning and/or discussion. If the students' level of understanding is low, the analogy is modified or the process is aborted. The teacher should ensure that there is at least one obvious similarity for the students between the analogy and the target.

(iii) Identifying the relevant features

This step involves explaining the analogy to the students at a level that is appropriate to their understanding and which will accurately identify the features of the analogy that was used to build concepts in the next stage.

(iv) Mapping the similarities

The analogy features are linked with the target concepts. The conceptual map may have a converge on a single target concept or develop two or more target concepts.

(v) Drawing conclusions about the concept

After mapping the similarities, a summary of what has been learned about the target concept from the analogy should be stated to facilitate student learning. Moreover, to sum up the lesson by grasping the concepts, the teacher must ask the questions that deal with the target lesson. If necessary, teachers have to give feedback and correct the weak points of the students. Therefore, all stages are overlapped and linked with one another. For example, the qualitative description of

the concept for mechanics, heat, wave and sound, optics, electricity and magnetism, and modern physics can be discussed and presented by this model.

In part three, the stage of the results and reflection is to describe the students' engagement and reflect conceptual understanding. This stage involves assessment and feedback. The questions and concept tests are prepared and asked to grasp the concepts of the lessons. The reversible arrow shows the results of not only the students' active participation but also the conceptual understanding. If necessary, supplementary activities are needed to provide the students who have misconceptions and conceptual difficulties.

3. Methodology

This research aims to study the impact of interactive conceptual instruction on students in studying physics at the basic education high school level. Quantitative research method was used to compare students' achievement in studying physics between the two groups: experimental and control groups. For the qualitative part, two questionnaires for teachers and students were also constructed.

3.1. Quantitative Research Method

Table 1

Experimental Design

Group	Pretest (T1)	Treatment	Posttest (T2)
Experimental	T1	Interactive Conceptual Instruction	T2
Control	T1	Conventional Teaching Method	T2

The Non-equivalent Control Group Design, the Quasi-Experimental design in the explanatory sequential (QUAN → qual) was used (Gay & Mills, 2016). The design of the study is as follows:

3.2 Subjects

Participants in this study were 438 Grade 10 students from the selected schools. Population and sample size for five selected schools are presented in Table 2.

Table 2

Population and Sample Size

Name of School	Population	Sample Size		Total
		Group	Number of Subject	
S1 Nay Pyi Taw	128	Experimental	30	64
		Control	34	
S2 Mandalay	265	Experimental	46	94
		Control	48	
S3 Mandalay	240	Experimental	65	118
		Control	53	
S4 Sagaing	120	Experimental	38	80
		Control	42	
S5 Sagaing	82	Experimental	44	82
		Control	38	
Total	**835**	**Experimental**	**223**	**438**
		Control	**215**	

Legend: S1 = BEHS (5), from Zabu Thiri Township in Nay Pyi Taw
S2 = BEHS (7), from Chan Mya Tharsi Township in Mandalay
S3 = BEHS (Kyauk Mee), from Pathein Gyi Township in Mandalay
S4 = BEHS (3), from Sagaing Township in Sagaing
S5 = BEHS (Thaleba), from Ayadaw Township in Sagaing

Five Basic Education High Schools in Nay Pyi Taw, Mandalay and Sagaing Region in Myanmar were randomly selected by the use of simple random sampling method to carry out the research. One high school from Nay Pyi Taw, two high schools from Mandalay and two high schools from Sagaing were administered in order to get the required data for this study. Further, two intact groups in each school were randomly assigned as the experimental and control groups.

Table 3

Population and Sample Size for Qualitative Study

Sample Region	Sample Schools	Sample Teachers for Questionnaire	Sample Teachers for Interview	Sample Students
Nay Pyi taw	S1	1	1	30
Mandalay	S2	1	1	46
Mandalay	S3	1	1	65
Sagaing	S4	1	1	38
Sagaing	S5	1	1	44
Total		**5**	**5**	**223**

Only experimental groups from the selected schools participated in qualitative study. The sample size for qualitative study can be seen in Table 3.

3.3. Instruments

The instruments were constructed in accordance with the selected research design. Therefore, (1) a pre-test and its marking scheme, (2) a post-test and its marking scheme were used. They were developed under the guidance of supervisor and co-supervisor. In order to establish validity, they were presented to teacher educators and academicians. According to their valuable suggestions, some items were modified.

3.3.1. Pre-test

By the nature of Grade 10 Physics, it contains new terms, symbols, measurement, systems and concept-related equations. This research is mainly concerned with the study of interactive conceptual instruction on students in studying physics at the basic education high school level. A pre-test measures the initial ability of the selected sample students. The pre-test items were based on the first three chapters of the physics textbooks. Objective test items were used. There were no identical concepts among these items. Both the recall and recognition items were used to see initial ability of the sample students. Test items were mainly related to the concept of physics and measurement, vectors and describing motion. In an alternative way, those concepts are very basic to study further. Without having thorough knowledge in those basic concepts, a student cannot achieve the mastery level in physics learning. Item format and the number of test items were formed to represent the criteria for measuring instrument, which has content validity and construct validity.

3.3.2. Post-test

The effectiveness of the instructional design or model in studying physics is necessary in basic education high school. According to the allocation of the curriculum and syllabus for August, September and October, Chapters 4, 5 and 6 of physics were selected as a valid content for this test. In more details, 16 lessons plans for physics were used to construct the post-test items of part A and B.

Part A contains eight objective test items. Each item is concerned with a physics concept. Part A assesses the recognition and application level of the learners on the concept of subject terms and definitions and calculation. Part B contains six items, which include calculation. Specifically, item 1 represents right calculation about the concept of density and weight and; item 2 represents to solve the problems for right concept of pressure. Similarly, item 3 and 4 are concerned with the

calculation of the concept about the kinetic energy and potential energy. Moreover, item 5 represents to solve the problems for the right concept of the linear expansion and item 6 is concerned to solve the calculation with the concept of temperature on the Celsius scale and Fahrenheit scale. All items in this part assess the learners' comprehension and concept. The time allowed is 1 hour 30 minutes. The post-test includes Part A for objective items and simple calculation while part B for complex calculation items. Like pre-test items, the post-test items were based on four types of test validity, item validity, sampling validity, construct validity and consequential validity. Content validity was through measuring 17 items that represent the intended content area or all physics concepts learned from the selected learning materials. Moreover, the pre-test and post-test items were structured with the simple wording. These items do not contain the facts that can diminish the validity of a test and instruments, such as unclear test items, ambiguous test items, difficult vocabulary, complex sentence structures, untaught test items and inconsistent and subjective scoring methods. Finally, the test items were verified by experts' judgments and advices to become a good measuring instrument.

3.4. Learning Materials

Physics concepts must be explained with the excellent learning materials. Students cannot automatically acquire conceptual understanding. Therefore, studying the physics concept is essential for the students in the basic education high school level systematically. So learning materials have been developed based on the interactive conceptual instruction. Among the 10 chapters, only three chapters were chosen for teaching experiment because of the time limit. It is assumed that these three chapters can cover all the physics concepts of interactive conceptual instruction at the high school level. The lessons were developed into sample lessons plans for new instructional design. Every lesson contains a concept, which relates to equation including identification of symbols, sign convention, unit system and illustration with diagrams. The most important procedure is presenting qualitative description of concept. It must be supported with conceptual focus, classroom interaction with analogy and result and reflection. These steps have to be practiced with examples, questions and textbook exercises.

3.5. Procedure

The independent variables in this study were the different instructions of physics teaching. Therefore, the independent variable for experimental group was instruction using interactive

conceptual instruction and for control group was instruction without using it. The dependent variable was student's score on the posttest.

Firstly, in order to evaluate the feasibility of the instruments for full-scale study, pilot experiment was conducted at Practicing High School (Shwe Min Wun), Sagaing University of Education from July 15 to August 10, 2018. The time taken for teaching including testing before and after was 22 class sessions, each of which lasted 45 minutes. The study was carried out according to quasi-experimental design. The number of participants were 50 for experimental group and 47 for the control group. In the light of experiences of pilot study, necessary changes in testing and planning for experimental study were made. Before pilot study it was predicted to take 4 class sessions for teaching a chapter, but in reality it took 6 class sessions for a chapter. Thus, time allocation was changed. In order to establish the reliability of the pretest, a pilot study was carried out with 50 Grade 10 students at Practicing High School (Shwe Min Wun). According to pilot study, the internal consistency of the test, the reliability coefficient, Cronbach's Alpha was 0.77 of the pretest included 50 items. Pilot teaching also gave better ideas for the interactive conceptual instruction to motivate students' interest in learning.

Conducting full-scale experimental study was started in all five selected schools in August 2018. At the beginning of the study, all participants in both groups were tested to check the equivalence of the two groups. It took 1.5 hours for the 2 class sessions. Afterwards, the experimental groups were treated with the interactive conceptual instruction while the control groups were taught the usual. After the treatment period, post-test was administered to all students in experimental groups and control groups to measure the interactive conceptual instruction. The post-test took 1.5 hours for 2 class periods. The experimental study finished in November 2018.

Data collection process was carried out in November 2018. The questionnaire was administered to all students and teachers who participated in experimental groups in all five selected schools.

3.10. Data Analysis

The statistical package for the social science (SPSS) version 22 was used to analyze the quantitative data. The data were analyzed using ANCOVA test to compare the differences between the experimental groups and control groups.

4. Findings and Discussion

This study is mainly concerned with the analysis of data, findings and interpretation of the experimental study to ascertain the impact of interactive conceptual instruction on students in studying physics at the basic education high school level. This study deals with research findings based on quantitative and qualitative studies.

4.1. Quantitative Findings

Table 4

Analysis of Covariance on the Pre-test Scores by Schools

School	Group	N	M	SD	Ms	F	p
S1	Experimental	30	39.06	4.30	56.94	0.206	0.206 (NS)
	Control	34	37.17	7.01			
S2	Experimental	46	29.00	7.15	34.29	0.567	0.453 (NS)
	Control	48	30.20	8.33			
S3	Experimental	65	39.20	4.51	2.46	0.137	0.712 (NS)
	Control	53	39.49	3.88			
S4	Experimental	38	33.47	4.38	4.12	0.206	0.651 (NS)
	Control	42	33.92	4.56			
S5	Experimental	44	31.27	5.03	62.18	2.882	0.093 (NS)
	Control	38	29.52	4.14			
Total	**Experimental**	**223**	**34.53**	**6.67**	**12.17**	**0.260**	**0.611 (NS)**
	Control	**215**	**34.20**	**7.01**			

Legend: NS=no significance

There was no significant difference between the mean of the experimental group and control group in all schools before they were treated. From these data, it can be interpreted that both groups in each school started with the same initial ability.

Table 5 shows that the mean of the experimental group in each school was significantly higher than that of the control group. It also indicated that there was a significant difference at $p <$ .001 between the post-test scores of the two groups in all the schools.

Table 5

Analysis of Covariance on Overall Post-test Means

School	Group	N	M	SD	Ms	F	p
S1	Experimental	30	45.58	2.704	1312.39	27.63	.000***
	Control	34	36.50	9.031			
S2	Experimental	46	33.21	8.896	5922.95	107.86	.000***
	Control	48	17.07	5.840			
S3	Experimental	65	45.33	3.42	5555.80	19.39	.000***
	Control	53	41.05	6.846			
S4	Experimental	38	30.27	9.32	2632.20	29.7	.000***
	Control	42	18.67	9.95			
S5	Experimental	44	40.05	4.994	533.883	17.487	.000***
	Control	38	34.67	6.056			
Total	**Experimental**	**223**	**39.26**	**8.800**	**11478.37**	**102.63**	**.000*** **
	Control	**215**	**29.39**	**12.510**			

***** $p < .001$**

From the findings, it can be interpreted that the use of interactive conceptual instruction had significant effect on students' achievement in physics. Therefore, the students of the experimental groups gained significant positive effect due to the interactive conceptual instruction at some cognitive levels (i.e. remembering, understanding and applying level).

Table 6

Analysis of Covariance on Remembering Level

School	Group	N	M	SD	Ms	F	p
S1	Experimental	30	11.43	1.250	97.30	20.711	.000***
	Control	34	7.67	2.716			
S2	Experimental	46	4.48	1.907	1.78	0.691	.408
	Control	48	4.75	1.2333			(ns)
S3	Experimental	65	9.13	1.020	22.48	22.502	.000***
	Control	53	8.18	.966			
S4	Experimental	38	4.15	1.636	1.63	0.478	.492
	Control	42	3.86	2.00			(ns)
S5	Experimental	44	8.47	1.454	31.67	14.05	.000***
	Control	38	7.10	1.586			
Total	**Experimental**	**223**	**7.50**	**2.991**	**193.82**	**27.55**	**.000*** **
	Control	215	6.29	2.423			

Note: *** $p < .001$, NS=no significance

Table 6 indicates that the means of the experimental groups were significantly higher than those of the control groups in all schools. At the remembering level, there was a significant difference in the means of the two groups at $p < .001$ in school 1, school 3 and school 5 but there was no significant difference between the mean of the experimental and control groups in school 2 and school 4.

These findings reflect that the group of experimental students who received interactive conceptual instruction were found to have more effective achievement than the group of control students. However, school 2 and school 4 have the same achievement between the experimental and control group for the remembering level. It can be interpreted that the students in these schools have good prior knowledge of physics concept and very active in the teaching-learning process. Moreover, one teacher is assigned for both Grade 10 and Grade 11 of school 2 and school 4 due to inadequacy of teachers in these schools. In addition, the teacher in school 4 has no physics specialization.

Table 7

Analysis of Covariance on Understanding Level Items

School	Group	N	M	SD	Ms	F	p
S1	Experimental	30	11.86	1.814	3.77	1.50	0.225 NS
	Control	34	12.07	1.360			
S2	Experimental	46	11.25	1.669	13.50	4.04	0.047*
	Control	48	7.29	2.681			
S3	Experimental	65	12.57	.786	2.56	6.57	0.012*
	Control	53	12.00	1.754			
S4	Experimental	38	7.88	2.077	147.72	27.65	.000***
	Control	42	5.14	2.484			
S5	Experimental	44	9.33	2.117	8.13	2.19	0.143 NS
	Control	38	8.71	1.650			
Total	**Experimental**	**223**	**10.76**	**2.400**	**388.8**	**39.43**	**.000*** **
	Control	215	9.03	3.398			

Note: * p < .05, *** p < .001, ns= no significance

Table 7 reveals that the experimental groups showed a clear superiority over the control groups in the means of understanding level questions in school 2, school 3 and school 4. At the

understanding level, there was a statistically significant difference in the means of the two groups at $p < .001$ in school 2 and school 4 and at $p < .05$ in school 3. Among them, there was no significant difference between the experimental and control group for understanding level in school 1 and school 5.

Furthermore, there was no significant difference between the experimental and control group for understanding level in school 1 and school 5. It can be interpreted that the teachers of control group in school 1 and school 5 taught the students by sharing their knowledge and giving opportunities to discuss physics concepts. The teachers in experimental group taught the physics concepts with the proposed model. Therefore, interactive conceptual instruction tends to be more effective than the formal instruction for students to grasp the meaning of their learned materials. Therefore, interactive conceptual instruction can increase the conceptual understanding. It can be interpreted that all students in these schools have the excellent eagerness and attention in studying physics.

Table 8

Analysis of Covariance on Applying Level Items

School	Group	N	M	SD	Ms	F	p
S1	Experimental	30	22.28	1.472	379.67	16.04	.000***
	Control	34	16.63	6.558			
S2	Experimental	46	17.47	6.848	34.61	119.99	.000***
	Control	48	5.06	3.949			
S3	Experimental	65	23.69	3.199	242.76	12.96	.000***
	Control	53	20.79	5.372			
S4	Experimental	38	18.13	6.760	1397.88	31.95	.000***
	Control	42	9.66	6.494			
S5	Experimental	44	22.45	3.108	227.49	16.69	.000***
	Control	38	19.11	4.232			
Total	**Experimental**	**223**	**21.02**	**5.382**	**5577.03**	**122.15**	**.000*** **
	Control	**215**	**14.12**	**8.153**			

Note: *** p < .001

Table 8 shows that the mean of the experimental group was significantly higher than that of the control group in all schools. This indicates that there was a significant difference at $p < .001$ on the mean of application level items in all schools.

4.2. Findings from Teachers' Interview and Students' responses

In order to obtain in-depth information of the teachers' attitudes towards the proposed interactive conceptual instruction model and learning activities through this model and teaching concept of physics, open questions and interviews were conducted. Five teachers who taught experimental groups in the selected schools were interviewed.

Teacher 1. The first interviewee is a Grade 10 physics teacher from school 1. Her undergraduate degree is Bachelor of Science in Physics and continued the Bachelor in Education degree and Master in Education degree. She had teaching experiences in foreign countries and attended science teaching program for 21 days abroad. Her responses highlight that the prepared learning activities were useful for teaching physics. She studied other physics books such as "O" level. She drew the attention of her students with experiments about physics concept and started experiments and computer aided instruction in her teaching with whole class discussion. She gave equal opportunities to share the opinions and ideas of the students. She even shared her problem solving of physics concept to teachers in her township. She suggested that real objects and teachings aids of physics are needed to raise physics teaching in Myanmar. Moreover, she asserts that sufficient time is necessary for physics teaching, teachers who can lead experiments in physics teaching are needed and the physics curriculum should be regularly upgraded.

Teacher 2. The second interviewee is a Grade 10 and Grade 11 physics teacher from school 2. Her first degree is Bachelor of Science in Botany and has Bachelor in Education degree with specialization of physics and biology. She had experiences with the education training in the government, which were her model experiences of teaching physics. She said that the prepared learning activities were very useful for the teaching of physics. As to her teaching, she handles students of medicine and able to produce students with distinctions in physics. She starts the class with portions of chapters and focuses on physics concept through interactive conceptual instruction. She also uses computer

aided-instruction and actual experiments in teaching. She observes that students enjoy observations with real objects. She even plans to upgrade the subject and eventually share the teaching method in a district level workshop. She suggests proper time allotment for the teaching of the subject so that repetitions could be properly implemented as these help solve the problems.

Teacher 3. The third interviewee is a Grade 10 physics teacher from school 3. She has Postgraduate Degree and Bachelor in Education. She also had the chance to attend Master in Education degree. She got distinctions in physics and mathematics in the undergraduate course. She discussed the same narratives of an experienced teacher. Moreover, she suggested that the physics should be taught with real objects and interactive conceptual instruction to be effective.

Teacher 4. The fourth participant is a Grade 10 physics teacher from school 4. Her first degree is Bachelor of Science in Zoology. She was afraid of physics and calculation but was forced to teach the subject due to extreme necessity. According to her, the prepared learning activities were very useful for the teaching of physics; the interactive conceptual instruction was very effective in the teaching-learning process. This was her first time to adopt the interactive conceptual instruction and implement the same in the first physics subject in her university. She suggests that teachers guide the Grade 10 and 11 students through the appropriate teaching methods instead of preparing them guide questions for the examination.

Teacher 5 .The last interviewee is a Grade 10 physics teacher from school 5. She got Master of Science in Physics and aimed to become a science teacher since she was in high school. She attends training in their town and discusses key ideas of physics concept with colleagues. According to her, the prepared learning activities were very useful for the teaching of physics. She also noted that the interactive conceptual instruction was very effective in the teaching-learning process. She suggested that physics teachers use authentic materials for a more effective teaching. She observed that the students in the experimental group developed positive attitude towards their learning.

5. Conclusion

The research aims to develop innovative teaching approaches in the study of physics at the basic education high school level. In this study, quantitative method was used to compare students' physics concept between the two groups. Meanwhile, qualitative method was used to investigate students' attitude towards physics learning, and teachers' attitude towards the attainment of physics concept and the proposed interactive conceptual instruction model. The results showed that performance of students who were taught using the interactive conceptual instruction model were significantly higher than those of the students who were learning with formal instruction.

The results of the study posit that if teachers want the students remember 90% of the physics topics, the use of experiments and peer learning are highly encouraged. Therefore, conceptual focus and classroom interaction with analogy are must for teaching physics. The interactive conceptual instruction model develops the memory level of students through experiments and computer-aided instruction. In this method, the systematic process of interactive conceptual instruction model begins with conceptual focus and classroom interaction with analogy. Thus, the following instructional steps are recommended: (1) introducing the concept; (2) cueing the students' memory; (3) identifying the relevant features; and (4) mapping the similarities and drawing conclusion about the concept. The method develops student engagement and conceptual understanding through the supplement activities.

The teacher can employ multiple methods or activity sequences that can lead to successful student learning of a specific concept or process skill. Similarly, employment of a variety of concrete and abstract representation and experimental procedures to appeal to the variety of ways students' learning are necessary. Students should be encouraged to arrive at an answer by reasoning rather than by memorization and recall. Finally, the classroom must be a place for meaningful learning that constructs science concepts actively by using the cognitive concept that involve learners themselves.

The model can be useful to some extent in teaching physics wherein students can learn physics concepts easily. Similarly, the model can serve as basis for other subject areas. Further research on the effectiveness of interactive conceptual instruction model can be developed.

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Online Learning Expectations among Engineering Students: Analyzing Pre-Determined Factors in the Implementation of Flexible Learning

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Abstract

Academic institutions shifted to a new model of teaching and learning due to the COVID-19 pandemic. To study the gradual implementation of synchronous and asynchronous learning considering its flexible schedule to engineering students in one state university in Laguna, this research paper determined the students' expectations on the pre-determined factors in online learning. The descriptive research design used a standardized instrument answered by 30 computer engineering and 55 electronics and communication engineering students of the academic year 2020-2021. The study revealed that both groups of engineering students have a high level of online learning expectations as to proficiency with technology, the capability of the course instructor, delivery of the course content, setting social interaction, ensuring course organization, and realizing time management and convenience. This supports that there is no significant difference between the expectation levels of engineering students to study online. Further, there is a significant positive relationship between and among the pre-determined factors in implementing flexible learning. However, no significant relationship is depicted on proficiency with technology to the capability of the course instructor, delivery of the course content, and course organization. The result served as a guide to the institution to ensure an organized policy designed toward smooth implementation of flexible learning and examine pre-determined expectations that can be satisfied.

Keywords: *flexible learning, synchronous learning, asynchronous learning, online learning*

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1. Introduction

Teaching and learning processes in a different educational institution in the country were affected by the conditions brought by the coronavirus pandemic. Every institution was challenged to implement a flexible scheme for their academic program offerings and services to ensure that the students will realize the same quality of education (Coman et al., 2020; Tarayo et al., 2021). To control the situation, there were policies developed on flexible learning modalities, adoption of synchronous and asynchronous online learning, blended learning, and other learning modes to replace the conduct of face-to-face sessions following the strict health protocols. As an alternative, most institutions in the Philippines adapted internet-based learning to reach their student-clienteles who are willing to continue their course journey despite the challenges brought by the coronavirus pandemic.

In one state university in Laguna, a flexible learning scheme of using one-time synchronous and twice asynchronous online learning for every course subject was institutionalized during the imposed community quarantine. However, it challenged the university at first on how teachers and students will accommodate the idea and the underlying processes that need to be established to meet success on its implementation. Some believed that there were problems that might be encountered on its implementation, like the knowledge and skills of the teachers in handling online learning, the material preparation that needs to be uploaded for the students, low or no internet connectivity of both students and teachers and other expectations arising from the clientele (Martin, 2019; Mahyoob, 2020; Cicha, 2021). If these were not addressed at first, a poor learning experience might be expected as a result. As an initiative of the College of Engineering, the faculty members were tasked to work on research as to the expectations of the students on online learning delivery. It could be studied at first to anticipate the problems arising as the college will transition to flexible learning modes. The college should prepare and effectively implement a potential policy for the smooth imposition of flexible learning.

Several challenges may need to be faced in implementing flexible learning in an online scheme, but there are also advantages than can be realized later on. Students will be more focused on learning the lessons as they have comfortable work conditions (Bhamani et al., 2020). More and more educational resources can be accessed by the students in just one click using their internet connectivity that would broaden the concept they are learning (Lebenicnik et al., 2015). Students can learn at their own pace following the lesson guides prepared by the teachers (Kochar et al.,

2018). Being in a flexible learning mode, students managed the time allocation in learning each topic for each course subject well. They are given the privilege to accomplish only what they can for a specific period for as long as they can achieve everything before the deadline (Miertschin, 2015). It is expected that students will be more confident this time to communicate and collaborate with their teacher and classmates since they are more prepared and have resources to study other concepts for them to participate in online learning discourse.

With all the benefits that the students can realize once subjected to online learning or through the flexible learning scheme of the institution, the institution needs to analyze several factors before the implementation of flexible learning carefully. Expectations of the students as to how the institution can serve them should be examined to be the basis of several internal policies to be implemented. The study explored some pre-determined factors in implementing flexible learning through the student's expectation of online learning survey developed by Harris et al. (2011). It is anchored in the expectancy theory that describes the framework for future actions that might be experienced, which are the preliminary criteria for meeting the outcomes. To the context of the study, pre-determined factors are those examined parameters that may affect the future development as to the success of flexible learning in the institution. It supposes the pre-determined factors are aligned and consistent with the experiences of the engineering students. In that case, it is more likely to be controlled in the future for more achievable objectives in the academic discourse.

The study aimed to determine the expectation level of the engineering students on pre-determined factors in the implementation of flexible learning in terms of proficiency with technology, course instructor, course content, social interaction, course organization, and time management and convenience. The study also aimed to find-out whether there is a significant difference between the perceived expectations levels of the engineering students on pre-determined factors in the implementation of flexible learning when grouped according to student's course specialization. Lastly, it is the intention of the study to find-out whether there is a significant relationship between and among the perceived expectation level of the engineering students on pre-determined factors in the implementation of flexible learning.

2. Literature review

2.1.Implementation of Flexible Learning

Flexible learning is a learning scheme for students with a unique set of philosophies and systems. It provides a learning arrangement that depends on the learner's choice, capability, comfortability to learning space, and the bulk of tasks to the students (Joan, 2013). The basic questions on how, when, and where the student will learn the concept depends on the flexible arrangement. When it comes to the capability of the learners, the level of difficulty of the materials to be given is also to be considered, which should fit the level of the learners (Huang et al., 2020). Learning styles of the students should be clustered and should be addressed by every teacher. The learning space has a significant contribution to the flexibility of learning. The infrastructure and devices available for the learners should be identified to enable the institution to effectively plan what online or offline learning mode or platform can be used (Kariippanon et al., 2018).

Several information and communication technologies were developed to satisfy the conditions of flexible learning modality for the institution. The widely used learning platform in the university is the Google classroom. It allows teachers to become facilitators of learning through asynchronous online learning activities (Azhar & Iqbal, 2018). It enables as well to realize a learner-centered standard that students were given flexible modes to respond to educational practices of their teachers (Shaharanee, 2016). Some other benefits of using it are user-friendly features to the students and accessibility using any device (McGinnis, 2020). When it comes to unrestricted use of virtual platforms used for synchronous online learning, the institution utilizes Google meet. It has basic features that allow the active participation of students during the teacher’s presentation of the lesson (Basilaia & Kvavadze, 2020).

2.2. Expectations of Students toward Flexible Learning

Determining the expectations of the students towards the implementation of flexible learning is a good indicator for the institution to improve their satisfaction with the services being offered. Through this, the institution would be able to prepare its capacity to serve its clientele. When there is a high level of expectations among the students, institutions need to work on necessary actions to lead them to successful outcomes. The pre-determined factors on proficiency with technology, course instructor, course content, social interaction, course organization, and time management and convenience should be carefully examined as to the expectations of the students for the flexible learning implementation to be more effective (Harris et al., 2011).

It is expected among the students in the higher institution that they are more proficient in the use of technology as compared to lower levels. Most of their classwork requires basic computer application of word processing, making presentations and reports, basic computing applications, and web-based mailing, which requires their capacity to work proficiently (Batez, 2021). When flexible learning is implemented, there are many academic factors that the students expect to be worth satisfying. The instructor who will teach the course and manage the learning platforms is expected to be knowledgeable. They have a good level of classroom management, which is to be applied in a virtual setup. Expectations are also considered when it comes to the course content (Coman et al., 2021). Learning materials should be prepared with good quality adhering to the standards set by the higher institution. Standards on quality of content, learning approaches, reflective parameters, and active learning components are some of the key indicators that students expect to be included in the learning content of the materials to be given (Khan et al., 2021).

Despite some limitations of flexible learning, the students still expect that there would be social interactions in the learning process. Students would still be given opportunities to interact with their classmates and their teachers (Kokoç, 2019). The organization of the learning process is also one of the critical indicators that need to be satisfied. Students should feel the total quality of teaching and learning service rendered to them through logically organized content and easy-to-understand instructions in the learning activities (Ferri et al., 2020). Lastly, effective time management and convenience should be present in the flexible learning preparation. Proper scheduling of learning tasks and performances are considerably planned (Ahmad et al., 2020).

2.3. Success Indicators of Flexible Learning

In order to determine the successful implementation of the flexible learning, the institution need to efficiently monitor and analyze actions in the enrollment to online synchronous and asynchronous, options to take modular distance learning, use of appropriate evaluation, students grades and success tracking, and addressing arising conflicts once it exists (Andrade & Alden-Rivers, 2019). It is not only the institution that should impart their efforts to attain success in the implementation of flexible learning, the persistence and positive outlook to the policy and programs of the student-clientele must also be present (Naidu, 2017).

3. Methodology

Research Design

The descriptive research design was used to effectively describe the pre-determined factors in the implementation of flexible learning. The pre-determined factors are based on the expectations of the engineering students when it comes to proficiency with technology, the capability of the course instructor, delivery of the course content, setting social interaction, ensuring course organization, and realizing time management and convenience.

Respondents of the Study

The study participants were 30 computer engineering and 55 electronic and communication engineering students of the academic year 2020-2021. They were conveniently sampled from the different group of classes in the College of Engineering. Convenient sampling was used to effectively assess the expectations of the students enrolled. The College is relatively small with limited number of students considering only five (5) regular faculty members handling the program and provision of building or learning spaces for engineering students.

Research Instrument

The study utilized an adapted instrument based on the developed student's expectation of online learning survey of Harris et al. (2011) noting 0.897 Cronbach's alpha signifying a good level of internal consistency. The parameters used in the study covers the pre-determined factors in terms of proficiency with technology, course instructor, course content, social interaction, course organization, and time management and convenience. The scales used were the four (4) levels of expectations, Very High, High, Low and Poor. The even numbered scales help eliminate safe responses in the middle scales.

Data Gathering Procedure

From the instrument adapted, the study created a Google form to conduct the survey due to the strict health protocols implemented during the data-gathering period. The link was disseminated to the engineering students through the help of the College secretary as approved by the College Dean. The data gathered in the study were treated with strict confidentiality and were only used as baseline for the expectations of the students toward flexible learning to be implemented.

Statistical Treatment

Several statistical treatments were used to satisfy the objectives of the study. To describe the expectations of the respondents, mean and standard deviations were used. When it comes to determining significant difference between the expectations of the two respondents, an independent t-test was used. Lastly, Pearson product-moment correlation was used following the parametric requirement of normally distributed data to find out whether there is a significant relationship between and among the study variables.

4. Findings and Discussion

There are three parts of the discussion provided. Part I describes the expectation of the students on the indicators, part II and III tackle the results on inferential objectives of the study.

As can be seen from the values depicted in the table 1, both groups of engineering students have high level of expectations on proficiency with technology for them to be able to cope up with the implementation of flexible learning. As indicated, the respondents feel high capability in most of the indicators, with the indicator "*attaching files to email messages*" getting the highest mean value, and "*use of word processing software like Microsoft Word*" (for the Computer Engineering students). For indicators on software and hardware troubleshooting, low mean values were obtained indicating respondents' confidence that areas such as troubleshooting, which requires practice and proper training, is not highly expected of them in the flexible learning.

The current situation changed the landscape of learning to an online modality, which the results clearly emphasized the findings of Vargo, et al. (2021), Mpofu (2016) and Manu and Mensah (2015) that students are becoming proficient in the use of computers and even other gadgets such as cellphones, laptops and tablets to cope up with the demands of online education. In addition, the use of internet is another familiar and even an expertise of the students nowadays. As Liesa-Orús, et al. (2020) and Raja and Nagasubramani (2018) affirmed that survival in school has become very much dependent on technology hence almost all students were expected to become computer applications whiz in a blink of an eye. Even though applications are very familiar to them, troubleshooting is still not their expertise.

Table 1

Expectation Level on Pre-Determined Factors in the Implementation of Flexible Learning

Statements	CE			ECE		
	Mean	SD	VI	Mean	SD	VI
1. Use of Computers and Gadgets	2.70	0.65	H	2.67	0.61	H
2. Word processing software program like Microsoft Word	2.80	0.76	H	2.75	0.70	H
3. Use of emails	2.73	0.64	H	2.82	0.58	H
4. Attaching files to email messages	2.80	0.66	H	2.85	0.68	H
5. Use of Internet and search engines.	2.67	0.66	H	2.60	0.63	H
6. Internet searches for personal reasons	2.70	0.60	H	2.67	0.64	H
7. Internet searches for school work	2.70	0.60	H	2.75	0.67	H
8. Google classroom utilization	2.70	0.53	H	2.78	0.66	H
9. Computer software troubleshooting	1.97	0.76	L	2.02	0.65	L
10. Basic technical problems (hardware) troubleshooting	2.10	0.88	L	2.07	0.74	L
Overall (Proficiency with Technology)	**2.59**	**0.49**	**H**	**2.60**	**0.44**	**H**
I expect the course instructor…						
1. clearly communicate the course objectives.	3.40	0.72	H	3.31	0.60	H
2. clearly communicates what they expect from students.	3.17	0.75	H	3.11	0.53	H
3. posts requirements of the course within an agreed upon time.	3.07	0.69	H	3.36	0.59	H
4. delivered assignment feedback in a constructive manner.	3.07	0.83	H	3.20	0.59	H
5. consistently attends discussion sessions.	3.00	0.69	H	3.13	0.55	H
6. is supportive in the promotion of online learning sessions.	3.30	0.70	H	3.29	0.57	H
7. to have an appropriate online tone.	3.17	0.87	H	3.22	0.57	H
8. to be responsive to students' online concerns.	3.20	0.76	H	3.24	0.58	H
9. to provide contact information to students.	3.10	0.66	H	3.00	0.51	H
Overall (Expectations of the Course Instructor)	**3.16**	**0.59**	**H**	**3.21**	**0.45**	**H**
I expect this online course to…						
1. be productive and attentive like face-to-face set-up.	2.90	0.84	H	2.78	0.60	H
2. establish active learning.	3.07	0.64	H	3.02	0.65	H
3. set activities considering large class discussions.	2.77	0.77	H	2.76	0.72	H
4. provide activities for small group discussions.	2.70	0.70	H	2.69	0.66	H
5. allows learner for self-reflection of what they learned.	2.87	0.68	H	3.00	0.61	H
6. relate theory to real life application of concepts taught.	2.93	0.69	H	3.04	0.69	H
7. provide meaningful postings and discussions.	2.87	0.78	H	2.93	0.57	H
Overall (Expectations of the Course Content)	**2.87**	**0.62**	**H**	**2.89**	**0.44**	**H**
I expect…						
1. the course session allows students to meet new people.	2.63	0.93	H	2.69	0.77	H
2. a respectful academic community with my classmates.	3.37	0.56	H	3.38	0.62	H
3. a frequent online learning sessions like face-to-face scheme.	2.67	0.84	H	2.65	0.95	H
4. to have as many opportunities to get to know my classmates.	2.57	0.86	H	2.60	0.85	H
5. to be optimistic in dealing and learning online.	2.97	0.76	H	3.16	0.66	H
Overall (Expectations for Social Interaction)	**2.84**	**0.65**	**H**	**2.90**	**0.57**	**H**
1. Oncourse CL was user friendly.	2.63	0.67	H	2.69	0.60	H
2. The forum names and topic titles are unambiguous.	2.70	0.65	H	2.55	0.74	H
3. The course materials were easy to locate.	2.83	0.65	H	2.84	0.57	H
4. The course instructions were clear and unambiguous.	2.80	0.61	H	2.75	0.64	H
Overall (Expectations toward Course Organization)	**2.74**	**0.54**	**H**	**2.70**	**0.49**	**H**
1. I feel concerned that I may not manage my time well.	3.27	0.83	H	3.13	0.64	H
2. I am an independent learner.	2.03	0.81	L	2.09	0.75	L
3. This online course provides has flexible scheme on requirements.	2.47	0.86	L	2.45	0.79	L
4. I am confident that my family members and friends are supportive.	2.77	0.82	H	2.84	0.86	H
5. My home environment is conducive in learning.	2.27	0.83	L	2.36	0.80	L
Overall (Expectations towards Time Mgt. and Convenience)	**2.56**	**0.51**	**H**	**2.57**	**0.41**	**H**

Legend: 3.50-4.00 Very High (VH), 2.50-3.49 High (H), 1.50-2.49 Low (L), 1.00-1.49 Poor (P)

The results also showed that both groups of engineering students have high level of expectations from their course instructors. Computer Engineering students highly expect their instructor to be clear in communicating the goals of the course while Electronics and Communications Engineering students highly expect their instructors to post the course requirements within an agreed time. It is clear from the responses of the two groups that they want to prepare any course requirements in advance, which also affirm the findings of Aguilera-Hermida (2020), and (Blackmon & Major, 2012). The self-assessment of the students indicates self-discipline and responsibility that no student wishes to be caught off-guarded or unprepared on anything that is expected from them. This also shows the descriptions of Naji, et al. (2020) and Widodo, et al. (2020) that students in the online mode have keen sense of responsibility.

Since they have finished a school year without too much intervention from their instructors, they have low expectations that the teacher will be consistently with them in discussion forums or even provide contact information to students. This mentality of the students shows the observations of Gopal (2021) and Gillett-Swan (2017) that university students are getting fully aware of their responsibility and are independent in the performance of tasks with or without teachers' guidance. Interestingly, students form their own group chats, even teachers not included, where they freely discuss topics and exchange and share ideas regarding lessons (Broadbent & Lodge, 2021).

The results further showed that both the groups of engineering students have high level of expectations on the course content. The students expect that the course content will provide them with opportunities for active learning and opportunities to relate theory to real life. Though the specializations differ in their perception of the course content, it is clear that the students expect their course to make them learn actively and relate what they have learned to real life. According to Rapanta (2020) and Coman (2020), learning is not within the confines of the topics but the ability to apply to real life situations and make them better individuals. Simply put it, learning is not just memorizing lines, theories and formulas, but rather it comes with an understanding on how these may be applied to real life situations.

Students do not highly expect that they will be provided with opportunities for small group discussion since they are now fully aware of the fact that due to the current situations outside of their homes, it is not possible for them to face one another and make discussions. There is also the issue of connectivity, which hinders them from creating group discussions for quite a long period of time (Apuke & Iyendo, 2018; Jibrin, et al., 2017). Similarly, both groups of engineering students have high level of expectations in terms of social interactions even during the implementation of

flexible learning. They highly expect that their classmates will be respectful even in an online learning situation. Rules of conduct would still govern the students' behavior. Guidelines set by the instructors on the conduct of classes would still be followed to the letter. Yet they have accepted the fact and does not expect much that they will get many opportunities to get to know their classmates online as they would face to face. They have accepted the reality that conduct of classes and opportunity to meet face to face is hindered by many reasons (Sarmiento, 2021; Raitzer, et al., 2020). IATF protocols, safety measures implemented by institutions and even internet connectivity become reasons to limit such interactions.

In addition, both groups of engineering students have high level of expectations on course organizations for them to be able to cope up with the implementation of flexible learning. As indicated, they feel that for them to successfully cope with flexible learning, course materials indicated in the outlines/syllabi would be easy to locate as provided by their instructors. Since their access to materials is very much limited, them being confined to the comfort of their own homes, deem it necessary that the materials indicated in the materials provided by their instructors would be very much accessible for them (Armstrong-Mensah, 2020; Chen, 2018). They do not expect much that the materials be user-friendly and the names or topics be unambiguous, yet what they want is for them to have something to consult or look into when they are in the process of learning by themselves.

Furthermore, both groups of engineering students have high level of expectations when it comes to time management and convenience for them to be able to cope up with the implementation of flexible learning. As indicated, both groups have shown high concerns that they may not be able to manage their time well considering the activities they are to be given in every subject. The fact that they are at-home, it is a common knowledge that their parents also expect them to at least contribute in some of the household chores, thereby dividing their focus and attention to their studies and home life (Baticulon, 2021; Chandra, 2020). There is also that fact that not every student has the privilege of obtaining unlimited internet connection for online learning thereby limiting their access to classes and discussions (Dhawan, 2020; Francisco, 2020). Yet, the respondents have quite low expectation that they will become real independent learners since it would still require synchronous sessions to be facilitated by their professors, and in the current situation, it seems not possible yet.

Overall, it can be seen that engineering students have high expectations for them to be able to cope with the implementation of flexible learning, yet all indicators lead to the fact that these

expectations will leave them to become learners who were able to overcome the hindrances brought about by the new normal (Callo & Yazon, 2020).

It is revealed in table 2 that there is no significant difference between the expectation levels of the two groups of respondents on the pre-determined factors in the implementation of flexible learning. It only means that both groups of engineering students have high level of expectations with regard to proficiency with technology, expectations with the course instructor, course content, social interaction, course organization, and time management and convenience. Both groups of respondents understood that in order to accomplish all the necessary tasks or activities to be given by their instructors it is important that they highly expect to be proficient in attaching files through sending emails to their professors and that the use of word processing applications is beneficial to formally present their output as affirmed by Batez (2021) and Oguguo (2020).

Table 2
Test of Significant Difference between the Expectation Levels on Pre-determined Factors in the Implementation of Flexible Learning when Grouped According to Course Major

Variables	Groups	Mean	SD	T	Sig.	Mean Diff.	95% Cl of the Diff.	
							Lower	Upper
Proficiency with Technology	CE	2.59	0.49	-.111	.912	-.012	-.218	.195
	ECE	2.60	0.44					
Course Instructor	CE	3.16	0.59	-.378	.707	-.043	-.270	.184
	ECE	3.21	0.45					
Course Content	CE	2.87	0.62	-.147	.884	-.017	-.246	.212
	ECE	2.89	0.44					
Social Interaction	CE	2.84	0.65	-.426	.671	-.058	-.330	.214
	ECE	2.90	0.57					
Course Organization	CE	2.74	0.54	.323	.748	.037	-.192	.266
	ECE	2.70	0.49					
Time Management and Convenience	CE	2.56	0.51	-.143	.887	-.015	-.217	.188
	ECE	2.57	0.41					

It is expected among the students in both groups that they highly viewed that their instructors will share clearly the objectives of the course, which implies the same level of expectations. They both believe that the instructors already prepared the material beforehand and the expected objectives of the course are identified already for the success of the flexible learning implementation (Naidu, 2017). They highly expect as well that their instructors will promote surely online learning sessions like synchronous and asynchronous online since these are the two modalities allowed by the institution written in their policy (Callo & Yazon, 2020).

Similarly, both groups highly expect that their instructors will deliver the course content setting active learning effectively. Despite the challenges brought by the current flexible learning, students are optimistic that their instructors still have best practices to be imposed that would

capture their learning interest (El Firdoussi, 2020; Coman, et al., 2020). They both agreed that the expectation for social interaction is on high level considering that the academic community that they are in are truly respectful. Even though students have different ways of learning the lesson and have different levels of understanding it, they still expect that their schoolmates and instructors would respect the phasing duration that they have (Cortes, 2020; UNICEF, 2020).

When it comes to course organization, both groups have the same level of expectations that it is highly expected that the materials and resources included by their professors are easy to locate. The reference list given to them are updated and potential links to locate are included in the material (Ferri, et al., 2020; Schaffhauser, 2020). However, both groups are afraid that they may not be able to manage effectively their time to accomplish all the tasks given by their instructors. The deadlines set by their instructors might be a factor that may indicate pressure between the two groups of respondents. It might also be the number of activities when all instructors in all courses that is projected to be one of the reasons why they are worried that the time may not be able to manage effectively (Santelli, et al., 2020).

Table 3
Test of Significant Relationship between and among the Expectation Level on Pre-determined Factors in the Implementation of Flexible Learning

Expectation to Online Learning	1	2	3	4	5	6
Proficiency with Technology	1					
Course Instructor	.158	1				
Course Content	.163	.503**	1			
Social Interaction	.233*	.503**	.688**	1		
Course Organization	.185	.358**	.401**	.324**	1	
Time Management and Convenience	.288**	.311**	.456**	.367**	.462**	1

**. Correlation is significant at the 0.05 level (2-tailed).*

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

It is reflected in table 3 that there is a positive significant relationship between and among the expectation level on pre-determined factors in the implementation of flexible learning. The expectations of the students with regard to their proficiency with technology considering that they will be subjected for a flexible learning mode of synchronous and asynchronous online significantly relates positively to their expectations on social interaction to be established and how they will be able to management time and convenience. On the other hand, no significant relationship is depicted with their expectations level on technological proficiency and their expectations with their course instructor, content and organization. It only implies that even though they highly expect high level of technological proficiencies in using word processing, and other

computer applications to be used in an online set-up, it may not influence the way they view academic practices in learning the lesson. Students are used with these computer applications even without the implementation of flexible learning. Ever since they were in a face-to-face learning modality, ICT skill should be developed among students in order for them to prepare and submit their best learning outputs (Heerwegh, 2016; Verhoeven, 2012).

The results further show that there is a moderate positive significant relationship between and among the pre-determined factors on expectations with the course instructor, course content, social interaction, course organization, and time management and convenience. All these factors contribute to one another in order for a university student to be more prepared in attending flexible learning set-up in the institution. When one factor increases its expectation level, there is a moderate evidence that the others will follow. There might be challenges being faced by several institutions in the implementation of flexible learning modalities considering the current situation brought by COVID-19, it is beneficial that the institution should study or plan effectively all aspects concerning students' success of being part of the learning modes (Ishmael, 2020). The instructors that are well-trained and well-informed of the educational policies, there would be a smooth implementation of the flexible learning. With these, the students may be able to realize the organization of every course and the established learning spaces for them (Joaquin, 2020; Benade, 2019; Müller, 2018).

5. Conclusion

The engineering students have a high level of expectations on proficiency with technology, the capability of the course instructor, delivery of the course content, setting social interaction, ensuring course organization, and realizing time management and convenience. Furthermore, there is no significant difference between the expectations of the computer engineering students and electronics and communication engineering students. When both of them are to be subjected to an online learning delivery, they expect to have a high level of proficiency in word processing and attaching files to emails but had low expectations on computer software troubleshooting. They expect their course instructors to communicate the learning goals and post the course requirements as agreed upon. When it comes to the course content, they expect that it would provide them with active learning conditions and can be applied appropriately to real-life implications. Though there may be limitations of face-to-face interaction with their classmates, engineering students expect

for an online collaboration where they can respect one another. Engineering students expect that their instructors' course materials are logically organized and can be easily located through the reference list to be provided. Lastly, they expect that they would be able to effectively manage their learning time, ensuring that there are enough and appropriate activities to be given by all instructors within the specified time agreed upon. It is depicted that there is a significant positive relationship between and among the pre-determined factors in the implementation of flexible learning. Each factor is essential and should be considered by the college administrators to efficiently and effectively implement the flexible learning mode. When one of the factors is addressed and considered its relevance, most likely it would bring a positive outcome to the total learning experience of the engineering students.

University officials and college heads may use the result in ensuring an organized policy toward smooth implementation of flexible learning and examining pre-determined expectations that can be satisfied. The instructors have to be considerate in giving flexible arrangements for the students in a gradual shift of making them independent learners, which revealed to have low expectations. If needed, virtual consultation is recommended to students who will need assistance to cope with challenges brought by educational reform in order for them to comply with different course requirements. On the other side of the spectrum, students may continue to develop proficiency in using the technology to achieve more in flexible learning conditions. Since there is a significant positive relationship between and among the pre-determined factors in the implementation of flexible learning, it is suggested that curriculum planners and developers may consider that proficiency with technology and the expectations to the course instructor, content, social interaction, course organization and time management and convenience work together. With these, greater accomplishments can be realized among engineering students. For future researchers, since the study only focused on perspectives on flexible learning among limited number of engineering students, the parameters can also be adopted to other courses with greater number of potential respondents that will serve as a guide for university-wide policy implications.

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A Meta-Analytic Structural Equation Modelling on the Unified Theory of Acceptance and Use of Technology in Higher Education

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Abstract

With technology advancements in society, many theories and models evolved for explaining the technology acceptance of people in different contexts, especially in education. This study's main objective is to confirm the factors influencing the actual use behaviour of technology in the higher education sector, based on the framework of the unified theory of acceptance and use of technology (UTAUT). This objective was executed by means of the modern statistical technique, meta-analytic structural equation modelling (MASEM). This study synthesized 44 samples from 38 quantitative studies of UTAUT constructs, covering 16550 participants in higher education institutions. The result confirms the validity of the UTAUT model, except the direct effect of facilitating conditions on use behaviour. Therefore, performance expectancy, effort expectancy, social influence and facilitating conditions are the significant positive predictors of the teachers and students' behavioural intention to use the technology. The behavioural intention can also significantly predict the actual technology use behaviour of teachers and students. Moreover, the resulted model can explain the higher variance of the technology use behaviour among student population than the teacher population. It is anticipated that this study's findings can add the strong evidence of the validity and usefulness of the UTAUT model to the technology acceptance literature. Moreover, the practitioners with the help of this research's findings can guide the future integration of technology in higher education effectively.

Keywords: *Behavioural Intention, Technology Use Behaviour, UTAUT, Meta-analysis, Structural Equation Modelling*

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1. Introduction

The perspective on traditional education has already changed in the last few years in accordance with the advanced improvement of information and communication technology (ICT). As in traditional education, people cannot be educated only when they sit and learn physically in the classrooms. Owing to the rise of the internet and new technologies, most of the subjects or courses can be studied through staying at home called online learning or online education. Online learning is considered to be essential in the 21st century and its popularity increases more radically among the people all across the world. It is said in a most recent survey from Babson Survey Research Group that over 30 percent of higher education students in the United States take at least a distance course through online learning (Josep, 2021). Not only in the United States but also all over the world, the number of people who study online increases day by day because of the coronavirus pandemic, which started in December 2019 in China. According to an article from Insider, Zoom, a teleconferencing application typically used by businesses, has become the hot new way for people to connect and study online while social distancing during the coronavirus pandemic (Gilbert, 2020). In Myanmar, online learning has been popular among the students for the past few years. According to Kathryn online university, an online learning university in Myanmar, there are over 4000 students studying and 60 percent of them are from underdeveloped cities (Kathryn, 2021). During the pandemic, an unbreakable piece of evidence is that the popularity of online learning has increased more and more in the country.

In order to study online, there can be found many online learning platforms and some of the best and most popular ones include Coursera, Skillshare, Udemy, Codecademy, Edx, Pluralsight, Future Learn and Moodle. These are the ones leading the e-learning industry, which has been growing fast especially since the advent of COVID-19. According to a description in LearnWorlds, the number of people becoming interested in online learning is increasing both for learning and teaching purposes - to either learn a new skill or teach online. An online learning platform is an information system that provides a safe learning environment where students can take online courses (Raouna, 2020). These platforms are also called ‘online learning marketplaces’ in which students can search for the course and pay for them directly through online payment. When these platforms are applied by the teachers to teach online, they are called ‘online course platforms’. Many students and teachers specializing in various subjects gather in these platforms to learn or to teach. In online learning platforms and online course platforms, there are thousands

of courses for various subjects. For instance, a popular online learning platform, Future Learning includes various subjects and educational subjects are one of the best courses.

Before introducing online learning to students, it has become necessary to know technology acceptance of learners. In order to approach the digital learning environment, students' digital literacy and competency must be taken into consideration (Nelson et al., 2011). Kennedy et al. (2008) inquired about a few factors related with the student's use of technology in learning and their competency. Moreover, Goodyear and Ellis (2008) and Teo (2011) also studied about the impact of technology on students, teachers and their teaching-learning process. Jacobsen et al. (2013) also did a review on technology enhanced learning environment in higher education. With the results of many studies done by the researchers, many theories and models studying technology acceptance evolved in the literature: Theory of reasoned action by Fishbein and Ajzen in 1975, Theory of planned behaviour by Ajzen in 1985, Technology Acceptance Model by Davis in 1986 and Innovative Diffusion Theory by Rogers in 1983 (Lai, 2017). These models explain immediate and indirect effects on actual usage behaviour. Venkatesh et al. (2003) combined these and other models (The motivation model and PC utilisation), forming an integrated theory of technology acceptance called unified theory of acceptance and use of technology. While several models have been used in several studies, the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) has become very popular.

With its popularity, UTAUT has been widely used in studying technology acceptance and usage behaviour of students. The problem found in several researches highlighted that more accurate interpretation or consistent generalization has become an urgent need in the research field. In order to give out consistent result by combining various results from different studies, meta-analysis is used. Meta analysis is a robust tool for statistical analysis by combining the results of multiple scientific studies with the approach of the aggregation of information from previous studies leading to a higher statistical power. For identifying a model, a technique called structural equation model is used.

There have been many meta-analysis studies for UTAUT model in several different fields. In higher education field, meta-analysis studies for technology acceptance are found to be conducted mostly for students. However, there is still a little synthesis research for technology acceptance of teachers in higher education. In order to create a successful digital learning environment, technology acceptance and competency are important both for students and teachers. Therefore, this study will weigh both for students and teachers as to how much influence

technology acceptance has on a successful digital learning environment by giving out an organized and consistent result using a meta-analysis approach. Therefore, through the use of the MASEM technique, this study is aimed to identify whether the UTAUT model is capable of explaining the technology acceptance of teachers and students in higher education.

The main aim of this study was to confirm the validity of the unified theory of acceptance and use of technology (UTAUT) in higher education context via meta-analytic structural equation modelling approach. According to the UTAUT model (Venkatesh et al., 2003); the following **Research Hypotheses** are formulated:

H1: Performance expectancy significantly predicts the behavioural intention to use technology in higher education context.

H2: Effort expectancy significantly predicts the behavioural intention to use technology in higher education context.

H3: Social influence significantly predicts the behavioural intention to use technology in higher education context.

H4: Facilitating conditions significantly predict the behavioural intention to use technology in higher education context.

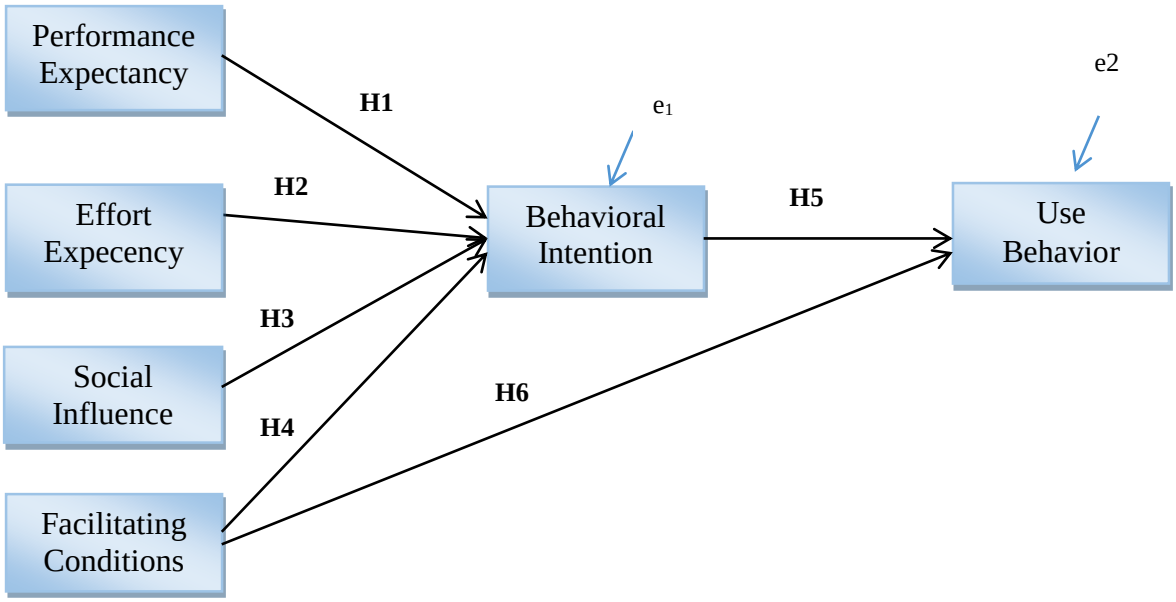
H5: Behavioural intention significantly predicts the actual technology use behaviour in higher education context.

H6: Facilitating conditions significantly predict the actual technology use behaviour in higher education context.

The **proposed conceptual model** of the factors influencing the actual technology use behaviour, in light of the UTAUT model (Venkatesh et al., 2003), is shown in Figure 1.

Figure 1

The Proposed Conceptual Model of Factors Influencing Actual Technology Use Behavior



2. Literature review

2.1 Technology Acceptance

After Covid-19 pandemic breakout, E-learning has attracted considerable interest among researchers (Wang et al., 2019; Vasconcelos et al., 2020; Vershitskaya et al., 2020). The reason is that it has the ability to transform learning and broaden its scope to reach more people. It is undeniable that e-learning is empowering, efficient, cost-friendly, and sustainable (Abdekhoda et al., 2016). With its advanced demand of digital learning environment, researches on the other hand, highlight the importance of technology acceptance of students. In 2003, Biggs argues that: "*if students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get the students to engage in learning activities that are likely to result in their achieving those outcomes….what the student does in determining what is learned is more important than what the teacher does*". Moreover, in the study conducted by Ramsden (1998), there is substantial evidence to suggest students' perceptions of teaching have a profound impact on their approaches to learning and the quality of what they learn. The success of e-learning systems is dependent on their usage and acceptance by students and instructors that, if high, will increase the return on the investments higher education institutions make in such systems (Sharma et al., 2017).

Teo (2011) describes technology acceptance as the user's willingness to employ technology for the tasks it is designed to support. Researchers have become more interested in understanding the factors influencing the adoption of technologies in various settings over the years. It is also found in most of the acceptance studies that researchers have also sought to identify and understand the forces that shape users' acceptance so as to influence the design and implementation process in ways to avoid or minimize resistance or rejection when users interact with technology. As a result, models of acceptance have emerged, some extending the theories from psychology focused on the attitude-intention paradigm in explaining technology usage, which allowed researchers to predict user acceptance of potential technology applications.

2.2 Emergence of Different Technology Acceptance Models

In the 21st century, technology is playing the main role in the teaching and learning process. As a result, some researchers have been studying students' readiness in their acceptance of technology in learning for a couple of years. According to the findings of some researches, many models of technology acceptance have been found to date. They are: Theory of Reasoned Action, Technology Acceptance Model, Motivational Model, Theory of Planned Behavior, A Combined Theory of Planned Behavior and Technology Acceptance Model, Model of Personal Computer Use, Innovations Diffusion Theory and Social Cognitive Theory.

2.3 The Unified Theory of Acceptance and Use of Technology

Based on the eight models, which appeared in the 1990s, Venkatesh et al. (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT). The purpose of the UTAUT was to create a model that represents a more unified view of the technology acceptance process. The UTAUT model compared the predictability of this model to many similar technology acceptance models in the seminal paper that first introduced their unified model (Venkatesh et al., 2003). They found the model to account for only 70% of the variance in behavioral intention to use and only about 50% in actual use (Venkatesh et al., 2012).

The model made a comparison between several technology models, which were of concern to the technology acceptance process including the Theory of Reasoned Action (TRA), the TAM, the Motivational Model, the Theory of Planned Behavior (TPB), the combined TAM and TPB, the Model of PC Utilization (MPCU), the Innovation Diffusion Theory, and the Social Cognitive Theory (Venkatesh et al., 2003). By reviewing all eight models simultaneously through multiple

studies, they managed to pinpoint the key components from each model and combine them into a more unified theory, the UTAUT. In their initial study, results suggested strong support for the four constructs described as direct determinants of user acceptance and usage (operationalized as behavioral intention and user behavior).

According to UTAUT, there are determining factors that directly affect intention or use in models combined within the UTAUT framework. These determining factors are called performance expectancy (PE), social influence (SI), effort expectancy (EE) and facilitating conditions (FC). In addition, UTAUT includes four intermediate individual variation variables, gender, age, experience and voluntariness of use, which predict the relationship between primary factors and behavioral intention and use behavior. Indeed, that UTAUT was able to account for 70 percent of the variance in usage intention (Venkatesh et al., 2003). Their results also suggested strong support for several moderators including gender, age, year of experience, and willingness to use the technology. Overall, the UTAUT is a theory that synthesizes what is known concerning the topic of the technology acceptance process.

Venkatesh et al. (2003) explained these four constructs on his original example using a Personal Computer (PC). **Expectation of performance** refers to "*the degree to which an individual believes that using the system will help him or her to attain gains in job performance*". For example, what use does a PC generate for the employees? **Expectation of effort** refers to "*the degree of ease associated with the use of the system*". For example, how much effort do employees have to contribute to using a PC? **Social influence** refers to "*the degree to which an individual perceives that important others believe he or she should use the new system*". For example, what do the colleagues and superiors of the employees say about using a PC? **Facilitating conditions** refers to "*the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system*". For example, do the employees know how to use a PC? The first three constructs are direct determinants of the intention to use new technology. Facilitating conditions is a direct determinant of the intention to use a new technology and user behaviour. Therefore, the behavioural intention also serves as the mediator between the facilitating conditions and the user behavior.

In the model UTAUT, it incorporated significant factors of formerly established theories such as such as TAM, TRA, TPB and so on and established four key determinants of individual technology adoption, which are performance expectancy (PE), effort expectancy (EE), social

influence (SI) and facilitating conditions (FC) mediated by behavioral intention to use in predicting actual technology utilization behavior.

2.4 Previous Meta-analysis Studies on the UTAUT Model

Starting from the establishment of the UTAUT model by Venkatesh, Morris, Davis, and Davis in 2013, there have been many empirical studies in various fields of technology application utilizing different versions of the UTAUT models. From 2010 onwards, there have also been many meta-analysis studies synthesizing results of empirical studies of UTAUT model in several different fields. Some studies analyse all empirical studies utilizing the original UTAUT model while some analyse its modified versions. Various fields of ICT applications utilized meta-analysis technology for confirming the validity of the UTAUT model and for making some useful modifications of this model in their respective fields. Therefore, over ten meta-analysis studies on the UTAUT model have evolved for investigating the factors influencing the acceptance and use of technology during one decade starting from 2011 until 2021.

Yogesh K. Dwivedi, a Professor of Digital Marketing and Innovation, has published many meta-analysis papers on the UTAUT model in the area of Information Systems. In 2011, he and his colleagues conducted a meta-analysis study by synthesizing the sample size, correlation coefficients and overall variance explained from all empirical studies utilizing the UTAUT model. Moreover, Dwivedi et al. (2017) used a combination of meta-analysis and structural equation modelling (MASEM) techniques for explaining the acceptance and use of information system and information technology innovations. In 2019, Dwivedi and other scholars conducted a review for the theoretical addition of the variable “Habit” into the extended UTAUT model. In addition, Dwivedi et al. (2020) also made a comprehensive review of the above UTAUT and meta-UTAUT models for revising the UTAUT model with endogenous mechanisms and new moderating mechanisms in the field of information technology.

In the field of technology adoption and use, there are also other meta-analysis studies confirming the UTAUT models with some innovations (Taiwo & Downe, 2013; Sammarraie et al, 2013; Khechine et al, 2016; & Blut et al, 2021). In the field of Korean ICT service industries, Hwang and Lee (2018) synthesized the results of 69 published papers in Korean journals for confirming the variables in the UTAUT model. In economic field, Jadil et al. (2021) also synthesized the empirical findings from 127 mobile banking studies with the focus on the UTAUT model for investigating the predictors of mobile banking (m-banking) adoption.

In higher education field, meta-analysis studies for technology acceptance are found to be conducted mostly for students, but a few for teachers. Most of the meta-analysis studies of technology acceptance in higher education field are based on the TAM model. However, there is still a little synthesis study on the UTAUT model for explaining the technology acceptance of both students and teachers in higher education. In order to create a successful digital learning environment, technology acceptance and competency are important both for students and teachers. Therefore, this study will try to synthesize the previous studies focusing the UTAUT model in higher education field by giving out an organized and consistent result using a meta-analysis approach.

3. Methodology

3.1 Research Design

Meta-analytic structural equation modelling approach was used in this study for the confirmation of the Unified Theory of Acceptance and Use of Technology developed by Venkatesh, et al. (2013) in the higher education context. For synthesizing the prior research findings on the UTAUT constructs, meta-analysis and structural equation modelling techniques were used in combination to test the UTAUT model in higher education context.

3.2 Data Collection Process

The data collection process begins with searching for the studies by identifying the keywords, search period and search engines, followed by specifying the selection criteria, selection process, and then ends with extracting data in excel file together with the study characteristics. The detailed procedures are clearly described in the each step.

3.2.1 Searching for the studies

As the UTAUT model was first developed by Venkatesh et al. (2003), the search period of the relevant studies covered from 2003 to June 2021, both included. Studies were collected via available search engines: Google, Google Scholar, Research Gate, Academia and Eric. In searching the relevant studies, the keywords “Unified theory of acceptance and use of technology in higher education”, “Students’ acceptance of technology in higher education”, “ICT acceptance of teachers in higher education”, and “Technology use in higher education” were used. In addition, the references of the studies retrieved were also checked in order to get additional studies compatible with the selection criteria.

3.2.2 Selection Criteria of the Studies

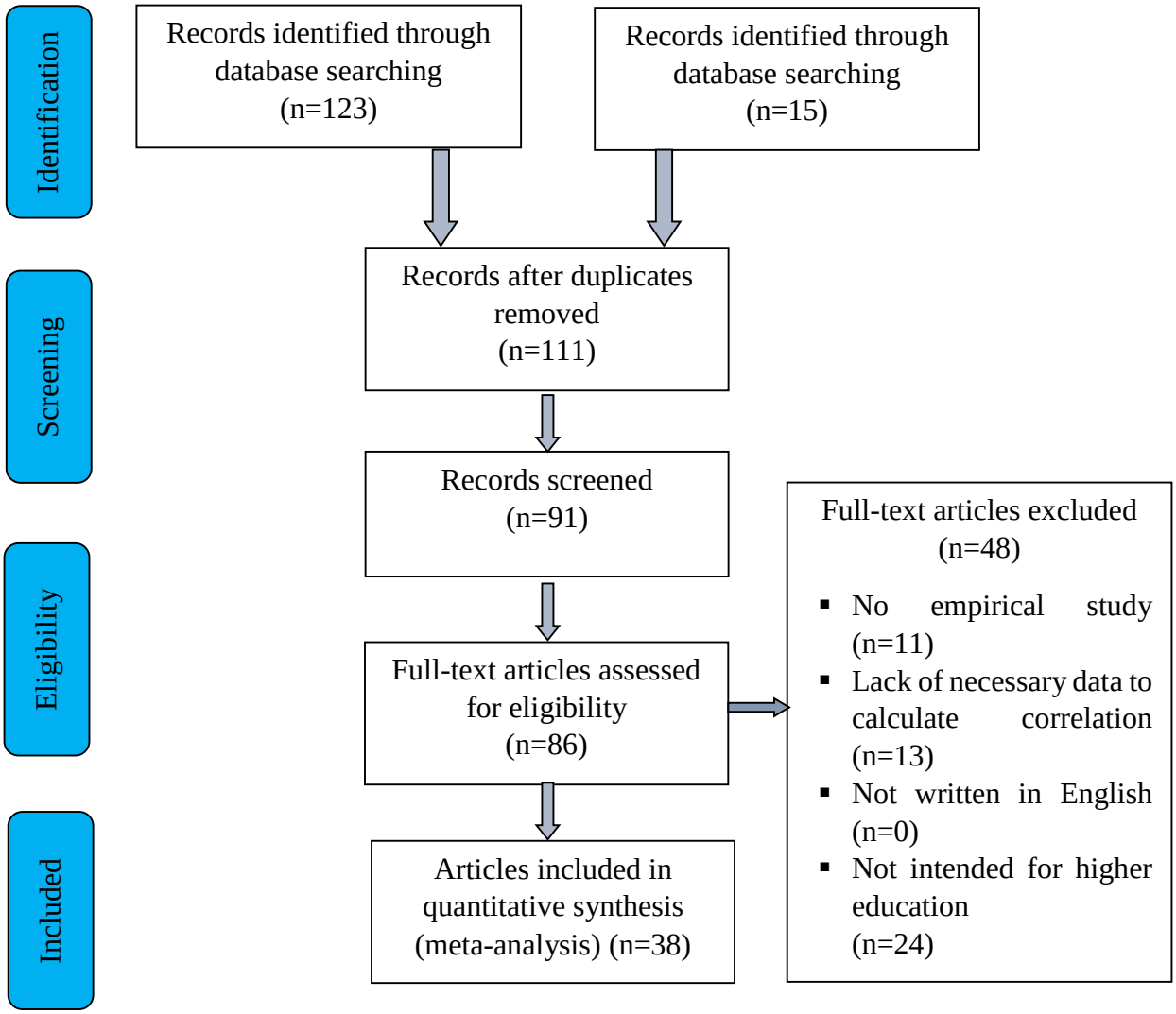
Inclusion criteria for this study was formulated as following: (a) to be an empirical study (i.e., survey), (b) to be the study presenting correlation coefficients or the necessary data to calculate the correlation; (c) to be written in English; and (d) to be the study conducted in higher education setting.

3.2.3 Selection Process of the Studies

Figure 2 shows a flowchart describing the selection process of the studies.

Figure 2

Flowchart of the Selection Process of Studies for the Present Meta-analysis



3.2.4 Data Extraction

In order to know how study characteristics affect the relationships between the study constructs if heterogeneity exists, the following additional variables were also extracted for coding: target population (teachers coded as 1 and students coded as 2), sample size, year of the study and geographic location of the study (country). Among these study variables, target population is assumed as the main target variable for heterogeneity of the effect sizes across the studies because teachers' technology acceptance may not be the same with that of students due to age difference.

Table 1

Summary of Previous Studies using UTAUT Constructs in Higher Education Field

Study	Author	Year	Country	Sample	N
1	Kurt, Ozlem, Tingoy & Ozhan	2017	Turkey	2	610
2	Kurt, Ozlem, Tingoy & Ozhan	2017	England	2	622
3	Vankatesh, Thong & Xu	2012	Hongkong	2	1512
4	Liebenberg, Benade & Ellis	2018	South Africa	2	738
5	Harris	2016	United States	1	111
6	Amadin, Obienu & Osaseri	2018	Nigeria	1	200
7	Pinochet, Nunes & Herrero	2019	Brazil	2	419
8	Altalhi	2021	Saudi Arabia	1	150
9	Alasmari	2017	Saudi Arabia	2	1185
10	Moran, Hawkes, & Gayar	2010	United States	2	263
11	Lewis, Fretwell, Ryan & Parham	2013	United States	1	46
12	Schaik (Study 1, VLE)	2009	England	2	118
13	Schaik (Study 1, Library Website)	2009	England	2	118
14	Schaik (Study 2, Library Website)	2009	England	2	118
15	Schaik (Study 2, Goal Mode)	2009	England	2	118
16	Schaik (Study 2, Action Mode)	2009	England	2	118
17	Isaac, Abdullah, Aldholay & Ameen	2018	Yemen	1	508
18	Gogus, Nistor, & Lerche	2012	Turkey	1	1723

Study	Author	Year	Country	Sample	N
19	Alowayr & Azawei	2021	Saudi Arabia	2	246
20	Abdallah, Abdallah, & Bohra	2021	Palestine	2	218
21	Naveed, Alam, & Tairan	2020	Saudi Arabia	2	386
22	Nawaz, & Mohamed	2020	Sri Lanka	2	453
23	Almaiah, Alamri, & Al-rahmi	2019	Jordan	2	697
24	Nassuora	2013	Saudi Arabia	2	80
25	Abu-Al-Aish	2014	England	2	174
26	Alharbi, Alotebi, Masmali & Alreshido	2017	Saudi Arabia	1	83
27	Chaka, & Govender	2017	Nigeria	2	320
28	Ahmet	2014	Turkey	2	561
29	Alhramelah, & Alshahrani	2020	Saudi Arabia	2	167
30	Wai Wai Than & Nu Nu Khaing	2020	Myanmar	2	412
31	Alshehri, Rutter & Smith	2020	Saudi Arabia	2	605
32	Oye, Iahad & Rahim	2011	Nigeria	1	100
33	Imarah, Zwain, & Al-Hakim	2013	Iraq	1	430
34	Alshmrany, & Wilkinson	2017	Saudi Arabia	1	170
35	Thomas, Singh & Gaffar	2013	Guyana	2	322
36	Abu-Al-Aish, & Steve Love	2013	England	2	174
37	Khechine & Augier	2019	France, United States, China, Brazil	2	99
38	Elkaseh, Wong, & Fung	2015	Libya	2	318
39	Elkaseh, Wong, & Fung	2015	Libya	1	182
40	Raman, Don, Khalid, Hussin, Omar, & Ghani	2014	Malaysia	1	68
41	Salloum, Maqableh, Mhamdi, Kurdi, & Shaalan	2018	United Arab Emirates	2	333
42	Moonkyoung, Milla, Seongcheol, & Shahrokh	2020	Korea, Finland	2	368
43	Dakduk, Banderali, & Woude	2018	Colombia	1	307
44	Maina, & Nzuki	2015	Kenya	2	600

After selecting the appropriate studies for meta-analysis using the eligibility criteria, 44 samples (16550 participants in higher education institutions) from 38 studies conducted in 24 countries were included in the current meta-analysis study.

3.3 Statistical Analysis

The research objective was undertaken by the combination of two advanced statistical techniques: meta-analysis and structural equation modelling. After synthesizing the quantitative findings from previous research studies, path analysis was conducted by means of SEM techniques for assessing the research hypotheses, R studio (version 4.0.3), two stage meta-analytic structural equation modelling (TSSEM) was conducted by using the metaSEM package and the semPlot package.

In the first stage of TSSEM, the homogeneity of correlation matrices across studies were tested and assuming random effect and adding categorical moderators were considered if heterogeneity exists. Then, with univariate approach, pooled correlation matrix was estimated for further testing of the model. In the second stage, the resulted pooled correlation matrix was used as an observed covariance matrix in fitting the SEM model.

The validity of the proposed model can be proven with multiple chi-squared tests and the rate of change of a conditional mean was interpreted as a regression coefficient. In order to measure the goodness of fit indexes of the model, many different types of fit indexes including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) can be tested. In this study, only RMSEA value is presented.

4. Findings and Discussion

This study conducted the two stage meta-analytic structural equation modelling (TSSEM) for the purpose of confirming the original version of the Unified Theory of Acceptance and Use of Technology in the higher education context.

From the selected studies, total 472 independent correlation values among the constructs of the UTAUT model were obtained to calculate the pooled correlation matrix.

4.1 Pooling the Correlation Values by Meta-analysis Technique

In the first stage of the current TSSEM, independent correlation matrices and sample sizes from individual studies are imported to R as the input variables for checking heterogeneity and calculating the pooled correlation matrix. Using the Univariate approach, the pooled correlation matrix is then calculated.

Table 2

Pooled Correlation Matrix from Meta-analysis Result

	UB	**BI**	**PE**	**EE**	**SI**	**FC**
UB	1	10678 (22)	10081 (23)	10081 (23)	9633 (21)	9810 (17)
BI	.388***	1	15744 (41)	15962 (42)	14762 (40)	12579 (33)
PE	.416***	.527***	1	14329 (40)	13226 (37)	12051 (31)
EE	.377***	.456***	.539***	1	13444 (38)	12269 (32)
SI	.322***	.373***	.418***	.396***	1	12269 (32)
FC	.370***	.437***	.389***	.454***	.394***	1

Note. r_c *in lower triangle and N (k) in upper triangle*

**** p <.001*

r_c*=Pooled correlation values*

N= Number of participants for each correlation

k= Number of studies for each correlation

By means of meta-analysis technique, fifteen pooled correlation values among the study constructs were calculated and presented in the lower triangle of the matrix. In the upper triangle, the number of participants and the number of studies respective for calculating each correlation value were also presented. According to the result, it can clearly be seen that all correlation values were positive and significant at the .001 level, showing that all constructs of the UTAUT model are strongly correlated in the positive direction.

4.2 Fitting the Proposed Model with the Pooled Correlation Matrix by means of SEM technique

In the second stage of this TSSEM, pooled correlation matrix was used as the observed covariance matrix in fitting the proposed model of technology acceptance.

Table 3

Summary of Causal Effects for the Structural Model (Technology Use Behavior)

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
BI	PE	.39*	-	.39*
(R^2=.63)	EE	.28*	-	.28*
	SI	.36*	-	.36*
	FC	.40*	-	.40*
UB	BI	.56*	-	.56*
(R^2=.32)	PE	-	.22*	.22*
	EE	-	.16*	.16*
	SI	-	.20*	.20*
	FC	-	.22*	.22*

*Note. * denotes significant paths t at p <.05.*

Examination of the RMSEA value for the proposed model is 0.1, which is not in the acceptable range of the model fit. Therefore, one path from the proposed model (FC ➔ UB) was removed from the model, and the result showed that the RMSEA value for the revised model is 0.08, which shows the best fit of the model with the observed data. The SEM result of the revised model showed that all four predictors, namely "performance expectancy", "effort expectancy", "facilitating conditions" and "social influence" had significant impact on students' behavioural intention to use mobile learning technology, explaining 63% of variance in it. However, facilitating conditions do not have a significant direct effect on actual use behaviour. Then, behavioural intention to use technology showed significant positive effect on students' actual use behaviour of technology, explaining about 32 % of variance in it.

Comparing with the previous meta-analysis studies on the UTAUT model, all meta-analysis studies in various fields confirmed the validity of the original UTAUT model with some modifications in some studies by adding new mediators. Many researches in the fields of

information systems and technology, technology innovation, Korean industries and mobile banking provided the evidence supporting the hypotheses formulated in this study (Dwivedi et al., 2011; Dwivedi et al., 2019; Hwang & Lee, 2018; Jadil et al., 2021). Dwivedi et. al. (2019) modified the UTAUT model by adding the mediator "attitude" connecting the four predictors with the intention and technology use. Therefore, this study's result is consistent with previous meta-analysis studies in the finding that all four predictors contribute to the behavioural intention and technology acceptance. However, there was an inconsistent finding that the predictor "facilitating conditions" show only the indirect effect on technology acceptance through the mediator "behavioural intention".

This inconsistent finding, otherwise, shows the complete mediation of behavioural intention between the facilitating conditions and technology acceptance. Although some studies in the literature emphasize that facilitating conditions have an effect on use behavior rather than behavioural intention (Venkatesh et al., 2003; Chiu & Wang, 2008; Wang & Shih, 2009; Taiwo & Downe, 2013), some researches in education field (Mtebe & Raisamo, 2014; Singh & Gaffar, 2013) had found that "facilitating conditions" construct had significant positive effect towards students' behavioural intention to use technology. Moreover, there have been many studies that confirmed the positive significant impact of facilitating conditions on behavioural intention to use technology in the higher education field (Samsudeen & Mohamed, 2019; Shen et al., 2019; Jameel et al., 2020). Also in this study, the "facilitating conditions" construct was the strongest predictor of behavioural intention. Because of the strong relationship between facilitating conditions and behavioural intention, it may be that behavioural intentions fully explain the mechanism between facilitating conditions and technology use behaviour. Therefore, it may be that FC showed only significant indirect effect on UB through the mediator of BI.

4.3 Explaining the Heterogeneity by Study Variable "Target Population"

All of the estimated heterogeneity values for all the correlation values in Table 3 are higher than 0.8, showing high level of heterogeneity in correlation matrices among different studies. A solution to heterogeneity in correlation matrices is to explain the heterogeneity using study characteristics by means of sub-group analysis. Therefore, sub-group analysis was calculated by using the target population (students vs. teachers), one of the study characteristic, as the moderator for explaining this heterogeneity.

Although this sub-group analysis cannot explain this heterogeneity completely, the division of the student and teacher groups can reduce the heterogeneity in the correlation matrices among the studies from high level to the medium level. Therefore, the following results for the student and teacher groups are more generalizable and accurate than the above overall result.

Table 4

Summary of Causal Effects, R^2 and Fit Index for the Final Model from Sub-group Analysis

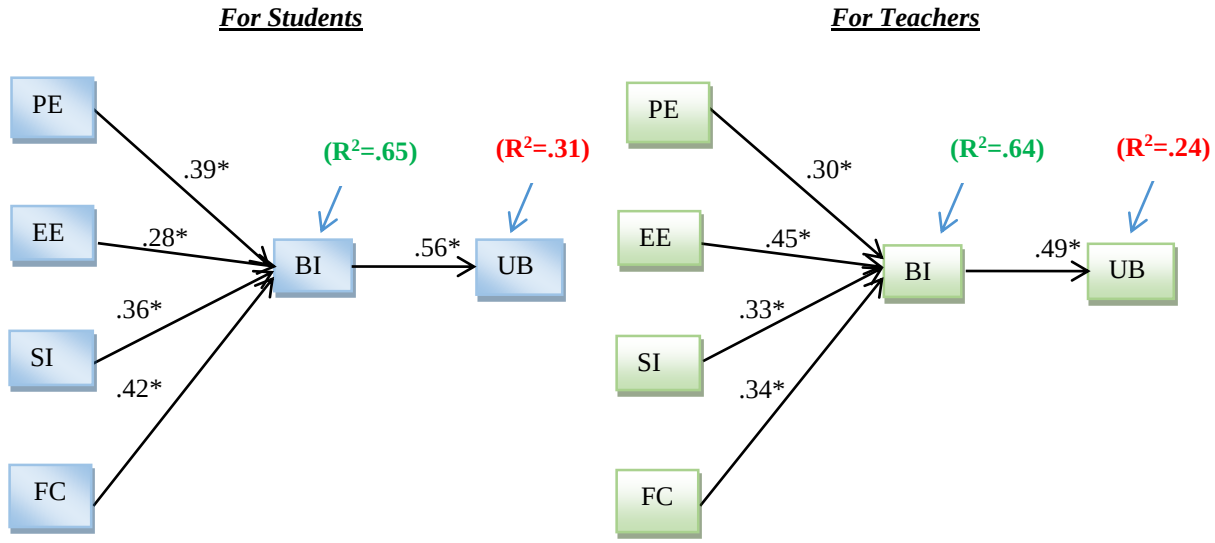
	Students	**Teachers**
	Standardized coefficient	**Standardized coefficient**
PE → BI	.392*	.297*
EE → BI	.279*	.449*
SI → BI	.360*	.328*
FC → BI	.418*	.341*
	R^2 = .65	**R^2 = .64**
BI → UB	.559*	.491*
	R^2 = .31	**R^2 = .24**
Model fit	**RMSEA = .079**	**RMSEA = .080**

*Note. * denotes significant paths t at p <.05.*

According to Table 4, the final model can explain about 31% of the variance of the technology use behaviour among student populations and about 24% of the variance of the technology use behaviour among teacher populations. By comparing them, the model can explain the technology use behaviour of students better than that of teachers. In explaining the variance in behavioural intention, the model works equally for both students and teachers by explaining about 65% of variance of behavioural intention. Another different finding is that the "facilitating conditions" construct was the strongest predictor for behavioural intention to use technology among the student population while the "effort expectancy" construct was the strongest among the teacher population.

Figure 3

Comparison of the resulted UTAUT models for Factors Influencing Technology Use Behaviour for Students and Teachers



5. Conclusion

The main aim of this study is to confirm the validity of the UTAUT model for explaining the factors influencing actual acceptance of technology among students and teachers in higher education setting. Hypotheses (1), (2), (3) and (4) proposed that four predictors, namely "learning expectancy", "effort expectancy", "social influence" and "facilitating conditions" have significant impact on students and teachers' behavioural intention to use technology. Hypotheses (5) and (6) proposed that facilitating conditions and behavioural intention to use technology have the significant effect on their actual use behaviour of technology. According to the result of MASEM on the quantitative synthesis of 44 studies covering 16550 participants (4078 teachers and 12472 students) in the higher education setting, all hypotheses, except Hypothesis (6), are confirmed, showing that all of the study constructs are significantly correlated. Therefore, it can be said that the independent predictors in the UTAUT model, "learning expectancy", "effort expectancy", "social influence" and "facilitating conditions", and the mediator "behavioural intention" can directly or indirectly explain the actual technology use behaviour of students and teachers in higher education. However, as the new finding, facilitating conditions showed no significant direct effect but only significant indirect effect on technology use behaviour through the mediator of

behavioural intention. As another new finding, the resulted model explained the technology use behaviour of students better than that of teachers.

This study's theoretical contribution goes to the literature of ICT integration theories, especially to the UTAUT model. It supports almost all of the hypotheses in the original UTAUT model: (a) learning expectancy, effort expectancy, social influence and facilitating conditions have direct positive effect on behavioural intention, and (b) behavioural intention has direct positive effect on actual use behaviour of technology, but (c) facilitating conditions had no significant direct effect on use behaviour. As a result, this study's findings can add strong evidence of the validity and explanatory power of the UTAUT model to the technology acceptance literature. Moreover, the future integration of ICTs and technology in higher education can be performed with the knowledge of the revised UTAUT model by emphasizing the four predictors.

Moreover, the results of this study also contribute practical implications to different stakeholders. Especially during the Covid-19 Pandemic Period, there is an urgent need for policy makers, university administrators and instructional designers to understand the influencing factors for technology use behaviour of both students and teachers in higher education. To successfully implement distance e-learning systems for higher education institutions which can increase the students' and teachers' behavioural intention and use of technology, university administrators and different stakeholders should take into consideration of the "performance expectancy", "effort expectancy", "social influence" and "facilitating conditions" factors by providing institutional support to students. Since performance expectancy and effort expectancy had effect on technology acceptance, practitioners should emphasize on the ease of use and usefulness of applied technology in the higher education context. For ensuring the social influence factor, practitioners should create sharing sessions for broad use of technology, and generate favourable words of mouth in using innovative technology in education. Finally, facilitating conditions is also a crucial one in the successful use of technology in learning. Technical and financial support such as media literacy, ICT knowledge, and data access should be provided to students. By considering all four predictors of the UTAUT model in collaboration, instructional designers should get insight to create mobile friendly instructional platforms and contents with the characteristics of interest, curiosity and enjoyment, which may cost as low as possible but increase learning rate. Higher education institutions also need to develop strategic plans and guidelines for successfully integrating

technology in education. For the above-mentioned implications, it is anticipated that this study may be a valuable one conducted during this pandemic period.

The present study has some limitations. First, this study only synthesizes the effect sizes for the relations between endogenous and exogenous variables in the original UTAUT model, but it ignores the effect sizes for the moderator variables such as gender, age, experience and voluntariness of use, which may predict the relationship between primary factors and behavioral intention and use behavior. Therefore, it reduces the explanation power of the resulted model for explaining the behavioral intention and use behavior of technology. Second, this study utilizes the univariate MASEM approach to get the pooled correlation matrix. In this approach, each pooled correlation value is based on a different subset of studies because of the missing values in the correlation matrices of the six variables in the including studies. This may create many disadvantages in fitting the SEM model. Finally, this study cannot explain completely the heterogeneity in the correlation matrices across different studies. The sub-group analysis using the study variable "target population (teachers vs students)" can only reduce the heterogeneity of the correlation matrices across studies to some extent. Therefore, many other study characteristics should be considered in explaining the heterogeneity of the correlation matrices in order to improve the generalizability and accuracy of the resulted model in explaining the technology use behavior in higher education.

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Academic Motivation and Self-Efficacy in Technical Skills as Correlates to Academic Performance

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Abstract

This study aimed to investigate whether significant relationship exists between the affective components of learning such as academic motivation and self-efficacy on demonstrating technical skills among students and their level of academic performance in Exploratory TLE mini-courses. The study is descriptive-correlational in nature, which employed a questionnaire to gather the data. The study found that most of the junior high school respondents were at the approaching proficiency level in terms of dressmaking/tailoring and beauty care services. Meanwhile, most of the respondents were at the proficient level in terms of bread and pastry and production and mechanical drafting. It was also found that a significant relationship exists between students' academic motivation and their performance in both bread and pastry and production and beauty care services mini-courses. Furthermore, there is a significant positive relationship between the respondents' self-efficacy and their academic performance in the four TLE mini-courses covered. Based from the findings, a plan of action on strengthening the integration of affective targets in teaching TLE mini-courses could be recommended.

Keywords: *academic motivation, self-efficacy, technical skills, academic performance*

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1. Introduction

Skills represent a key driver of development and growth in the Philippines (OECD, 2017). For a developing country like the Philippines, education and training for productive employment play a crucial role in achieving national development as well as social and economic development (Adeyemo & Sehoole, 2015). Along with thinking and behavioral skills, technical skills are deemed essential in successfully securing employment and performing one's job (Diokno & Peprah, 2021). Thus, graduates upon entering the field of work are expected to possess academic and technical skills necessary in order to thrive in this technical and innovation-driven economy.

According to World Bank (2012), technical skills belong to the group of academic skills taught in schools alongside life skills and cognitive skills. It is characterized as the mixture of knowledge and skills required to perform specific jobs. In the Philippines, emphasis on the acquiring of technical skills has always been in the government agenda. In fact, the Republic Act No. 3377, otherwise known as the Vocational Act of 1927 and the Article XIV Section 5, of the 1935 Philippine Constitution provide for the development of vocational efficiency. Moreover, the implementation of the Strengthened Technical and Vocational Education Program (STVEP) in 2007 aimed to prepare secondary-school graduates for certification in vocational and technical skills, university preparation, entrepreneurship and apprenticeship eventually leading to formal employment (Valles, 2012). Relative to this, the current K to 12 curriculum of the Department of Education (DepEd) also highlights the importance of technical and vocational training among graduates of basic education through the offering of Technology and Livelihood Education (TLE).

TLE as a fundamental subject area in the junior high school aims to provide learners with opportunity to develop technical skills by exposing them to experiences and trainings that prepares them in the various field of works (Agdan, 2013). The acquisition and demonstration of these skills are the basic indicators of academic performance in the subject area. The offering of TLE is seen as a response to the need of community to provide young citizens the knowledge and skills necessary in establishing vocational and technological efficiency and problem solving in daily life. Fabico (2015) considers TLE as essential in the education and training of learners and harnessing them as a powerful force in nation building.

In the K to 12 curriculum, TLE is a subject area where learners are taught with the basic skills and concepts of Home Economics, Entrepreneurship, Information and Communication Technology (ICT), and Agricultural Arts as well as Industrial Art, taken as a unified course. The

first two years in the junior high school (JHS), called Exploratory courses, serves as preparatory for the demonstration of skills and choosing of specialized area in the last two years of JHS.

However, despite the significance accorded to the training and acquisition of technical skills among learners even in the early stage of schooling, World Bank (012) data revealed that the Philippines have gaps in producing graduates with high-level of desired skills necessary in the workplace including information technology skills, problem solving skills and technical skills, among others. Furthermore, in the employment and skills development report of the OECD (2017), looking at the Philippine setting, firms were unavailable to fill job vacancies due primarily to skills-issues such as skills mismatch and even lack of skills. Circumstances like these leads primarily to unemployment. Agluba (2021) looking at the root of the problem in unemployment of over half of the Filipino labor force, came to the idea that this could be related skills mismatch which in turn is related to their preparation during their junior and senior high school years. Interest was also identified as a factor associated to a student's acquisition of technical skills and performance in general.

The educational psychology literature points out that psychological variable possibly play a significant role in academic performance (Zanbuk, 2021). However, in TLE as a subject area, academic success is largely measured in terms of acquisition of technical skills. Thus, this study aims to look particularly to a student's attempt for success called academic motivation and the belief in one's capability to succeed called self-efficacy in the context of the ability to demonstrate the technical skills. This study specifically investigated how these two psychological variables relate to the level of academic performance demonstrated by students in TLE.

Academic motivation refers to learner's internal predisposition which leads to learning, skill attainment and academic achievement (Omidvar, et al., 2013). It could be equated to the interest of an individual learner to engage in the learning experiences offered (Hulleman, et al., 2016). Highly motivated students are expected to make more effort to increase their academic and social achievement in their learning process. It is a highly and significantly correlated to the students' academic achievement (Abdelrahman, 2020). Specifically, it is found that students who were equipped with intrinsic academic motivation can face academic challenges and difficulties with the appropriate flexibility and adaptability and thus are more capable of success on their study.

Another important factor known to influence learner's performance is self-efficacy or one's personal judgement of capability to successfully perform a particular task (Pena, et al., 2015). An

individual's self-efficacy was known to influence the amount of effort one gives to a particular learning task (Hartmen, 2021) and the level of persistence when faced with difficulties (Khalique & Singh, 2019). In a subject area such as TLE where learners in the junior high school are expected to demonstrate certain level of skills based on the desired outcome set by the curriculum, it is deemed important that tenacity towards a task and belief in one's capability be examined.

In recognition of the importance of technical skills being the foundation of one's performance in the TLE specialization courses, this study was conceived with the aim of looking into the association between the affective factors influencing the academic performance of Grade 9 students. Specifically, the present study aimed to determine whether affective traits of students, such as academic motivation and self-efficacy in acquiring technical skills, significantly relate to their academic performance in TLE exploratory courses including bread and pastry production, dressmaking/ tailoring, mechanical drafting and beauty care (nail care) services at Recto Memorial National High School (RMNHS). The results of which may possibly guide TLE exploratory courses teachers in formulating interventions or designing programs that will prepare exploratory learners in pursuing specialized TLE fields in their higher years of study.

2. Literature Review

Technology education refers to educational or learning activities that deal with the development of technical skills, knowledge and attitudes relevant to production or service occupations for effective workers. It also prepares someone for employment in technical work or upgrades persons who are presently employed or engaged in technical work. In the Philippines, the current K to 12 curriculum clearly delineates the need for skills acquisition among Filipino students such as media, information and technology skills (DepEd, 2019). Accordingly, the curriculum aims to develop globally competitive, productive and responsible citizen equipped with essential competencies, technical skill and values for both lifelong learning and employment through the eight basic learning areas, one of which is TLE.

The offering of Technology and Livelihood Education (TLE) in the junior secondary school as means to develop technical and vocational skills is not a new concept. In fact, the enactment of RA 7796, otherwise known as Technical Education and Skills Development Authority Act of 1994, emphasized the teaching and learning of technical education and skills development in response to the challenge of the dynamic demand for quality middle-level manpower. However, with the offering of TLE in the junior high school level, the important role

played by the technical and vocational education in attaining national development goals was highlighted. TLE generally includes the basic skills and concepts of home economics, entrepreneurship, information and communication technology (ICT), and agricultural arts as well as industrial art (Agluba, 2021). It is offered as an exploratory subject for lower secondary school particularly in Grades 7 and Grade 8. This course introduces the different mini-courses and learning activities, which will prepare the students to be skillful and competitive before they take the specialization course in Grade 9 and 10. These areas of TLE are fundamentals for technical-vocational courses to be taken in the senior high school where they are expected to undergo training and assessment to evaluate their performance in their field of specialization and to acquire certificate of competency (TESDA, 2012). In the secondary education curriculum, TLE has different components including: home economics, agri-fishery, arts, industrial arts and information and communication technology. According to Gregorio (2016), taking these courses of TLE could be helpful in responding to the need for industry workforce and possibly, lessen the job mismatch in the country.

There are two types of curriculum provided in the present K to 12 curriculum of the DepEd such as technical-vocational education-based TLE and entrepreneurship education-based TLE (Espiritu, 2020). The present study's locale, RMNHS is offering the technical-vocational education-based TLE, which is focused on technical skills development in various areas. It has five common competencies, based on the training regulations of the Technical Education and Skills Development Authority (TESDA), which are covered in the exploratory phase (Grades 7 and 8): mensuration and calculation, technical drafting, use of tools and equipment, maintenance of tools and equipment and occupational health and safety. Students can choose a maximum of four TLE mini courses in Grade 7 and another four in Grade 8. However, the specialization offered in Grades 9-10 were based from the school's needs assessment for the offering per locality with special consideration on the needs of the community and schools' resources.

Academic performance of student in secondary schools refers to the extent to which a student, a teacher, or an institution has achieved their educational goals (Zambuk, 2021). In a skill-based course such as TLE, skills acquisition in the identified areas serves as the measure of achievement or performance. On the other hand, academic performance serves as benchmark in order to determine the result of student attainment of set goals. Mushtaq and Khan (2012) identified some factors affecting student's achievement like learning facilities, communication, proper guidance and family stress. In addition, Calixto (2015) identified factors including student-related,

faculty-related and program-related factors. The current study however specifically looked into the student-related factors identified as self-efficacy in demonstrating skills and the academic motivation of the learners.

According to Bandura (1986), perceived self-efficacy is defined as people's judgments of their capabilities to organize and executive courses of action required attaining designated types of performances. This implies that the level of self-efficacy will influence a learner's perception of difficulty of an academic task. A learner with lower self-efficacy may see academic tasks as difficult compared to those with high self-efficacy. Khan and Bhatt (2021) describe self-efficacy as one's confidence or the optimistic belief to one's competence or chances of success. This could be demonstrated in such academic success level in accomplishing academic task or demonstrating technical skills in the case of TLE. In social cognitive theory, people's sense of personal efficacy to exercise some control over events that affect their life is considered to be the most influential aspect of self-knowledge, and a key element in the exercise of control and personal agency. Self-efficacy plays a major role in determining chances for success (Khan & Bhatt, 2021) as it serves as one's judgments of their capabilities to organize and execute courses of action required in attaining desired learning outcomes or demonstrating performances.

Another factor considered in this study was academic motivation. Amrai, et al., (2011) stated that motivation for academic achievement is of great importance because it is the force that pushes a person or student to successfully complete assigned tasks, perform an activity, complete the assignment, achieve set goals, or pass examinations. According to Viarri, et al. (2011), academic motivation is one of the effective factors of students' performance. It is a force that directs and sustains behavior towards an attainment of goal (Eymur & Geban, 2011).

The Self-Determination Theory (SDT) proposed by Deci and Ryan (1985) outlines the three types of motivation particularly as predictor of performance. This includes intrinsic or being motivated by the feeling of enjoyment or competence one feels toward the task engagement; extrinsic or the motivation one derive from the perceived usefulness of the task to one's future goal; and, a-motivation where an individual has no discernment of connection between the actions towards and the outcomes of the task. Consequently, academic motivation defines the reasons behind students' actions and behavior in school thus greatly influencing the achievement of desired outcome. Motivated students tend to behave energetically and are goal oriented. Though researches have established that academic motivation could likely influence the level of academic achievement in general (Sturges, 2016; Mohammadi, et al., 2021; Zambuk, 2021), few studies

particularly looking into the academic motivation in the context of the teaching and learning process in TLE is seldom found in the literature.

3. Methodology

This study is descriptive-correlational and cross sectional in nature. It utilized the descriptive survey method, which involves collecting information by interviewing or administering a questionnaire to a sample of individuals (Orodho, 2005). According to Ariola (2006) descriptive survey research attempts to analyze, interpret, and report the present state of the subject matter or problem. It deals with the cross-section of the present time and uses the questionnaire or other instruments to gather data. The study is correlational in the sense that it tries to determine whether a significant relationship exists between the independent and the dependent variables of the study. Since the data in the study were collected from the respondents during a single point and relatively brief period, it is cross sectional in terms of time dimension.

The respondents of the study were 200 randomly chosen Grade 9 students who were completers of TLE exploratory courses. The respondents selected were informed through a letter attached in the survey questionnaires. The researcher-adapted questionnaire was composed of three parts. The first part includes the respondents' perception on their academic motivation in TLE, the second consists of self-efficacy in acquiring technical skills in TLE exploratory courses and finally, the students' academic performance.

The data gathered were tallied, tabulated and analyzed. In analyzing and interpreting the information gathered, descriptive and inferential statistics were employed. To determine the students' perception on their self-efficacy and academic motivation, mean and standard deviation were used while the performance of the respondents was described using the frequency counts, percent, mean and standard deviation. Inferential statistics such as the Person product moment correlation coefficient (Pearson *r*) was used to determine whether a significant relationship exist between the independent variables, self-efficacy and academic motivation, and the dependent variable, the student's performance.

4. Results and Discussion

Table 1
Respondents' Perceived Academic Motivation in TLE Exploratory Courses

Indicators *I attend TLE class….*	M	SD	VI
1. because I experience satisfaction while learning new things	4.11	0.8	A
2. for the pleasure I experience when I learn to do new things I've never done before	4.01	0.74	A
3. for the pleasure that I experience in when I learn more about TLE topics which I really like	3.99	0.83	A
4. because my TLE class helps me to continue to learn about many things that interest me	4.07	0.92	A
5. for the pleasure I experience while surpassing myself in my studies	3.64	0.86	A
6. for the pleasure that I experience while I am surpassing myself in one of my personal accomplishments	3.7	0.74	A
7. for the satisfaction I feel when I am doing difficult academic activities in TLE	3.42	0.78	A
8. because TLE class allows me to experience a personal satisfaction in my quest for excellence in my studies	3.81	0.86	A
9. because I really like going to school and attending TLE class	3.9	0.78	A
10. because for me, TLE class is fun	3.92	0.88	A
11. for the pleasure that I experience when I enjoy the discussions with interesting teachers	3.83	0.92	A
12. for the feeling of enjoyment that I experience while reading about different interesting topics in TLE.	3.72	0.84	A
13. because I think that a learning from TLE class will help me better prepare for the career I will choose in the future	4.13	0.9	A
14. because eventually it will help me to have job in a field that I like	3.89	0.87	A
15. because this will help me make a better choice regarding my career orientation	3.78	0.93	A
16. because I want to show myself that I can succeed in my studies	4.05	0.84	A
17. to prove to myself that I am capable of completing my high-school subjects	3.93	0.88	A
18. because when I succeed in my subjects, I feel important	3.95	0.93	A
19. to show myself that I am an intelligent person	3.67	0.91	A
20. because I want to show myself that I can succeed in the subject	4.01	0.88	A
21. because I need to pass this subject and graduate in order to find a high-paying job later on.	3.88	0.97	A
22. in order to have a more prestigious job later on	3.78	0.89	A
23. because I want to have 'the good life' later on	4.11	1	A
24. in order to have a better salary later on	3.86	0.95	A
25. I'm not sure, but I really feel that it was worth my time	2.75	1.19	MA
26. I just think I should continue attending TLE classes	2.95	1.16	MA
27. I can't see why I go to school; I just feel like I need to attend	2.77	1.12	MA
28. I don't know; I just feel like I want to attend TLE classes	2.67	1.18	MA
Overall Mean	**3.67**	**0.39**	**A**

Legend: 4.21 -5.00 Strongly agree (SA); 3.41 - 4.20 Agree (A); 2.61 – 3.40 Moderately agree (MA); 1.81 – 2.60 Disagree (D); 1.00 – 1.80 Strongly Disagree (SD)

Table 1 provides the respondents' perceived academic motivation in TLE exploratory courses including bread and pastry production, dressmaking/ tailoring, mechanical drafting and beauty care (nail care) services. It was found in the study that the respondents express agreement on most of the statement indicating academic motivation towards learning TLE particularly expressing their desire to attend TLE classes because of the perceived importance it may contribute to their future career and having a "good" life in the future. This was evident in indicators with

highest agreement including statement "*I attend TLE classes because I think that a learning from TLE class will help me better prepare for the career I will choose in the future"* (mean=4.13, SD=0.90) and "*I attend TLE classes because I want to have a good life later on"* (mean=4.11, SD=1.00).

The table further reveals that students' academic motivation to attend classes and learn TLE concepts were also derived from the pleasure they experience when they are able to learn to do new things and acquire new skills. This may be supported by the nature of exploratory courses contents, which introduce the students to different technical skills ranging from baking, dressmaking and tailoring, drafting and nail care servicing. These skills in turn are by nature relating to having technical skills they can use to earn a living either by producing goods (bread, pastry, food products), providing services (nail care, draftsmanship services, dressmaking) or by putting up a business that offers these services such as a parlor, a bakery or a garment shop. This thought is supported by Alsong and Alsong (2019) who stated that TLE subject could give the students opportunity to earn a living as they can apply their acquired skills and knowledge in providing services where they can earn, or by landing a job relevant to their skills specialization or even putting up a small business. They can venture into commercial cooking, apply as sewer in a factory or engage in a micro business.

Similar to the pointed statement with highest mean perception, Aguilana (2019) noted that TLE being a skill-oriented subject is significant in educating and preparing students for aspects of family living including those that will provide students with academic and vocational training necessary in achieving success in one's future career. Likewise, it was pointed out that students are generally motivated to study TLE since the trainings offered in subject could be a possible source of livelihood and entrepreneurship opportunities. As Tan (2021) described, TLE prepares high school students by providing them the knowledge and skills useful in becoming a productive citizen and one who can economically support himself or his family by earning a living early should the possibility of tertiary education becomes unavailable.

Overall, the study establishes that respondent-students in exploratory TLE have high level of academic motivation towards TLE exploratory mini-courses since they agree on most of the statements pertaining to willingness to attend TLE classes having an overall mean of 3.67 (SD=0.39). This study therefore shows that respondents perceived the exploratory course to be instrumental in landing relevant job in the future thus making them academically motivated to attend classes and acquire the knowledge and skills offered in the mini-courses.

Table 2
Respondents' self-efficacy in acquiring technical skills as to Bread and Pastry Production

Indicator	M	SD	VI
I believe that I can successfully…			
1. prepare tools and equipment for specific baking purposes.	3.91	0.80	A
2. familiarize oneself with the table of weights and measures in baking.	3.75	0.84	A
3. apply basic mathematical operations in calculating weights and measures.	3.64	0.89	A
4. measure dry and liquid ingredients accurately.	3.82	0.89	A
5. check condition of tools and equipment.	3.81	0.93	A
6. perform basic preventive measure.	3.74	0.81	A
7. store tools and equipment properly.	3.77	1.00	A
8. identify and evaluate hazards and risks.	3.43	0.92	A
9. control hazards and risks.	3.42	0.95	A
10. maintain occupational health and safety awareness.	3.97	0.87	A
Overall	**3.73**	**0.58**	**A**

Legend: 4.21 -5.00 Strongly agree (SA); 3.41 - 4.20 Agree (A); 2.61 – 3.40 Moderately agree (MA); 1.81 – 2.60 Disagree (D); 1.00 – 1.80 Strongly Disagree (SD)

Based from Table 2, it is found that students in exploratory TLE who served as respondents have a high level of self-efficacy in demonstrating the technical skills in bread and pastry mini-course. This was shown by the overall agreement of 3.73 (SD=0.58) to the indicators showing their belief that they can successfully acquire specific skills and competencies of the mini-course. Specifically, students have high self-efficacy on successfully preparing tools and equipment in baking, checking the conditions of these tools, measuring both dry and liquid ingredients accurately and maintaining occupational health and safety in baking. Self-efficacy beliefs determine one's feeling, thinking, behavior and even motivation.

Overall, the respondents view their self-efficacy or their ability to successfully demonstrate technical skills or accomplish task that demonstrate these skills, to be positive since they agree on all of the statements indicating the sub-competencies of bread and pastry production. Taking from Bandura's (1994) definition, it can be derived that one's perception of self-efficacy is the belief one has about their ability and capability to do something or produce designated levels of performance.

Table 3

Respondents' self-efficacy in acquiring technical skills as to Dressmaking/Tailoring

Indicator *I believe I can successfully…*	**M**	**SD**	**VI**
1. identify sewing tools and equipment and their uses	3.81	0.94	A
2. identify the types of sewing machine and its parts.	3.56	0.88	A
3. obtain body measurements	3.45	0.91	A
4. perform simple calculations	3.54	1.01	A
5. estimate appropriate quantities	3.43	0.88	A
6. sketch simple project design	3.40	1.12	MA
7. produce simple project	3.36	1.01	MA
8. operate machine and assess its performance	3.06	1.06	MA
9. clean and lubricate machine	3.18	1.02	MA
10. identify and evaluate hazards and risks	3.33	0.96	MA
Overall	**3.41**	**0.65**	**MA**

Legend: 4.21 -5.00 Strongly agree (SA); 3.41 - 4.20 Agree (A); 2.61 – 3.40 Moderately agree (MA); 1.81 – 2.60 Disagree (D); 1.00 – 1.80 Strongly Disagree (SD)

Table 3 presents the respondents' perceived self-efficacy in acquiring technical skills as to dressmaking/tailoring. Based from the results of the study, the respondents have a moderate level of efficacy as shown by the overall agreement of 3.41 (SD=0.65) to the indicators showing the competencies in dressmaking/tailoring. Though most of the respondents perceived their capability to identify sewing tools and equipment and their respective uses, they have a low self-efficacy when it comes to producing simple projects in dressmaking and operating the sewing machines including the assessment of the machine's performance. This may be due to the nature of the exploratory course being more focused on introducing the concepts and establishing understanding of the procedures rather than giving students the opportunity to practice the skills hands-on. Likewise, their moderate self-efficacy may have stemmed from their lack of exposure to the equipment (sewing machine) and opportunity to use and manipulate them since there is only limited equipment available in the classroom. Overall, the respondents could be described as having moderate self-efficacy towards the acquisition of the skills and competencies in exploratory dressmaking/tailoring mini-course.

Table 4
Respondents' self-efficacy in acquiring technical skills as to Mechanical Drafting

Indicator *I believe I can successfully…*	M	SD	VI
1. identify drafting materials and tools/drawing instruments applicable to a specific job.	3.53	1.02	A
2. request, receive and inspect drafting materials and tools	3.44	0.90	A
3. manipulate T-square and Triangle.	3.24	0.97	MA
4. select and use measuring instruments	3.18	0.96	MA
5. clean and store measuring instruments	3.16	0.90	MA
6. convert fraction to decimal and vice versa	3.28	0.95	MA
7. convert English and Metric measurement vice versa	2.99	1.00	MA
8. identify assembly and detailed drawing	3.24	0.94	MA
9. identify hazardous area	3.23	1.00	MA
10. use personal protective clothing and devices	3.56	1.00	A
Overall	**3.28**	**0.69**	**MA**

Legend: 4.21 -5.00 Strongly agree (SA); 3.41 - 4.20 Agree (A); 2.61 – 3.40 Moderately agree (MA); 1.81 – 2.60 Disagree (D); 1.00 – 1.80 Strongly Disagree (SD)

A moderate level of self-efficacy was found among the respondents in terms of acquiring technical skills in mechanical drafting. It could be derived from Table 4 that only three indicators were shown to be perceived by the respondents to have high level of efficacy (agree), "*I believe I can use personal protective clothing and devices"*, "*identify drawing tools/materials needed in particular job and request", "receive and inspect drafting materials and tools".* Notably, respondents have a low self-efficacy in terms of their ability to convert English and Metric measurement and vice versa which had the lowest mean of 2.99 (SD=1.0) interpreted as moderately agree. Furthermore, indicators pertaining to performing basic mensuration and calculation (indicators 4-7) also had low mean agreement on the successful acquisition of the given outcomes, which reflects moderate self-efficacy level. Overall, the respondents can be described as having moderate efficacy in terms of their belief to successfully acquire the outcomes and competencies in mechanical drafting.

In terms of the respondents' perception on their self-efficacy in acquiring technical skills as to beauty care services, the study found a high level of self-efficacy. This was particularly evident in indicators pertaining to the preparation and use of tools and equipment for specific nail care activity. It could be seen from Table 5 that the highest perception of self-efficacy was recorded in statement 1, "*prepare the necessary tools and equipment for the specific nail care*

activity" (mean=4.19, SD=0.89) while the lowest recorded mean was statement 7, "*evaluate hazards and risks"*. Nevertheless, the respondents generally perceived their self-efficacy towards skills acquisition in beauty care services to be high as shown by their agreement on all of the outcomes reflected in the ten indicators of competencies. This therefore shows their belief in their capacity or ability to succeed in the TLE mini-course beauty care (nail care) services.

Table 5

Respondents' self-efficacy in acquiring technical skills as to Beauty Care (Nail Care) Services

Indicator *I believe I can successfully…*	M	SD	VI
1. prepare the necessary tools and equipment for the specific nail care activity.	4.19	0.89	A
2. use the nail care tools and equipment.	4.11	0.92	A
3. perform sterilization of nail care tools.	3.91	0.95	A
4. perform basic preventive and corrective maintenance.	3.72	1.02	A
5. store nail care tools and equipment.	3.86	0.87	A
6. identify hazards and risks.	3.52	0.92	A
7. evaluate hazards and risks.	3.41	1.03	A
8. control hazard and risks.	3.50	0.99	A
9. identify nail structure, shapes and nail diseases/disorders.	3.65	1.03	A
10. create basic nail designs.	3.79	1.07	A
Overall	**3.77**	**0.73**	**A**

Legend: 4.21 -5.00 Strongly agree (SA); 3.41 - 4.20 Agree (A); 2.61 – 3.40 Moderately agree (MA); 1.81 – 2.60 Disagree (D); 1.00 – 1.80 Strongly Disagree (SD)

Table 6 presents the distribution of the respondents in terms of academic performance in TLE exploratory courses. As to the performance in the bread and pastry mini-course, the study found that most of the respondents (39%) were at the Proficient (P) level with grades ranging from 85-89, followed by 29% at the Advanced (A) level with grades ranging from 90-100. In terms of beauty care services (nail care) mini-course, most of the respondents (31%) were at the Proficient (P) level followed by 29% at the Approaching Proficiency (AP) level. There are also a high number of students reaching the Advanced (A) level with 21%.

Table 6

Respondents' Academic Performance in TLE Exploratory Courses

Proficiency Level	BPP	%	DT	%	MD	%	BCS	%
Developing (79-75)	10	5	62	31	44	22	38	19
Approaching Proficiency (84-80)	54	27	76	38	82	41	58	29
Proficient (89-85)	78	39	30	15	54	27	62	31
Advanced (100-90)	58	29	32	16	20	10	42	21

Legend: BPP-Bread and Pastry Production; DT-Dressmaking/Tailoring; MD-Mechanical Drafting; BCS-Beauty Care Services

On the other hand, the respondents were generally at the Approaching Proficiency level (AP) in both dressmaking/ tailoring and mechanical drafting mini-courses. Specifically, majority of the respondents in dressmaking and tailoring have grades ranging from 80-84 for Approaching Proficiency (AP) level and 75-79 for Developing (D) level. Only 38% reached Approaching Proficiency (AP) while 31% were only at the Developing (D) level. Only 16% of the respondents were able to reach the Advanced (A) level in this mini-course.

Mechanical drafting mini-course also registered a relatively low academic performance as revealed by the gathered data. Majority of the respondents (41%) were at the Approaching Proficiency (AP) level with grades ranging from 80 to 84. Only 10% of the respondents reached the advanced level or had rating of 90 or higher while also a large portion, 22% were still at the Developing (D) level.

Though academic performance is commonly measured by examinations or continuous assessment, there is no general agreement on how it is best tested or which aspects are the most important as it depends on the nature of the subject areas usually dictated by the curriculum being enforced. Similarly, assessment of learning depends on the purpose of the assessor so there is no permanent or exact tool to be used and it varies on the usability and appropriateness of its goals and objectives (Alsong & Alsong, 2019). Nevertheless, it is a general belief that academic performance is one of the top priorities for schools being the best indicator of the extent by which a student, a teacher, or an educational institution has achieved the set learning outcomes (Firouzeh, 2013). In the case of TLE as a subject area, academic performance is generally associated to acquiring certain level of knowledge of and competence in demonstrating technical skills. The present TLE subject of the K to 12 Curriculum is clear in its aim of equipping students with the knowledge and skills requisite to developing life-long learners who are prepared for tertiary education, mid-level skills development, employers and entrepreneurship and an individual who is capable of improving one’s quality of life (DepEd 2012). In this study, the respondents are characterized to be in the process of acquiring mastery based from the data revealing that most are in the Approaching Proficiency and Proficient level in terms of achieving the learning outcomes for TLE.

Table 7

Test of relationship between respondents perceived academic motivation and academic performance

Mini-Course	r-value	p-value	Remarks
Bread & Pastry Production	.231*	.021	Significant
Dressmaking/ Tailoring	.182	.070	Not significant
Mechanical Drafting	.065	.519	Not significant
Beauty Care Services	.298**	.003	Significant

*Legend: *significant p≤0.05, ** significant p≤0.01*

Presented in Table 7 is the test of relationship between respondents' perceived level of academic motivation and their academic performance in TLE exploratory courses bread and pastry production, dressmaking/ tailoring, mechanical drafting and beauty care (nail care) services. The results revealed that there is a significant positive relationship between students' academic motivation and their performance in both bread and pastry and production and beauty care services mini-courses (p<.05), .021 and .003, respectively. On the other hand, no significant relationship was found between students' motivation in dressmaking/tailoring and mechanical drafting and their performance in corresponding TLE exploratory course, p values 0.070 and 0.519, respectively.

This indicates that as students become academically motivated, there will likely be a raise in academic performance in TLE exploratory course. This is specifically indicative of the results gathered in the case of bread and pastry production and beauty care services. This study shows that the respondents were characterized as having a high level of academic motivation towards studying TLE. Taking on the view of Steinmayr, et al. (2019) that motivation could contribute greatly to students working towards better performance in the subject being taken as it renews and directs student behavior, it implies that academic motivation demonstrated by the students plays an important role in forecasting their future success or failure. Since students with low level of motivation are not propelled to succeed, they are less likely to engage in the learning task especially when confronted with difficulties. Motivation affects students' learning, perseverance, and scholarly achievement (Zanbuk, 2021). It generally plays a crucial role in determining academic performance among secondary school students (Aniruddha & Pranab, 2019). It is linked to how students feel towards the work they do whether on completing seatwork, working on assignments or participation in class demonstrations. Unless students attain a certain level of motivation, teaching and learning success might be difficult to attain.

Academic motivation has been described in the literature to be an important factor and requirements for learning (Uyulgan and Akkuzu, 2014). This gives the students the strength and

direction to their behavior, thus giving them the energy to perform activities or pursue desired goals. It is therefore important that both the teachers and the students should have a clear understanding of the prevailing level of motivation in the learning environment.

This may be the part where teachers can intervene. By incorporating into TLE lessons the importance of learning the TLE skills and competencies and how these can be used in the future jobs, academic motivation may be enhanced thereby enhancing academic performance. Furthermore, offering challenging activities that requires learning new skills may also produce satisfaction from students derived from their accomplishment may also help them, as they will appreciate more the importance of attending TLE classes. Generally, it may imply that by enhancing students' academic motivation, they may be helped to perform better in the subject area.

Table 8
Test of relationship between respondents' self-efficacy in acquiring technical skills and academic performance

Exploratory Course	r-value	p-value	Remarks
Bread & Pastry Production	.780**	.000	Significant
Dressmaking/ Tailoring	.645**	.000	Significant
Mechanical Drafting	.561**	.000	Significant
Beauty Care Services	.711**	.000	Significant

*Legend: *significant p≤0.05, ** significant p≤0.01*

Self-efficacy in acquiring technical skills and the academic performance of students in TLE exploratory courses were found to be significantly related. Self-efficacy, in this study being the belief in the ability to succeed in acquiring technical skills specific for each mini-course, were all positively related to students' academic performance as shown in Table 8. This means that the higher the level of self-efficacy of the students, the greater the chance they may succeed in the TLE mini-courses. This association is possible as self-efficacy is also described as the conviction to one's ability to realize an objective or achieve a result. It can therefore influence the amount of effort one exerts in doing a particular task or learning activity. Self-efficacy being a judgement of one's capability, students who sees himself or herself capable of demonstrating a skill will likely to persist in performing the task with competence despite the difficulties therefore leading to a greater chance of school success.

The present findings are also supported by various studies (Baanu, Oyelekan, & Olorundare, 2016; Honicke & Broadbent, 2016) which established that a significant relationship exists between students' self-efficacy and academic performance. Furthermore, academic self-efficacy is also considered as the best predictor of performance among high school students

(Firouzeh, 2013). From this, the teachers may therefore consider strengthening affective competency targets in the teaching of TLE contents since this domain plays a crucial part in the students' academic success and school performance in general. In a highly skill-based and performance-based subject such as TLE, persistence among students plays a crucial role in achieving success, which could be attained with one's self-efficacy being high. This is also parallel to the claims of Khalique and Singh (2019) saying that for a student to be resilient and persistent in the face of difficulties encountered in the learning process, one should have a high level of self-efficacy for a given task. Consequently, students who demonstrate low level of self-efficacy may tend to disengage with the learning process or avoid the situation resulting to a lower level of performance.

Based from the aforementioned discussion, it could be derived that self-efficacious beliefs in one's ability to demonstrate technical skills should be equally given priority in the teaching of TLE. Along with other factors of learning, self-efficacy should be imparted and habituated to students through the employment of varied teaching techniques and appropriate approaches to learning.

5. Conclusion

In general, the present study showed that the students in the TLE exploratory courses generally did not reach the advanced level of proficiency in their academic performance. Most of them are at the proficient (P) level in terms of their academic performance in bread and pastry production and beauty care services while at the approaching proficiency (AP) in terms of mini-courses dressmaking/tailoring and mechanical drafting. Affective component of learning, academic motivation, positively relates to academic performance. Likewise, a significant positive relationship exists between student's self-efficacy on acquiring technical skills and their academic performance in the four mini courses in TLE exploratory courses. According to this point, an improvement in students' affective domains, academic motivation and self-efficacy will also result to improvement in students' academic achievement.

Although the findings of the study showed a significant relationship between affective components, self-efficacy and academic motivation, and academic performance of students in the four TLE mini-courses, the results may be further supported with longitudinal studies, which may allow for more in-depth understanding. Further, since academic motivation and self-efficacy were found to be significantly related to academic performance in TLE, test of these variables as

predictors, as well as their interplay with other affective components of learning such as interests, values and attitudes, may as well be explored.

Based from the findings of the study, it may as well be recommended that future researches can be done investigating other factors that may help students raise their proficiency level in the mini-courses in TLE especially in dressmaking/tailoring and mechanical drafting since these mini-courses registered a low level of academic performance. Since this study found that the respondents from the locale only had moderate efficacy on acquiring the outcomes in mechanical drafting, further investigation may be done specifically on this mini-course where intervention could be derived.

Finally, having shown that there is a significant positive relationship between both the respondents' perceived academic motivation and self-efficacy in their acquisition of technical skills in TLE and their academic performance, a plan of action on strengthening the integration of affective targets in teaching TLE mini-courses such as bread and pastry production, dressmaking/ tailoring, mechanical drafting and beauty care (nail care) services can also be considered.

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Online Education as an Active Learning Environment in the New Normal

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Abstract

This study examined the students' perception on the collaborative-constructivist learning experience in the online education of the Laguna State Polytechnic University (LSPU) during the 'new normal' learning modality due to COVID-19 pandemic. The study utilized the descriptive-survey research using the Online Learning Environment Survey (OLLES) questionnaire comprising the seven (7) components namely: student collaboration, computer competence, active learning, teacher support, information design and appeal, material environment, and reflective thinking and the Community of Inquiry (COI) survey on the online learning experiences on social, teaching, and cognitive presence. The data were gathered from the 106 fourth year students of the College of Teacher Education (CTE) through Google Form. The findings proved that the respondents have a favorable perception on their online learning environment in terms of collaboration, computer competence, active learning, teacher support, information design and appeal, material environment, and reflective thinking. The outcomes exhibited a positive perception of learners towards social presence, teaching presence, and cognitive presence in their learning experiences. The findings of the current investigation also pointed that there is a significant relationship between learners' online learning environment and their learning experiences in the new normal education. Through this, educators will be able to deliver a collaborative-constructivist learning experience among learners.

Keywords: *online education, active learning environment, collaborative-constructivist learning experience, community of inquiry, new normal*

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1. Introduction

The CoViD-19 pandemic reconstructed education across the world. Educators are compelled to modify their teaching instruction from face-to-face education to online distance learning. However, not all educational institutions are proficient in conducting online learning well (Louis-Jean, & Cenat, 2020). Accordingly, it has brought unprecedented challenges to schools and learners in the Philippines. As no one can predict when the pandemic will end, infections still escalate even though countries around the world are implementing plans and procedures to contain the virus. In the educational milieu, Tria (2020) suggests that this new normal be taken into account in the planning and implementation of the "new normal educational policy" to support and maintain quality education amidst community quarantine.

The issues, problems, and trends that are emerging in the present and will emerge in the future should be addressed using the lens of the new educational norm. Opportunities and challenges should be understood and approached as a crucial matter. It is challenging to a great extent, to impart and administer quality education amidst exceptional times. It is also a challenge to be equipped when another predicament happens in the future (Tria, 2020). Thus, the Commission on Higher Education (CHED) advised public and private higher education institutions (HEIs) to employ available e-learning, distance learning, and other alternative modes of delivery (CHED, 2020). Online teaching and learning materials are encouraged to be utilized including but not limited to Google Classroom, Zoom, YouTube, Ted Talk, E-mail, and social media.

At the height of the pandemic, some educational institutions were equipped to immediately shift to online distance learning. Hence, these academies were less disturbed by the pandemic. On the other hand, other educational institutions were caught unprepared due to lack of essential e-learning facilities. As the situation forced every learning institution to online learning, institutions also advanced the competencies to meet the demands both on the facilities and teaching and learning. While success of online learning depends on effective preparation and appropriate resources, educational technologies and digital equipment update is a must (Louis-Jean & Cenat, 2020). With the pressures of online learning, educational levels and curricula areas employ networked computers, software applications, and computer simulations in learning activities. For example, web-based and online software applications such as browsers, search engines, communication tools, and databases are popularized as teachers utilize them for education

(Clayton, 2007). Described as borderless teaching and learning process, online education needs to be just as efficient as face-to-face education. For this, Callo and Yazon (2020) propose that it gives more weight the learning experience, content quality, and learner engagement.

Diverse e-learning resources with numerous asynchronous and synchronous communication devices provide a meaningful, more interactive online learning environment enabling varieties of learning styles to be better supported (Bates, 2000; Haynes, 2002; Ladyshewsky, 2004b; Mann, 2000). The transition from a conventional face-to-face learning environment to an online learning environment devised, executed, analyzed, and improved new ways of teaching and learning. There has been a paradigm shift in the learning environment for both educators and learners. (Chang & Fisher, 2001; Further Education Resources for Learning, 2007; Kent, O'Neil, & Page, 2006; National Science Board, 2006). However, there is a possibility that students who do well in face-to-face classes will not succeed in online classes (Wood, 2005). It is well-experimented that an online learning environment can significantly affect the learning experiences of learners based on their attitudes and opinions (Clayton, 2007).

The LSPU adopted online learning or flexible learning for the safety of the educators and learners during the COVID-19 pandemic. It made the teaching-learning process feasible even there are no face-to-face interactions. This model allowed the teaching instruction be delivered using synchronous and asynchronous classes. In lieu of the transitions and challenges brought about by the pandemic, the University also provided extended assistance and further means of support to better serve its faculty and students. As such, this study aimed to assess the learning experiences of the students in the crisis-driven online learning environment. Specifically, it evaluated the student collaboration, computer competence, active learning, teacher support, information design and appeal, material environment, and reflective thinking. It also surveyed the online learning experiences on social, teaching, and cognitive presence.

2. Literature review

2.1. Active Online Learning Environment

Online learning is simply learning that occurs over the internet. To Radford (1997), it pertains to materials obtainable through a computer using networks. An online learning environment is described by Chang and Fisher (1999) as a platform consisting of digitally created content resources and communication

mechanisms to enable interplay. It is a formal instructional method in which the student and the teacher are not together and the internet is adopted to accommodate a connecting link among them (McKnight & Edwards, 2007). In this environment, there is interaction of the students with the content, others learners, and their teacher with the use of the internet (Siragusa, 2005) as such there are internet-enabled instructional tools and web-based technologies to facilitate education (Dabbagh & Bannan-Ritland, 2005). It may also be called e-learning, e-training, or web-based instruction. Clearly, there are different manners educationalists, at every level, use the web in delivering education (Clayton, 2007).

In designing an active online learning environment, there are many procedures, frameworks, and theories to consider. These serve as blueprints for educators in investigating, devising, executing, assessing, and enhancing instructional processes. The focus of these models may include but is not limited to student engagement, persistence, and performance. In creating an online learning environment favorable to a significant level of engagement, educators should utilize an instructional design framework and a set of strategies that highlight cooperation, collaboration, facilitation, and feedback strategies in online learning contexts (Czerkawski & Lyman, 2016). Educators must rethink their purposes, how they will assist students, and the role of students being self-directed learners, engaged citizens, and independent social agents (Rapanta et al., 2021). The crisis-driven transition of the learning environment can be more effective, active, resilient, and significant through a harmonious synthesis of material and digital devices and designs.

In designing effective online learning environment, educators look into social, cognitive and teaching presence.

Social Presence. Social presence is essential in supporting an extensive, welcoming, and active learning environment (Cooper et al., 2020). Fostering social presence by promoting intercommunication between learners and between learners and the teacher will make the delivery of curricula in higher education effective. An online learning environment where learners can convey their feelings and communicate openly will make learners feel secure. To promote active online learning in terms of social presence, students should be allowed to post video replies or work on online applications like screen casting (Dunlap & Lowenthal, 2018; Seckman, 2018).

Cognitive Presence. Cognitive presence assists learners in exercising critical thinking and intuition (Cooper et al., 2020). Given proper importance, cognitive presence can make students collaborate and engage in an essential conversation that offers higher-order learning. Eminent to

cognitive presence was the necessity to devise curricula that include diverse student groups with different learning styles, adjustability, and cultural backgrounds. To support active online learning in terms of cognitive presence, learners can make and post materials, quest out and post sources (Dunlap & Lowenthal, 2018).

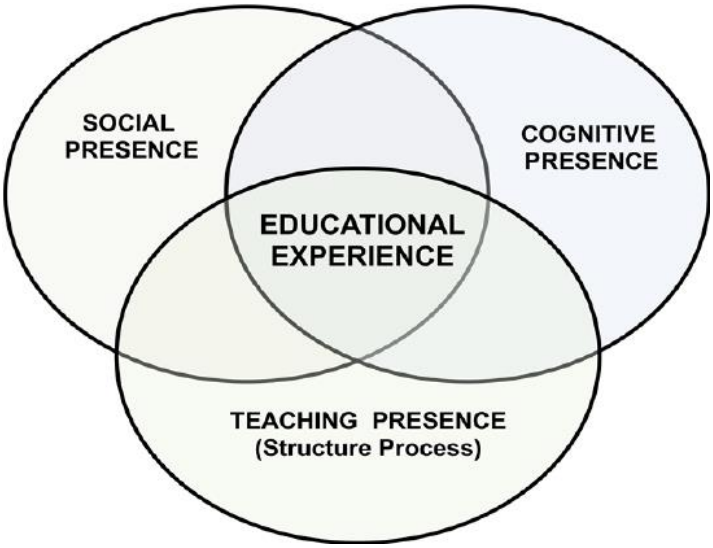
Teaching Presence. The key to a successful teaching and learning process is greatly dependent on the teacher. In an online learning environment, there are numerous issues that teachers need to attend to. In terms of facilitation of discussion, teachers should guarantee that the students know other people's views who have a different cultural background. All students should be allowed to contribute to the learning process. It is the role of the teacher to shape an online learning environment that is safe and protected. Thus, in setting the mood, teachers need to evaluate the reality of the complicated and stressful environments students will encounter in the workplace with the secured and protected learning environment (Cooper et al., 2020). To encourage active online learning in terms of teaching presence, the teacher should create instances in which the students will be solving their problems (Dunlap & Lowenthal, 2018).

2.2. Theoretical Framework

This study used Garrison's CoI (Community of Inquiry) model as its theoretical foundation. The CoI framework for e-learning environments created by Garrison, Anderson & Archer (2000) presents a collaborative-constructivist position in analyzing the properties of an online learning experience. It provides a comprehensive theoretical model that can illuminate both online learning research and online teaching practice. It asserts that effective online learning happens by creating a community that promotes notable inquiry and profound learning (Rovai, 2002; Thompson & MacDonald, 2005; Shea, 2006). As such is not a minor challenge in the online learning environment.

Figure 2.

The Community of Inquiry Framework



The CoI model comprises cognitive presence, social presence, and teaching presence as shown below in Figure 1. At the core of the overlap of these components was a profound and meaningful educational experience. The objective of this model is to determine, explain, and assess the components of a collaborative and valuable learning experience (Garrison, Anderson, & Archer, 2010). As CoI contends, learning experience is defined by how cognitive presence, social presence, and teaching presence extend over and work adjacent to each other. This model supports online learning as active learning environments reliant on the collaboration of educators and learners. The "presence" is a social aspect and exhibits itself through interplays among educators and learners. This model has become well-known for online learning that is highly interactive among educators and learners using videoconferencing, wikis, blogs, and discussion boards (Picciano, 2017). For a better comprehension of these interactions, it is crucial to have a close examination of each of the presences that the model is composed of. Significant effort has been exerted on examining each of the three presences within the Col framework. These three elements have been confirmed to be relatively well-built. Still, there have been refinements. After publishing articles about the framework, the center and vocabulary changed to a more comprehensive perspective of online learning (Garrison, Anderson, & Archer, 2010).

3. Methodology

3.1. Research Design

This study employed quantitative research as it summarizes results numerically while descriptive survey research was adopted as the primary approach in examining the data. Descriptive-survey research as described by Lodico, et al. (2006), intends to report behaviors and collate people's discernment, beliefs, perspectives, and views regarding a prevailing issue in education. These reports are organized by stating the number of persons in each response.

A survey or questionnaire is the principal instrument utilized to collect information in descriptive-survey research. Specifically, a one-shot survey design was adopted. In using this approach, questionnaires are sent to respondents at one particular period of time to collect their perceptions about a present problem or issue. Common responses to the questionnaire are quantitative and were collated quantitatively. The sample is chosen from the population to enable its conclusions to infer broader applicability (Lodico, et al., 2006). Analyzing the learning environment with the treatment of quantitative perceptual instruments is more beneficial than other types of evaluation (Fraser & Fisher, 1994; Fraser & Walberg, 1995). Some of its advantages include, but are not limited to being more cost-effective, experiential, has combined observations, determinants of student behaviors, and consider more differences in student learning.

3.2. Participants and Data Gathering

The study was conducted at Laguna State Polytechnic University-San Pablo City Campus (LSPU-SPCC). The questionnaire was administered among the fourth-year students enlisted under the College of Teacher Education during the 1st semester of Academic Year 2021 – 2022 with the courses Bachelor of Science in Secondary Education (BSED), Bachelor of Elementary Education (BEED), Bachelor of Physical Education (BPED), Bachelor of Technology and Livelihood Education (BTLED, and Bachelor of Technical Vocational Teacher Education (BTVTED). These students are taking their field study in the 1st semester and internship in the 2nd semester.

The questionnaire was encoded to Google forms and e-mailed to respondents' institutional email accounts. All fourth-year students in the College of Teacher Education were targeted as respondents but due to poor internet connections in some locations, only 106 students or 39.7% of

the population were retrieved. The responses were downloaded as CSV file and converted to Microsoft Excel file for further statistical analysis.

The BSED has the most number of respondents with 125 students followed by 50 BPED, 49 BTVTED, 40 BEED, and 11 BTLED students.

3.3. Research Instrument

The questionnaire is the primary instrument used to obtain data in a one-shot survey design. The survey was administered within a month from September to October 2021. The questionnaire is divided into three sections. The first section collects the demographic information of the respondents including age, sex, year level, course, and latest general weighted average (GWA). The second section is a modified 35-item Online Learning Environment Survey (OLLES) that gathers the perception of the respondents on their online learning environment. The last section is the Community of Inquiry (CoI) survey that accumulates the perception of the learners regarding their educational experiences by exploring the interplay of the three presences.

At the end of the 20th century and the beginning of the 21st century, there has been a concentration on creating instruments that measure the learning environments in online education (Clayton, 2007). The OLLES captures the learners' perception of the e-learning environment. The modified 35-item OLLES comprise the seven (7) scales recognized as Student Collaboration (SC), Computer Competence (CC) Active Learning (AL), Teacher Support (TS), Information Design and Appeal (ID), Material Environment (ME), and Reflective Thinking (RT). Each scales contain five (5) items in the instrument. These scales are described as follows:

1. **Computer Competence (CC).** The extent to which the learner feels satisfied and convenient in operating computers in the e-learning environment. On this scale, the perception of learners on their ability to work on their computers as a means to communicate with others and obtain information is investigated.
2. **Material Environment (ME).** The extent to which the computer hardware and software are adaptable and easily operated.
3. **Student Collaboration (SC).** The extent to which learners operate unitedly, know, help, support, and are cooperative with each other. On this scale, the perception of learners on their opportunities to cooperate, exchange information, and engage in collaboration is examined.

4. **Teacher Support (TS).** The extent to which the teacher facilitates learners in their learning and presents delicate, continuing, and reassuring support. On this scale, the perception of the learners on the guidance, confidence, and assistance offered by the teacher is reviewed.
5. **Active Learning (AL).** The extent to which the computer exercises assist learners in their learning and provide continuing and appropriate feedback.
6. **Information Design and Appeal (ID).** The extent to which course materials are clear, engaging and presentable to the student.
7. **Reflective Thinking (RT).** The extent to which reflective activities are supported and how students appreciated learning and engaging in the e-learning environment.

The internal consistency of OLLES, as affirmed by Cronbach Alpha coefficients in the validation conducted by Clayton (2007), all above 0.75, is considered acceptable. He asserted that the instrument was valid and reliable to explore techniques that enhance the online learning environment.

The last section of the questionnaire is the CoI Survey. It is designed and validated by Arbaugh, et al. (2008). The CoI framework observes the online learning experience because of the interrelations of social, teaching, and cognitive presence. The three presences are described as follows:

1. **Social presence.** The extent to which learners feel socially and emotionally associated with others in an e-learning environment.
2. **Teaching presence.** The plan, implementation, and control of cognitive and social methods for the achievement of individually meaningful and educationally valuable learning outcomes.
3. **Cognitive presence.** The degree to which learners can create and verify meaning through supported reflection and discussion.

The CoI survey presents a reliable tool for the occurrence of a community of inquiry that measures the social, teaching, and cognitive presence in online learning environments. It is an instrument consisting of consensual and statistically validated items that operationalize the notions in the CoI model. This may be adopted for the continued clarification of ideas in the framework. It may also be utilized for useful applications or to assess an online community of inquiry once implemented (Arbaugh, et al., 2008).

4. Findings and Discussion

Table 1

Students' Perception on Online Education In Terms Of Collaboration

	Indicator	Mean	SD	Interpretation
1	I communicate regularly with other students in this course.	3.84	1.08	Often
2	I often ask other students for help in activities we are doing.	3.51	1.08	Often
3	Other students provide feedback on activities I have done.	3.27	1.07	Sometimes
4	I share resources and information with other students.	3.92	1.02	Often
5	Other students share resources and information with me.	3.70	1.05	Often
	Over-all mean	**3.65**	**1.06**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

It is shown in Table 1 that indicator 4 has the highest mean (M=3.92, SD=1.02), interpreted as "often". Indicator 3 has the lowest mean (M=3.27, SD=1.07), interpreted as "sometimes". Generally, the respondents perceived collaboration in an online learning environment as "often" (M=3.65, SD=1.06).

Based from the results, learners often use personal and class communication devices in their online courses. Learners converse favorably with other learners in the course and acknowledge other learners who constantly communicate with them. This communication happens to dispense information and resources. Learners ask their classmates for help in achieving particular tasks. They are moderately willing to give feedback to other students regarding activities undertaken. The results also indicate that learners work unitedly to help and support each other and are often cooperative. They recognized the chances to cooperate, exchange information, and engage in collaboration. Accordingly, Haythornthwaite (2006) expanded the extent of collaboration from learning about content to a broader context of confidence in groups, the growth of an online knowledge community, and the elevation of collaborative practices. Since collaboration can intend many things, educators are prompted to examine the kind of collaboration they are designing and plan accordingly, considering the facilities and difficulties of the online learning environment.

Table 2

Students' Perception on Online Education In Terms Of Computer Competence

	Indicator	Mean	SD	Interpretation
1	I am confident and competent using a computer.	3.77	.939	Often
2	I am confident in using the World Wide Web to search for information.	3.91	.879	Often
3	I am able to reconnect to the network if anything goes wrong.	3.86	.930	Often
4	If necessary, I can select and print documents from the Internet.	3.71	1.12	Often
5	If necessary, I can electronically store information on my computer or disk.	3.82	1.07	Often
	Over-all mean	**3.81**	**0.987**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

Table 2 reflects that indicator 2 has the highest mean (M=3.91, SD=.879), which is interpreted as "often." Indicator 4 has the lowest mean (M=3.71, SD=1.12) equivalent to "often". Overall, the respondents perceived computer competence in an online learning environment as "often" (M=3.81, SD=0.987).

The result shows that learners perceived they were technologically capable of engaging sufficiently in the online learning environment. They were positive and skilled in using computers, and in searching, recovering, saving, and managing information from the web. It is evident from the result that learners utilize computers to communicate with others and to obtain information. They feel satisfied and appreciate the use of computers in the online learning environment. Learners perceived they can operate their computers conveniently in the e-learning environment.

The study of Meiselwitz and Trajkovski (2006) noted that expertise and skills similar to simple electronic communication and basic internet knowledge are adequate to improve a user's view of higher system usability and higher learning outcomes. Similarly, students do not need advanced computer competence or knowledge about web applications to increase regard of high system usability or high learning outcomes.

Table 3

Students' Perception on Online Education In Terms Of Active Learning

	Indicator	Mean	SD	Interpretation
1	The feedback I receive from activities / quizzes is meaningful.	4.10	1.05	Often
2	The feedback from activities / quizzes helps me to locate where I am having difficulties.	4.11	1.04	Often
3	I am motivated by the responses I get from the activities / quizzes included in this course.	3.99	1.05	Often
4	The activities / quizzes provided in the course enhance my learning.	4.12	1.04	Often
5	The responses to the activities help me understand where I am having difficulty.	4.08	1.01	Often
	Over-all mean	**4.08**	**1.03**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

It is exhibited in Table 3 that indicator 4 has the highest mean (M=4.12, SD=1.04) while indicator 3 has the lowest mean (M=3.99, SD=1.05) which are both interpreted as "often". The general perception of the respondents on the active learning in an online learning environment was "often" (M=4.08, SD=1.03).

The result implies that learners acknowledge the significance of feedback formed in an online learning environment. Feedbacks prompted them to ponder on learning activities and increase their comprehension of the materials presented. It is reflected in the result that the online learning environment supports learners in education and renders proper feedback. Accordingly, Cummings, et al. (2017) suggested that learners must be involved in active learning opportunities to make them feel associated with the class and not just inactive observers. Active learning requires educators to be more student-centered in the methods of teaching and learning that they employ. More than ever, both in K-12 and higher education, active learning strategies are appropriated to equip digital-age students.

Table 4

Students' Perception on Online Education In Terms Of Teacher Support

	Indicator	Mean	SD	Interpretation
1	The teacher encourages my participation.	3.93	.979	Often
2	The teacher responds promptly to my queries.	3.92	.947	Often
3	The feedback I receive from my teacher helps me identify the things I do not understand.	4.11	.929	Often
4	The teacher addresses group queries promptly	3.99	.845	Often
5	The teacher participates regularly in group discussions.	4.11	.876	Often
	Over-all mean	**4.01**	**0.92**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

It is displayed in Table 4 that indicator 3 and 5 has the highest mean (M=4.11, SD=.929) and (M=4.11, SD=.876) respectively as it is interpreted as “often”. Indicator 2 has the lowest mean (M=3.92, SD=.947) as it is interpreted as "often". Collectively, the respondents perceived teacher support in an online learning environment as “often” (M=4.01, SD=0.92).

The result implies that learners are satisfied with teacher communication in the course. They feel that the teacher actively supports group and individual participation and gives adequate guidance in the conduct of the course. Educators provide proper feedback to learners and are usually active participants and co-learners. It can be asserted based on the result that the teacher helps, befriends, trusts, and is interested in the students. The teacher facilitates students in their learning and renders responsive, continuous, and reassuring support. Learners appreciate the guidance, confidence, and support offered by the teacher.

McPherson and Nunes (2004) discussed the significance of online teachers in the achievement of online learning. Online educators perform a vital role in e-learning since they are facilitators who are mainly in charge of the instruction and learners' support. They concluded that educators must possess a relevant set of skills and attributes aside from mastery of the subject matter.

It is summarized in Table 5 that indicator 4 has the highest mean (M=4.17, SD=.867) as it is interpreted as “often”. Indicator 2 has the lowest mean (M=4.02, SD=.905) as it is interpreted as "often". Overall, the respondents perceived information design and appeal in an online learning environment as “often” (M=4.07, SD=0.89).

Table 5

Students’ Perception on Online Education In Terms Of Information Design and Appeal

	Indicator	Mean	SD	Interpretation
1	The choice of colours and style used in the text assisted my being able to read clearly.	4.03	.889	Often
2	The backgrounds used in tables and pages enhance the look of the material.	4.02	.905	Often
3	The material shows originality and creativity in the layout.	4.05	.888	Often
4	I find the graphics (photos, images and graphs) used are appropriate to the text and helps me understand.	4.17	.867	Often
5	I find the graphics (photos, images and graphs) used are well designed and visually appealing.	4.08	.912	Often
	Over-all mean	**4.07**	**0.89**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

The results reflected that learners considered the digital material displayed in the course was visually desirable. The color, style, and font for text and backgrounds assisted students in reading the material as it reduced screen glare and eye strain. The graphics applied in the course were recognized and helped students' comprehension. The result affirmed that the class materials used in their online learning are enjoyable and visually captivating. It designates that course materials are comprehensive, engaging, and presentable to the learners.

Clayton (2007) asserted that, in preparing digital materials, teachers should develop attractive materials for ease of study and grasp. These materials will involve learners, deepen their knowledge, and increase their fulfillment and accomplishment.

Table 6

Students' Perception on Online Education In Terms Of Material Environment

	Indicator	Mean	SD	Interpretation
1	The instructions provided to use the tools within the site are clear and precise.	3.94	.944	Often
2	The software I use is suitable for participating fully in the course.	4.01	.990	Often
3	I am able to install the appropriate software needed to participate in this course with ease.	3.87	.906	Often
4	All software applications needed to participate in this course are provided.	3.94	1.01	Often
5	There is little delay in opening and using the software applications used in this course.	3.67	.953	Often
	Over-all mean	**3.89**	**0.96**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

It is indicated in Table 6 that indicator 2 has the highest mean (M=4.01, SD=.990) as it is interpreted as "often". Indicator 5 has the lowest mean (M=3.67, SD=.953) as it is interpreted as "often". Overall, the respondents perceived the material environment in an online learning environment as "often" (M=3.89, SD=0.96).

The result displays that learners considered they were in charge of their online learning environment. They obtained relevant support files to use software applications needed in the course. Learners have downloaded the proper software applications and installed them with minimal problems. The software applications did not create unnecessary loading on their computer processor. Learners have completed online learning activities with limited technical difficulties. It

can be inferred from the result that the computer hardware and software are flexible and easily commanded. It reflects the adequacy and user-friendliness of the computer hardware and software.

For Clayton (2007), teachers need to create a course with low computer usage applications whenever possible. It will guarantee that learners will not be discouraged by low response times from their computers.

Table 7

Students' Perception on Online Education In Terms Of Reflective Thinking

	Indicator	Mean	SD	Interpretation
1	I find using the Internet for learning is stimulating.	3.82	.984	Often
2	I have no problems accessing and going through the materials on my own.	3.56	.895	Often
3	I feel I am in control of my learning as I review the material provided.	3.75	.874	Often
4	I feel the web based learning approach can substitute for, or enhance the normal classroom approach.	3.56	.977	Often
5	I feel I learn more in the online environment.	3.20	.055	Often
	Over-all mean	**3.58**	**0.96**	**Often**

Legend: 4.50-5.0 - always, 3.50-4.49 - often, 2.50-3.49 - sometimes, 1.50-2.49 - seldom, 1.0-1.49 - never

It is detailed in Table 7 that indicator 1 has the highest mean (M=3.82, SD=.984) as it is interpreted as "often". Indicator 5 has the lowest mean (M=3.20, SD=.055) as it is interpreted as "often". In a general sense, the respondents perceived reflective thinking in an online learning environment as "often" (M=3.58, SD=0.96).

The result exhibits that learners appreciated using computers and the internet for education. They liked using the internet to obtain knowledge and were incited and driven by their online course. Even though they were content with online learning, they still acknowledged the advantages of traditional learning modalities. The result shows that reflective activities are supported. Learners enjoyed studying and cooperating in the e-learning environment.

In the study of Levin, He, & Robbins (2006), they concluded that learners reflected critically on the interplay of classroom management and instruction and realized that online discussions are operational tools for fostering crucial reflection about matters concerning classroom administration. Learners are satisfied with and can acquire knowledge in synchronous classes. However, adult learners should be given choices in discussion formats so they can engage in critical reflection.

Table 8

Students' Perception on Educational Experience In Terms Of Social Presence

	Indicator	Mean	SD	Interpretation
1	Getting to know other course participants gave me a sense of belonging in the course.	3.95	.809	Agree
2	I was able to form distinct impressions of some course participants.	3.90	.716	Agree
3	Online or web-based communication is an excellent medium for social interaction.	3.71	.850	Agree
4	I felt comfortable conversing through the online medium.	3.70	.938	Agree
5	I felt comfortable participating in the course discussions.	3.75	.937	Agree
	Over-all mean	**3.80**	**0.85**	**Agree**

Legend: 4.5-5.0 – strongly agree, 3.50-4.49 – agree, 2.50-3.49 – neutral, 1.50-2.49 – disagree, 1.0-1.49 – strongly disagree

It is presented in Table 8 that indicator 1 has the highest mean (M=3.95, SD=.809) as it is interpreted as "agree". Indicator 4 has the lowest mean (M=3.70, SD=.938) as it is interpreted as "agree". On average, the respondents perceived social presence in their learning experience as "agree" (M=3.80, SD=0.85).

Kear (2010) asserted that social presence illuminates aspects of online communication for learning. Communication environment and learner's behavior impact social presence. Furthermore, learning environments can influence how people act towards one another. To increase social presence, communication systems for learning should be well-designed and used excellently.

As the results revealed, the learners can socially and emotionally relate with others in an online learning environment.

Table 9

Students' Perception on Educational Experience In Terms Of Teaching Presence

	Indicator	Mean	SD	Interpretation
1	The instructor clearly communicated important course topics.	4.24	.724	Agree
2	The instructor clearly communicated important course goals.	4.25	.744	Agree
3	The instructor provided clear instructions on how to participate in course learning activities.	4.22	.756	Agree
4	The instructor clearly communicated important due dates/time frames for learning activities.	4.25	.769	Agree
5	The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	4.21	.700	Agree
	Over-all mean	**4.23**	**0.74**	**Agree**

Legend: 4.5-5.0 – strongly agree, 3.50-4.49 – agree, 2.50-3.49 – neutral, 1.50-2.49 – disagree, 1.0-1.49 – strongly disagree

It is shown in Table 9 that indicator 2 and indicator 4 have the highest mean (M=4.25, SD=.744) and (M=4.25, SD=769) respectively, as these are interpreted as “agree”. Indicator 5 has the lowest mean (M=4.21, SD=.700) as it is interpreted as "agree". Overall, the respondents perceived teaching presence in their learning experience as “agree” (M=4.23, SD=0.74).

Teaching presence is the plan, implementation, and management of cognitive and social processes to actualize meaningful and educationally valuable learning outcomes (Anderson, Rourke, Garrison & Archer, 2001).

The study of Gurley (2018) asserts that educators who participated in prescribed training programs, like certification programs, are more positive in their capabilities to facilitate student learning in blended and online courses. Faculty development and mentoring programs capacitate educators to have appropriate teaching pedagogies and teaching presence behaviors, particularly in online learning environments.

As reflected on the gathered data, the design, execution, and control of cognitive and social presences to achieve individually meaningful and educationally valuable learning outcomes duly are observed.

Table 10

Students’ Perception on Educational Experience In Terms Of Cognitive Presence

	Indicator	Mean	SD	Interpretation
1	Problems posed increased my interest in course issues.	3.77	.820	Agree
2	Course activities piqued my curiosity.	3.82	.802	Agree
3	I felt motivated to explore content related questions.	3.92	.765	Agree
4	I utilized a variety of information sources to explore problems posed in this course.	3.97	.798	Agree
5	Brainstorming and finding relevant information helped me resolve content related questions.	4.06	.860	Agree
	Over-all mean	**3.91**	**0.81**	**Agree**

Legend: 4.5-5.0 – strongly agree, 3.50-4.49 – agree, 2.50-3.49 – neutral, 1.50-2.49 – disagree, 1.0-1.49 – strongly disagree

It is exhibited in Table 10 that indicator 5 has the highest mean (M=4.06, SD=.860) as it is interpreted as “agree”. Indicator 1 has the lowest mean (M=3.77, SD=.820) as it is interpreted as "agree". In general terms, the respondents perceived social presence in their learning experience as “agree” (M=3.91, SD=0.81).

Kilis & Yıldırım (2019) prescribed creating activities that apply to real-life and providing situations for these activities instead of purely factual knowledge. They also recommended a

problem-based learning approach in devising activities to improve students' reflections and critical thinking. It will assist them in inventing new knowledge or in deepening their existing consciousness.

As indicated on the gathered data, learners can construct and validate meaning using supported reflection and discussion.

Table 11

Significant Relationship Between The Perception Of The Respondents On Online Education As An Active Learning Environment And Perception Of The Respondents On The Social Presence

	Social Presence		
	r-value	**p-value**	**Interpretation**
Student Collaboration	.397**	.000	Significant
Computer Competence	.354**	.000	Significant
Active Learning	.684**	.000	Significant
Teacher Support	.403**	.000	Significant
Information Design and Appeal	.480**	.000	Significant
Material Environment	.517**	.000	Significant
Reflective Thinking	.588**	.000	Significant

*Legend: ** Correlation is significant at the 0.01 level (2-tailed).*

It is presented in Table 11 that Active Learning has the highest r-value (r-value=.684, p-value=.000) as it is interpreted as "significant". Computer competence has the lowest r-value (r-value=.354, p-value=.000) as it is interpreted as "significant". Generally, there is a significant relationship between online learning environment and social presence. It implies that Student Collaboration, Computer Competence, Active Learning, Teacher Support, Information Design and Appeal, Material Environment, and Reflective Thinking has a significant correlation with Social Presence separately and collectively.

Table 12

Significant Relationship Between The Perception Of The Respondents On Online Education As An Active Learning Environment And Perception Of The Respondents On The Teaching Presence

	Teaching Presence		
	r-value	**p-value**	**Interpretation**
Student Collaboration	.409**	.000	Significant
Computer Competence	.317**	.001	Significant
Active Learning	.457**	.000	Significant
Teacher Support	.588**	.000	Significant
Information Design and Appeal	.469**	.000	Significant
Material Environment	.492**	.000	Significant
Reflective Thinking	.451**	.000	Significant

*Legend: ** Correlation is significant at the 0.01 level (2-tailed).*

It is presented in Table 12 that Teacher Support has the highest r-value (r-value=.588, p-value=.000) as it is interpreted as “significant”. Computer competence has the lowest r-value (r-value=.317, p-value=.001) as it is interpreted as "significant". Collectively, there is a significant relationship between online learning environment and teaching presence. It signifies that Student Collaboration, Computer Competence, Active Learning, Teacher Support, Information Design and Appeal, Material Environment, and Reflective Thinking significantly correlate with Teaching Presence individually and accumulatively.

Table 13

Significant Relationship Between The Perception Of The Respondents On Online Education As An Active Learning Environment And Perception Of The Respondents On The Cognitive Presence

	Cognitive Presence		
	r-value	**p-value**	**Interpretation**
Student Collaboration	.545**	.000	Significant
Computer Competence	.545**	.000	Significant
Active Learning	.628**	.000	Significant
Teacher Support	.592**	.000	Significant
Information Design and Appeal	.579**	.000	Significant
Material Environment	.642**	.000	Significant
Reflective Thinking	.720**	.000	Significant

*Legend: ** Correlation is significant at the 0.01 level (2-tailed).*

It is presented in Table 13 that Reflective Thinking has the highest r-value (r-value=.720, p-value=.000) as it is interpreted as “significant”. Computer Competence and Student Collaboration has the lowest r-value (r-value=.545, p-value=.000) as it is interpreted as "significant". Overall, there is a significant relationship between online learning environment and cognitive presence. It denotes that Student Collaboration, Computer Competence, Active Learning, Teacher Support, Information Design and Appeal, Material Environment, and Reflective Thinking significantly correlate with Cognitive Presence independently and as a whole.

5. Conclusion

With the current learning modalities, educational activities are not confined to text, print-based materials, time, or space anymore. Educators are driven to create suitable pedagogies to deal with digital ways of teaching and learning. The results of the study affirmed that learners probed by this study perceived the online learning environment as favorable. It is also duly affirmed by

this study that learners view their learning experiences during the new normal as meaningful and collaborative-constructivist. It is therefore necessary to consider the integration of social presence, teaching presence, and cognitive presence to achieve that kind of learning experience.

It is believed the present study is valuable to school administrators, educators, learners, future researchers, and all those concerned with educational policy. Its timeliness and relevance can offer vital contributions to teaching, learning, and research. In reference to delivering a collaborative-constructivist learning experience among learners, the following recommendations are set-forth:

Educators should include activities that encourage collaboration. These activities will promote a spirit of community and belongingness that may boost student motivation and lessen drop-out. Educators should specify the technical skills needed to engage in the course. It will assure students will not be discouraged from performing tasks that are beyond their technical competency. It will increase a sense of command in their learning environment that will build fulfilment. Educators need to create activities that provide essential feedback to learners, enriching their knowledge, and improving student gratification and accomplishment. Educators should frequently communicate with their students and offer precise feedback when needed. These may help increase student participation and success. Educators should ensure communication activities to imbibe a sense of belongingness and community. It conceivably enhances student well-being.

Finally, several significant limitations should be a concern. First, a small sample of learners served as the respondents of this study. Further studies about the matter may also be conducted using a combination of quantitative approach and qualitative approach. Lastly, future researchers may also explore other areas affected by learners' online learning environment.

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