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Using Predictive Analytics to Identify First-Year Engineering Students at Risk of Failing Engineering Physics

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Abstract
Due to a lack of continual assessment or grade related data, identifying first-year engineering students in a polytechnic education at risk of failing Engineering Physics is challenging. Our experience over the years tells us that there is no strong correlation between having good entry grades in Mathematics and the Sciences and excelling in hard-core engineering subjects. Hence, identifying students at risk of failing cannot be on the basis of entry grades in Mathematics and the Sciences alone. These factors compound the difficulty of early identification and intervention. In this paper, we describe the development of a predictive analytics model in early detection of students at risk of failing and evaluates its effectiveness. Data from continual assessments conducted in term one, supplemented by data of student psychological profiles such as interests and study habits, were used. Three classification techniques, namely Logistic Regression, K Nearest Neighbour, and Random Forest, were used in our predictive model. Based on our findings, Random Forest was determined to be the strongest predictor with an Area Under the Curve (AUC) value of 0.994. Correspondingly, its Accuracy, Precision, Recall, and F-Score were also highest among these three classifiers. Using this Random Forest Classification technique, students at risk of failing could be identified at the end of term one. They could then be assigned to a Learning Support Programme at the beginning term two. This paper gathers the results of our findings. It also proposes further improvements that can be made to the model.

Keywords: Predictive Analytics, Random Forest, Students at risk, Early Intervention, Student Psychological Profile, Continual Assessment

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Introduction

Engineering Physics is a first year engineering subject that is taught in the second semester in Temasek Polytechnic School of Engineering (TP ENG). It is a pre-requisite to most engineering studies. Poor grounding in this subject can compound learning difficulties in many related and subsequent subjects. Because of its importance, TP ENG has been offering a remedial service called Learning Support Programme (LSP) since 2010.

The main target audience of the LSP program is students from vocational schools instead of mainstream secondary schools in Singapore. This is because students from vocational schools are not taught Mathematics and the Sciences, and as such, have knowledge gaps in these subjects compare to students from mainstream secondary schools. The LSP program can also be extended to students from mainstream secondary schools who have weak foundation in these subjects, but there is always a delicate balance between teaching resources available and class size. As such, these precious limited vacancies should be allotted to mainstream students who are at risk of failing.

The current practice is to allocate these vacancies to mainstream students who have weaker entry grades in Mathematics and the Sciences. The assumption is that students with weaker entry grades need more teaching support. Surprisingly, our experience and observations showed that, for mainstream students, there is no strong correlation between having poor entry grades in Mathematics and the Sciences and failing Engineering Physics. A quick look up into the data of students who have failed their semester examination or declined in performance often show that they started off with fairly decent entry grades in Mathematics and the Sciences. Some students may have fallen by the wayside as early identification of such students and support for these students were not in place.

Hence, early intervention is imperative and in this paper, we examine the viability of using predictive analytics (Martin et al, 2019) as an early intervention device. Early intervention does improve academic success (Zhang et al, 2014). In our context, early intervention means being able to sieve out students are at risk of failing Engineering Physics in term one of the semester and then enrolling them in the LSP program in term two of the semester. In this way, at risk students would receive one semester term of additional help.

Since identifying mainstream students to be sent to the LSP classes on the basis of entry grades in Mathematics and the Sciences is not a good determinant, other factors have be considered. In our analysis, we gathered and examine factors related to student aptitude and psychological profiles such as interests and study habits.

Literature Review

Predictive analytics in higher education has evolved fairly recently as a result of the availability of more data set. Indeed, the development of educational learning tools and educational management system have created large databases which has enabled data mining (Calvet Liñán & Juan Pérez, 2015). Data mining has evolved from the classical regression analysis to present day machine learning. While data mining relies on human intervention and decision making, machine learning trains a computer using a set of existing data to predict future outcomes and hence the term, predictive modelling. Today, predictive modelling is used in discovering patterns of knowledge about educational phenomena and the learning process (Anoopkumar & Rahman, 2016). Predictive modelling has been also used in predicting educational outcomes,

such as student performance (Hamoud et al, 2018), academic success (Martins et al, 2019; Richard-Eaglin, 2017), and dropout rate (Pérez et al, 2018).

These literatures reaffirm that using predictive analytics to sieve out student at risk is a viable approach. However, at the point of investigation, little or no empirical studies using predictive analytics in the context of Polytechnics in Singapore was done. In addition, most of the studies done were on students in their sophomore or senior years. As such, data related to continual assessments, grade point average and cumulative grade point average are readily available in their investigations. Our challenge is the lack of such data as our investigation was into first year students.

In determining students' academic success in higher education, prior academic achievements and student demographics were the top two factors quoted in 69% of the research papers (Alyahyan and Dustegor, 2020). However, our experience pointed away from a direct correlation between prior (entrance) academic achievements and student success. Besides, due to policies on data privacy, data of prior academic achievements, that is, student performance in their secondary schools, were not readily available and would consume much time to collect. We also do not suspect that demographic factors, such as financial background, play a key influence in academic success since the Ministry of Education in Singapore has a "No Child Left Behind" program instituted since 2012. As such, we were more interested in investigating other factors.

Instead, in our analysis, we considered students' aptitude, interests and study habits in the determination of their success in Polytechnic as more applicable. Key questions that we ask in these respects are the percentage of tutorial questions students are able to do unassisted, the amount of time a student spends self-studying each week, and the student's level of interest in Engineering Physics.

Methodology

A common technique that is generally used in the literatures to build a supervised learning predictive model is shown in Figure 1. The main stages are 1) factors, 2) data collection, 3) data pre-processing, 4) data mining, and 5) result evaluation.

Figure 1**:** Method Used in Prediction of Student at Risk

Stage 1: Input Factors or Features

Input factors, or features that were used are summarised in Table 1. These features fall broadly into two category. In the first category, the features were *tutorial attempt*, *like Physics*, *weekly self-study* and *prior knowledge*. These features are aptitude, attitudinal and psychological profile of student that focus on learning abilities, interests and study habits. The inclusion of *prior knowledge* as a feature is not to gather input of student's past academic achievements but to gather input of the relevancy of a past subject taken at the secondary school level. The second category of data are continual assessments marks that students have taken in the first term of the semester.

Input Factors / Features	Category	Explanation
Tutorial attempt	First	Captures input of percentage of questions student could answer unassisted
Like Physics	First	Captures whether student likes or dislikes Engineering Physics
Weekly Self-study	First	Captures the amount of time spent self-studying Engineering Physics each week
Prior Knowledge	First	Identifies if students has taken pure physics at "O" levels against other combinations
Assignment 1, Class Participation 1, Online Test 1, Term Test	Second	Continual assessment components from semester term 1
End-semester Examination	Target	Target which was converted into a derived column with either an "NR" or an "R" to indicate not-at-risk and at-risk

Table 1: Input Factors and Target Used in Our Predictive Analytics

Stage 2: Data Collection

The data for these first category features were information that needed to be collected directly from the students and were done through a student survey. The features from the second category were the outcome of assessment components and were collected from various marks and online assessment systems.

Stage 3: Data Pre-processing

A total of 200 students were surveyed, but due to incompleteness of data, some data were removed. Imputation of missing values was used where possible, without over making assumptions (Aleryani et al, 2018). The target used in training the model was the outcome of end-semester examination. End-semester examination marks were collected and a derived column indicating an "R" or an "NR" was introduced as the machine learning target. "R" indicates at-risk and "NR" indicates a not-at-risk. Students who failed the end-semester examination or had borderline passes were categorized as "R". By assigning students with C-grade and below into the "R" category, we could resolve the issue of data imbalance (Maheshwari, 2017). Indeed, students with borderline passing marks can be considered as students at risk.

We also made use of the linear projection and feature statistics widgets (see Figure 2) to ensure that data are not subjected to outliers that would affect the machine learning. Categorical data were converted to numerical data. After the data pre-processing and transformation, only 166 data points were used in this study.

Stage 4: Classification

Commonly used classification techniques are neural networks, K-nearest neighbor (kNN) and decision trees (Romero & Ventura, 2010). Their advantages and suitability were well discussed (Brohi et al, 2019). Our choice of classifiers used were random forest (a type of decision tree),

logistic regression and kNN. We made use of a freeware called Orange to perform our analysis. The Orange tool provides built-in algorithms that simplify analysis. A diagram of our classification analysis workflow is shown in Figure 2.

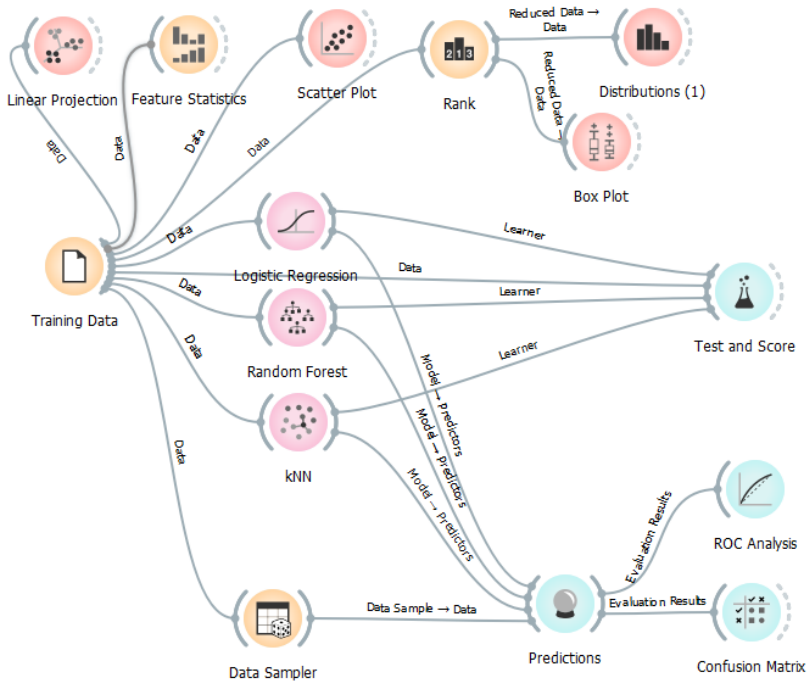


Figure 2: Workflow of Classification Analysis Using Orange

With reference to Figure 2, our collected data is used as the training data and is fed into the three classifiers to train these classifiers to identify the target outcome. To test the classifiers, we make use of the data sampler widget from the Orange tool. 35% of the data from the training data were sampled in a deterministic manner. Based on the sampled data input, the classifiers predict an "R" or an "NR". The prediction outcome of each classifier is then evaluated by the predictions widget. Further evaluations are made using the receiver operating characteristic (ROC) analysis widget and confusion matrix widget.

The linear projection and feature statistics widgets are used to provide insights of the training data as part of data pre-processing. The scatter plot, rank, distributions, and box plot widgets were used in feature selection and evaluating the significance of the features.

Stage 5: Results and Evaluation

Standard performance evaluation parameters (Alyahyan and Dustegor, 2020) such as confusion matrix, classification accuracy (CA), precision, recall, F1 score, and area under the curve (AUC) were used to evaluate the performance of the classifier.

The confusion matrix is a table that displays the number of actual and predicted values. If the predicated outcome is the same as the actual, then we have a true positive (TP) or a true negative (TF). Otherwise, we have a false positive (FP) or a false negative (FN). This is illustrated in Table 2 below.

		Predicated	
		Positive	Negative
Actual	Positive	TP	FN
	Negative	FP	TN

Table 2: Confusion Matrix

The other performance evaluation parameters are defined as follows.

CA measures the proportion of predictions that are correct and is calculated as

$$CA = \frac{TP + TN}{TP + TN + FP + FN}$$

Precision measures the proportion of positive cases and is calculated as

$$Precision = \frac{TP}{TP + FP}$$

Recall measures the proportion of positive cases that is correctly identified and is calculated as

$$Recall = \frac{TP}{TP + FN}$$

F1 score conveys the balance between precision and recall and is calculated as

$$F1\ score = 2\times \frac{Precision \times Recall}{Precision + Recall}$$

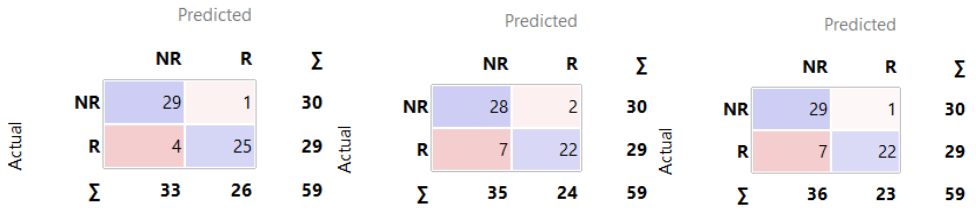
AUC is the area under the ROC curve and represents the probability of making a correct prediction.

All these parameters have values between 0 and 1 and are generally better when the values are closer or equal to 1.

Besides determining the classifier with the best performance, we also want to differentiate the features that are more significant in training the model. Scoring and ranking of features are performed using the rank widget. The performance indicators that we used were information gain and Gini gain. The information gain ratio determines the "pureness" of the information that is rendered by the feature towards identifying target. Information gain measures the amount of entropy or disorderliness that is removed. The higher the information gain, the more the entropy is removed. Likewise, the Gini gain determines the quality of the split between classes. The higher the Gini gain, the better the split.

Empirical Results and Evaluation

These performance evaluations are readily produced by the confusion matrix, predictions and ROC analysis widgets. The performance results of the classifiers are summarized in Tables 3 and 4 and Figure 3. These results show that random forest is the best performing classifier.



(a) Random forest (b) Logistic regression (c) KNN

Table 3: Confusion Matrices of Classifiers

Classifiers	CA	Precision	Recall	F1	AUC
Random Forest	0.915	0.919	0.915	0.915	0.994
Logistic Regression	0.847	0.857	0.847	0.846	0.883
KNN	0.864	0.880	0.864	0.863	0.909

Table 4: Performance Evaluation of Classifiers (Generated by the Predication Widget)

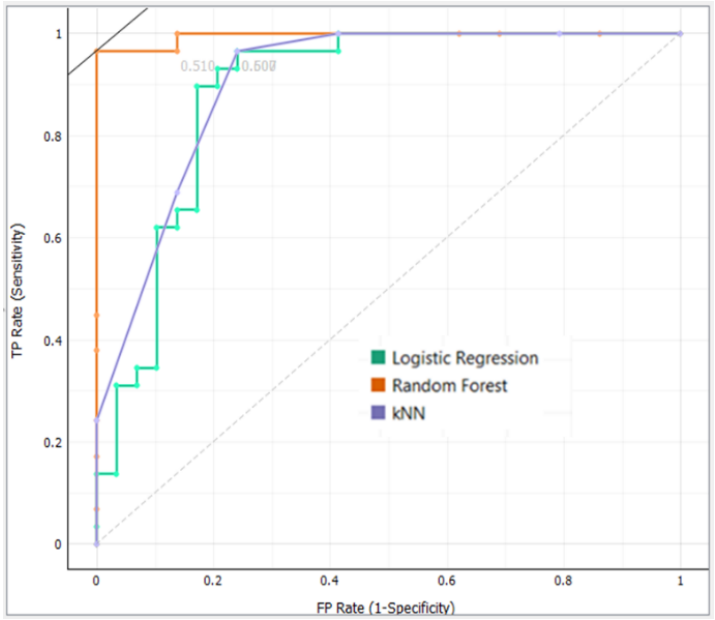


Figure 3: ROC Curves of Classifiers (AUC Values Can Be Found in Table 4)

Using the rank widget, feature selection can be made and the significance of the features were ranked in descending orders as shown in Table 5.

	#	Gai...tio	Gini
N TT		0.150	0.185
N Tutorial		0.076	0.057
N CP1		0.046	0.059
C Prior Knowledge	2	0.022	0.011
N Online1		0.018	0.024
N Assignment1		0.017	0.023
N Like Physics		0.011	0.010
N Weekly ...f-study		0.002	0.001

Table 5: Scoring and Ranking of Features

The next stage of our evaluation was to use the outcome of feature selection to re-evaluate our model. The information gain ratio and Gini gain of Table 5 suggest that *like Physics* and *weekly self-study* are among the least significant features. Since information gain ratio and Gini gain are also part of the random forest algorithm, these features were turned off to evaluate the performance of the random forest classifier. The result is summarized in Table 6. It does show improvements in all performance categories. In particular, the new AUC is 0.999 compared to the previous values of 0.994 and the CA also improved from 0.915 to 0.966.

		Predicted		
		NR	R	Σ
Actual	NR	30	0	30
	R	2	27	29
	Σ	32	27	59

Classifiers	CA	Precision	Recall	F1	AUC
Random Forest	0.966	0.968	0.966	0.966	0.999

Table 6: Performance of Random Forest After Feature Selection

Conclusions and Future Improvements

A predictive model was built to help identify first-year student at risk of failing Engineering Physics. This predictive model uses the limited data from continual assignment components from term one of the semester, and data collected from a student survey. The data from the student survey focuses on student psychological profiles such as aptitude, interests and study habits instead of student demographics. The end-semester examination was used as the target. A sample size of 166 data were used and three classifiers, namely, logistic regression, random forest and kNN were evaluated.

Random Forest was the best classifier and gave an AUC of 0.994 and a CA of 0.915. Feature scoring was used to rank the significance of the features. Two non-continual assessment related features stood out. *Prior knowledge* and *tutorial attempt* were significant features that help to train the classifiers. Two other non-continual assessment related features, namely *like Physics* and *weekly self-study,* were found to have low information gain ratio and Gini gain and were thus less significant. When *like Physics* and *weekly self-study* were turned off, the Random Forest showed an improved performance, with AUC of 0.999 and CA of 0.966. Using our predictive model, we could identify students at risk and take an early intervention actions such as assigning them to our LSP to receive additional tutoring help.

For future work, we can feed this trained model with data of the next student batch so that at-risk students of the next batch may be identified. We can then evaluate the outcome of our intervention by tracking students' performances in the end-semester examination and by comparing year-on-year end-semester examination performances. We were unable to perform this work in the October 2020 semester due to the Covid-19 situation, which resulted in a shift towards home-based learning and a change in assessment components.

In our next study, three additional features could also be incorporated into our model. The first is data of students' usage of Blackboard's Learning Management System. The second is tutor recommendation, which would be tutor's rating of students based on their attitude towards studies, and level of active engagement in class. The third is the non-medical attendance ratio, which disregards medical excuses and considers such cases as absent. These features, based on

our teaching experience, apply very well in Singapore's Polytechnic context and could enhance the performance of the next classifier.

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Preparing Teachers for Rural Schools in Indonesia: A Case Study of Teachers' Professional Development Program

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Abstract
Schools in eastern rural and remote regions in Indonesia continue to face teacher shortages and poor education quality. Complex rural challenges have become the main reason why many urban teachers are reluctant to apply for rural teaching position or consider as future career. Preparing teachers for teaching position across rural regions through government's leading program called Sarjana Mendidik di Daerah Terdepan, Terluar dan Tertinggal (SM-3T) is positively seen as sustainable initiatives. The effectiveness of this program, however, should be interrelated with teachers' professional perceptions and their practical experience. This qualitative case study investigates teacher retention who appointed teaching in four rural and remote districts in West Papua. The respondents were graduate teachers who joined a one-year teaching appointment in Teluk Duairi, Womesa, West Misool and Waigeo. In order to gather data, both individual and collective interview were conducted and followed by a document review. The overall findings revealed that teachers internal aspiration and motivation play a key role in their decision-making to remain in the profession as a rural teacher. Intense socio-cultural integrations also provide significant attributes on teacher retention, motivation and adaptability to rural challenges. The viability of the program, however, seemed to be lacking of its practical theory. Some concerns regarding teachers' initial education, rural placement and its preparatory program along with the sustainable impacts are taken into account.

Keywords: Rural Education, Teaching Placement, Professional Development Program, Sarjana Mendidik di Daerah Terdepan, Terluar dan Tertinggal (SM-3T)

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Introduction

Rurality is commonly understood as backward, and often perceived as a static notion. Problems associated with a low socio-economic background, remoteness, social barriers, and diverse cultural situations usually are key points of political debates about the challenges in improving the quality of rural life (Roberts, 2016). In international research, however, definition of rurality provides diverse standpoints associated with three cores; space, place and the society (Cloke, Marsden & Mooney, 2006).

Rural education, particularly, has been often examined from its critical perspectives, presenting it as marginalised, disadvantaged and remote (Stelmach, 2011). Many recommendations have been discussed to tackle rural education complexities. Initial recommendation proposed by the United Nation during the Millennium Declaration; stated that globalization should provide benefits to all regions of the world–that is not only to the most developed and populated or easily accessible ones but also and importantly, to rural areas (United Nation, 2000). The perpetual goals of Education for All 2015 also suggested that education should be equally seen as global needs by expanding early education service particularly for the most disadvantaged children; improving girls' education regardless of ethnic minorities; ensuring the equitable learning access for all young learners; achieving at least 50 percent equitable access to literacy and numeracy; eliminating gender disparities in any education level; and meeting on the excellent quality of education for all.

According to the Acceleration Development of the Underdeveloped Regions-Disadvantaged Rural and Remote Areas in Indonesia (2015-2019), there are about 122 rural regions across 24 provinces, 94 isolated districts in eastern regions and nearly 26 regencies in Papua are still considered as highly disadvantaged in the provision of quality education (The Presidential Regulation on Regional Determination Disadvantaged Regions, 2015-2019). Dealing with the complex condition in eastern rural in Indonesia, many critical concerns appear in the area of the imbalance education standard where learning outcome rates are primarily associated with the disproportion support of qualified and certified teachers, inadequate infrastructure and learning support, lack of standardized curriculum and rural policies.

In response to imbalance learning outcome rates, the World Bank reported that students in Indonesia are performing three years behind the OECD standard and which over 50% of them are fifteen years old who do not master the basic skills in literacy and numeracy (OECD/Asian Development Bank, 2015). The Program International Students Assessment also discovered prominent report that around 70% of children in Indonesia could not demonstrate the basic skill in literacy (PISA, 2018). Raising this problematic condition, thus, Indonesian education status is crucial to meeting the challenge of reaching equitable education quality, and the most prominent priority here is to improve the learning outcomes at all levels and enable students to form basic core skills and understanding.

Many researchers believe that the key success to such problems is relying on a robust teaching support for teachers to develop greater professional capacity by providing more accountable performance in both primary and secondary roles while broadening diverse and inclusive education framework. Many previous studies have also showed that both teachers' basic education and their professional learning are important factor in creating qualified and professional educators. This study, therefore, was proposed to investigate teachers' perception of their personal and professional preparation for work in rural schools in the program named Sarjana Mendidik di Daerah Terdepan, Terluar dan Tertinggal (SM-3T). As the role of SM-3T

program is highly crucial in supporting the government target plan for providing better education quality in rural and remote regions across Indonesia, thus, there is an urgency in exploring the effectiveness of its pedagogical knowledge for preparing new graduates with diverse teaching pathways in more inclusive settings.

Defining Rural Contexts and Its Challenges

There are a number of variables that applies in defining rural contexts. Understanding the scope of these variables is important for the researcher in order to make a valid observation about the challenges and opportunities on the educational development, teachers' professional learning and community revitalisation in rural regions. In international research, rural or rurality provides diverse standpoints associated with space, place and society. However, geographical conditions like location, access and distance offers more relevant and noticeable patterns of how it means to be rural as there is no consistent single definition used to best portrait rurality.

In order to gain better understanding on what aspects might constitute rural concerns and how to solve such complex issues, there is a strong need to incorporate rural knowledge and/or understanding in many aspects of life. Researchers like Danaher, Moriarty & Danaher (2003) Hudson & Hudson (2008a, 2008b) highlighted about the urgency to familiarise the contextual situations on a larger scale such as developing rural understanding and promoting awareness of rural living, values and its multicultural background/beliefs. Besides, a concept of 'Place and Space' was introduced for a rural project in Australia in order to promote rural consciousness and induce teaching participation in rural and remote schools (Adie & Barton, 2012). Additionally, adopting the idea of 'Ruralisation of the mind' have proposed positive perspectives in helping teachers, educators and rural practitioners gain broader insights about rural contexts and practices on a larger scale (Green & Letts, 2007).

Despite the proposed concepts and ideas, global issue of teacher shortages in rural and remote areas, seems to be a worldwide challenges (Hazel & McCallum, 2016 and Reid, Green, Cooper, Hasting, Lock & White, 2010). Among a variety of reasons for this situation, the problematic nature of rural education is related to the challenges of attracting, staffing and retaining well-qualified teachers (Burton & Johnson, 2010). Concerns about teacher shortages mainly associated with the geographical and social isolation, inadequate access to professional and personal supports, lack of specific teacher preparation programs, poor housing condition, multiple working demands, as well as lower salary and incentives (Jimmerson, 2004; White & Reid, 2008; Sharplin, 2002, 2010; Sulivan & Johnson, 2012; Lynch, 2014). These crucial issues have created urgent needs for reviewing past and current efforts in how well teacher education programs prepare teachers to teach in rural schools with strong emphasis on diverse inclusive needs (Trinidad, Broadley, Terry, Boyd, Lock, Byrne, 2012)

Significant review by Lunn (1997) underlining empirical evidence faced by many teachers during their first year of teaching service in rural schools, these are including:

- The desire of returning home/turnover;
- Struggle with professional learning and training;
- Dissatisfaction with rural/remote teaching and living conditions;
- Frustration with low salary and/or inappropriate incentives;
- The absence of teaching and learning supports;
- The longer teaching provision in rural and remote settings.

In the context of social, cultural and professional isolation, Sharplin (2002) found that many teachers were confronted with the "fear of unknown". Complex feeling of being isolated and limited access to personal and professional supports strongly impacted on teacher motivation and their willingness to consider future rural career.

On the other hand, both geographical condition and isolation become the main the reason why many urban teachers hesitated to consider rural employment (Appleton, 1998; Collins, 1999). Typical misconceptions and negative stereotypes of rural life have strongly influenced teachers' expectations and form mixed perceptions about rural living (Sharplin, 2002, 2010; Jenkins, Reitano & Taylor, 2011). These misconceptions are including poor housing and settlement, difficult life conditions and multiple demands, social and language barriers, and different socio-cultural background and beliefs (McClure, Redfield, Hammer, 2003; Munsch & Boylan, 2008). A review on project 'Why Rural Matters' conducted in 2005 confirmed three vital indicators concerning geographical isolation that affected teachers' motivation; they are access to transportation, technology and support for both personal necessities and professional learning (Johnson, 2005).

Teaching Placement in Rural Schools

Teaching placement can be a daunting experience for student teacher and new graduates as they start to learn and teach different learning environments, adapt with new responsibilities, juggle multiple roles and develop professional competencies whilst focus on accommodating students' needs. Teaching placements have consistently believed as prominent and practical opportunities for teachers to gain practical experience, identity development, career enhancement, and personal and professional improvement (Lind, 2004; Peters, 2002). The demand for a global improvement on teaching placement in rural and remote settings has been consistently discussed in international education research. Preliminary study by Woofter (1917) and Guenther & Weible (1983) claimed that many rural educators have long been calling for special preparations for teachers to teach in rural schools. Like in many rural education reports, rural placement is somehow believed to have greater impact on teachers' perceptions and readiness to teach in more inclusive and diverse teaching domains (White & Reid, 2008).

In attempt to closing the gap between urban and rural schools and prepare high performing educators, some concepts have been addressed including allocating strong teaching support for greater professional capacity (Loughran & Hamilton, 2016); designing and broadening more diverse education frameworks and policies (White & Reid, 2008; Roberts, 2016), providing more accountable performance in both primary and secondary roles (Cochran-Smith & Lytle, 2001), and promoting rural placements in order to enhance sustainable learning for teachers (Orrill & Kittleson, 2015; NCATE, 2010). Proposing (initial) teaching appointments in both socially and culturally diverse settings has also been discussed as essential requirements in early teacher education programs (White, Lock, Green, Reid, Cooper, & Hasting, 2008). Providing teachers with more diverse teaching pathways through placements might induce teachers participation and create accountable learning outcomes for rural schools. With the high demands and challenges found in rural schools, Barker & Beckner (1987) and Monk (2007) suggested the need to incorporate rural teaching contents into teacher preparation program while provide teachers with more diverse teaching pathways through placements. Teachers' initial education holds critical start for preparing high qualified candidates for more inclusive learning environment and create accountable learning outcomes for rural schools (White & Reid, 2008).

However, when linking to the overwhelming concerns associated with the challenges and opportunities create numerous perspectives on what variables have interfered the viability of teaching placement in the foremost classroom settings. Given the example of learning outcomes dilemma between urban and rural schools, many researchers claim that teacher education alone is not enough to accommodating teachers' clinical training in the field. Teacher education itself cannot accommodate teachers to fully understand and act on schools diverse needs (Bradfield-Kreider, 2001; Irvine, 2003; and Larke, 1990). In addition, Fry & Anderson (2011) and McCallum & Price (2016) highlighted a potent gap between theory and practices in rural settings. They argued that the implementation of professional learning and teacher education programs often seen too general, biased, and/or inappropriate; causing many urban teachers hard to remain in the profession as they continuously experience greater challenges related to resilience, well-being and commitment (Day, Kingston, Stobart & Sammons, 2006).

While many suggestions about placements and teaching practicum have taken place in international research, debates about lack of integration in teacher education between governments and education providers in Indonesia is still becoming trend discussion for wider education sectors. The absence of rural education policies has drawn central attention to broaden understanding about rural placements in both local and national perspectives.

Teachers' Professional Development Programs

Important components of teacher education have been consistently evaluated in the Handbook of Research on Teacher Education; highlighting that all teacher education program should not only endorse the complexity of teachers' work in diverse teaching contexts but also involve contents that focus on both primary and secondary roles rather than just emphasise single specialisation. Linking to the conceptual teacher education framework that proposed integrated learning continuation; The National Council for Accreditation of Teacher Education suggest that teachers regardless of any discipline backgrounds need to be well equipped with better demonstrations of up-to-date knowledge, skills, and characters that linked to diversity and integrated curriculum, instruction, clinical practices, evaluation as well as reflection in wider classroom practices (NCATE, 2010).

The expectation of preparing students for better learning outcomes in diverse settings, however, have not yet been achieved, particularly in rural and remote classrooms (White, 2010). Teachers have to do more than just transferring the educational content. They are not only expected to support students to be creative, think critically, solve problems and make decisions, but more importantly prepare students to be an independent and competent learner. Such expectation is critical, many key attributes of teacher education program have reportedly insufficient to prepare high qualified teachers for meeting complex needs in rural and remote settings.

Extensive learning through professional development programs, hence, has been identified as significant factor in improving education standards and students' learning outcomes (Puhan, Malla & Behera, 2014). Through professional learning, teachers have accessible options to the updated knowledge and information, transformative and applicable approach that support teachers to meet the up-to-date needs and learning standards. Many researchers believed that teachers who received thorough and better preparation throughout their careers are more likely to perform better, cope well with the challenges and stay longer in the profession (Kline, White & Lock, 2013). In other words, high qualified and well experienced teachers seem to be a great

benefit for schools as they might share valuable and constructive examples that promote self-efficacy and self-confidence among novice teachers (Sharplin, 2010).

Similar forms of professional learning like inductions, in-school trainings and workshops, teacher conferences and seminars, focus group discussion, mentoring and/or peer teaching should be taken place in order to stimulate teachers' capabilities with real teaching practices. White & Reid (2008) also suggest that universities and professional learning providers should emphasise on forming inclusive curriculum with a concept of place consciousness. Numerous studies showed that professional development program have gradually helped government in attracting, placing and retaining teachers in the profession. Successful reports from Australian Rural Education Research mentioned the idea of transferring or relocating to rural or remote setting has been identified as a new approach in promoting teaching participation and career enhancement (Adie & Barton, 2012).

Methodology

This research was designed as a qualitative case study to collect data on teachers' experience and their personal and professional perceptions towards the appointed professional development program (SM-3T) which prepared them for teaching appointment in rural and remote schools in West Papua. A qualitative case study mainly selected as it provides best procedures for describing, interpreting a culture-sharing group, shared patterns of behaviour, beliefs and values (Creswell, 2014). In an effort to understand the effectiveness of professional program and discover the pedagogical competencies they have developed from two-week preparatory program prior their teaching placement, semi-structured interview with open-ended questions was formed for addressing the selected research questions. Both individual and collective interview were addressed to collect rich information about participants' experience and gather deep insights about their personal and professional growth.

The selected participants of this study were four new graduate teachers who followed two-week preparatory professional development program called Sarjana Mendidik di Daerah Terdepan, Terluar dan Tertinggal (SM-3T) prior one-year teaching placement in four rural school regions in West Papua named Teluk Duari, West Misool, Wamesa and Waigeo. These teachers gained a 4-year teacher education program at urban university with different disciplines and voluntarily joined rural placement without experiencing any rural placement or practicum before.

Visual materials such as images and videotapes were also used as secondary form of data for this study. Both contents from interview and visual materials used to provide extensive visualization about rural condition, real moments and representations to which participants can easily relate (Creswell, 2014). A qualitative categorical analysis provided similar narratives and reflections towards their first experience of joining rural placement and being a rural teacher. These new graduate teachers were very articulate with their stories and displayed similar insightful patterns of experiences, challenges and outcomes. The gained data shows how some internal and external supports like motivation, personal commitment, perceptions, and personal and/or professional experience have strongly influenced teachers' participation and retention.

Findings

Motivation and Personal Commitment

Significant analysis that can be linked to the reduction of teachers' turnover in this program were the motivation and personal commitment (as perceived by the participants). The participants' resilience in coping with challenges was likely to be influenced by their preconceptions and successful integration within their teaching settings. Participants consistently mentioned that motivation played a significant role in their decision to remain teaching in rural schools in West Papua. The desire to accept teaching appointment through the SM-3T program, however, influenced by incentives of professional award and teaching certification they will receive after the completion of their teaching appointment.

The participants, however, mentioned that relying on the external rewards alone (e.g., certification) was not enough when compared to the everyday challenges in the field. They emphasised that both rewards and incentives were not determining factors that keep them in the profession. In other words, their motivation to remain in the profession as rural teacher was influenced by both internal and external factors. With regard to their successful completion, participants highlighted that challenges and struggles they had to deal with have helped them gain positive commitment in pursuing rural teaching career. Not only personal commitment, strong compassion and determination were also indicated as a factor that encouraged them to perform better. Shortcomings and problems were not perceived as obstacles as they challenged themselves to be more creative and innovative. Many believed that teachers who persistently show strong commitment are more likely to succeed in the program, and these participants showed some empirical evidences associated with motivation and commitment.

Perceptions of Teachers' Initial Preparation

Regarding participants' initial preparation, they had varied perceptions of their preparedness, depending on their actual living and working conditions. The participants stated that this program had successfully recruited teachers to work in rural settings and encouraged new urban teachers to take part in providing more equitable education in Indonesia. Based on the recurring outcomes, most of SM-3T teachers reported their positive intentions to accomplish a one-year teaching appointment, and some even remained up to two years in their previous location.

Apart from the highest number of teachers participating in the program, some empirical findings showed that the overall materials or theories used for the preparation did not meet the actual expectations in the field. Dissatisfaction of the unmatched approach and method caused anxiety and pressure, especially teachers who dealing with multiples roles and duties. The inappropriateness of the curriculum and insufficient knowledge about rural life have caused misunderstanding and disparity between the reality and expectations.

Personal and Professional Experience

One of the critical factors that influenced teachers' life and work were the challenges or pressures they had to deal with in rural and remote schools. All these four participants had different working and living experience, depending on their selected geographical sites. In relation to professional experience, the participants experienced poor working conditions, which strongly influenced their work performance. They commonly mentioned large

classroom sizes, long working hours with heavy workloads, teaching out-of-field, multiple roles and responsibilities that challenged them professionally.

Besides, the absence of professional support like inadequate teaching facilities in rural schools, limited access to teachers' handbooks and teaching materials, the transportation difficulties and remoteness of schools often caused turnover of novel teachers. In terms of working conditions, one participant mentioned, "since I have been appointed for teaching position in rural school, I barely have time to think about my own life, all I need to think about is my work, my new roles and my students". At the same time, two maths teachers felt like they were forced to teach out-of-field and handle multiple disciplines and classrooms.

Although many rural education studies addressed the issue of salaries or incentives as a critical one in career satisfaction, these participants did not mention that low salary/incentives influenced their personal desire to work in rural schools. Being challenged by different circumstances, they felt like their teaching skills were gradually improved and also with multiple social integration made with the community have helped them endure their motivation and willingness to stay. Difficult school conditions forced them to be more innovative and creative teachers. These factors, indeed, were perceived by them as beneficial factors in boosting their aspirations and encouraging them to gain as much experience as they could during their initial placement in rural and remote settings.

Discussion

Factors Contributing to the Retention of Teachers in West Papua

Studies of the perceptions of urban teachers towards their teaching placement in rural and remote settings have been done in several countries with particular focus on teacher recruitment and their retention in rural and remote schools (McCallum & Price, 2016; Trrinidad et al., 2012; Clayton & Cuddapah, 2011). All the participants in this study agreed that the proposed program called Sarjana Mendidik di Daerah Terdepan, Terluar dan Tertinggal (SM-3T) has successfully engaged many urban teachers to participate in the provision of better education in 56 rural regencies across Indonesia. However, their perceptions of the program effectiveness was based on anecdotal evidence rather than on research. Despite of the perceived achievement of the program, personal opinions of the participants cannot be used as a measurement of its effectiveness in comparison to other types of teacher preparation and other professional development programs.

There is a need to explore these programs further, beyond teachers' individual accounts of their personal and professional experiences. In respect to rural placement, the four participants in this study emphasised that their initial preparatory course was actually irrelevant to rural contexts. The program did not provide appropriate theoretical tools for teachers to reflect on their personal and professional performance. The participants pointed out that there was a gap between the theory and its practice in terms of the program's curriculum design (Corbett, 2016; Walker-Gibbs, Ludecke & Kline, 2015; White & Kline, 2012). Other points that contributed to the lack of practicalities in the fields are the implementation of metro-centric theories (Green, 2013), the absence of place-based approaches in both curriculum and lesson plans (Gruenewald, 2003; Lamb, Glover & Walstab, 2014), misconceptions of rural representations (Cuervo, 2012), and the inadequate duration of the required practical learning (Halsey, 2006; Roberts, 2004).

These shortcomings, indeed, contributed to the dissatisfaction of participants about their preparation for work and life in West Papua–a geographic area that is still highly considered as the most challenging among other regions listed by the SM-3T program. In terms of the research question about factors contributing to the retention of teachers in rural schools in West Papua, the participants' perceptions of their adjustment and adaptation to multiple challenges, opportunities to experience local values and life styles, collegial relationships, awareness of acceptance and appreciation, as well as opportunities for personal growth seemed to be the dominant factors affecting on teacher retention. Support from a local community, in particular, prompted positive attitudes, aspiration and supports for teachers to remain teaching in rural and remote schools. As stated by White et al. (2010, 2011), Reid et al. (2011) & White & Kline (2012) teachers who consistently experienced broader cultural understanding, learned local values and life-style and made effort for social integration with the community are likely able to cope with any particular circumstances when appointed in unfamiliar teaching and learning locations.

The data from this study showed that the participants remained in their new positions as rural and remote teachers due to their personal ability to cope with adjustment processes and socio-cultural integration they have gained through experiences and lessons from their everyday challenges. These teachers agreed that rural life and teaching experience were more challenging, yet rewarding for them personally and professionally. Equally, this findings showed the importance of motivation to work in rural schools and positive thinking in challenging conditions such as poor living conditions and differences in cultural backgrounds. In difficult times and complex situations, these participants were able to sustain a positive mindset and became more resilient by reinforcing their initial motivation to work in rural schools through daily evaluations and reflections.

Supporting these findings, previous research demonstrated the importance of teachers' motivation, aspiration and positive attitudes in dealing with new living and working environments. Rice, McFarlin, Hunt & Near (1985), for example, explained that the person/individual would bring a supply of abilities to adjust with the environment and demands as the environment satisfies certain personal needs and in turn, the environment makes demands on the person/individual and supplies the person with huge opportunities to improve by getting certain resources from surroundings. As a result, when referring to participants' stories, the internal motivation to remain in the profession was firmly shaped by the opportunity to learn new socio-cultural knowledge and valuable lessons from their surroundings.

Professional Learning through the SM-3T Program

Reflecting on the critical responses about teacher retention earlier, there is a strong need to explore further work and implementation in which the SM-3T program influenced teachers' personal and professional growths in rural settings. For most participants, the professional growths they made have positively impacted on the improvement of their interpersonal skills. They were fully aware that work in rural schools changed their lifestyle, attitudes, and perspectives towards rural life (Lester, 2011; Hudson & Hudson, 2008a, 2008b). The geographical conditions and socio-cultural challenges found in West Papua were considerably seen by them as alternative contexts for teacher to learn. Research also suggests that, unlike in urban schools, working in rural settings can be beneficial for beginning teachers in terms of building their capabilities and skills (Wildy, Siguroardottir & Faulkner, 2014). Hence, many rural education researchers suggest that all teachers and/or educators should be given more

opportunities to apply for rural career through teaching placement and working agreement (Hudson & Hudson, 2008a, 2008b; Lyons, 2009; Jenkins et al., 2011; Jenkins et al., 2015).

Teachers, who were open to local wisdom and/or developed multicultural understanding by learning new cultural values and languages, involved in various community service and religious activities, and established mutual relationships with the local community, were likely to have a higher sense of self-efficacy and commitment in the profession (Hart, 1994; Louis, 1998). Similarly, White et al., (2009) and Hazel and McCallum (2016) emphasised that teachers, who constantly engaged in community service and learned from the everyday challenges, were able to develop a sense of belonging and positive attitudes towards others. Therefore, the challenges and difficulties experienced by participants in this study contributed to their professional and personal formation. These participants added that rural teaching positions have changed their perceptions of local people who remain 'invisible' for most Indonesians. The appreciation and the feeling of being welcomed, and the chance to experience the diverse multicultural images, local hospitality, and strong values of people in West Papua have strongly support teachers' learning process and promote the accountabilities of the program which mainly designed to induce professional learning for teachers and educators.

Conclusion

The overall results from this study, however, are not about making particular judgements about the effectiveness of the professional development program. Rather, the study has sought to understand experiences of teachers that go beyond their preparation and into the lived practices in more diverse and multicultural teaching contexts, particularly in rural and remote schools. The findings of this case study show some positive experiences and reflections on working/living conditions of four urban teachers who taught for twelve months in rural districts of West Papua. The findings provided answers to the following research questions: what factors contribute to the retention of teachers in West Papua, and what factors impact on teachers' personal and professional growths. Although many studies have mentioned that most urban teachers are reluctant to work in rural schools and are likely to experience turnover during their first placement, teachers who participated in this study stated that professional aspiration and personal motivation play an important key role in their decision-making for choosing rural career and staying in the profession. Well concepted initial preparation prior rural teaching placement with more relevant content, specialised pedagogical knowledge and more contextualised life skills about rural living would benefit these teachers perform better as the would feel more prepared and competent with their new role. Promoting rural and remote placement and employment opportunities can be a successful pathway for building a highly dedicated teaching workforce for diverse and multicultural areas in Indonesia and would help closing the education barrier between urban and rural remote school. Finally, this study identified some factors contributing to positive experiences and retention of teachers in rural and remote schools of West Papua. Further research is needed to explore experiences of teachers on a larger scale in order to address shortages of quality teachers, reduce their attrition and ultimately improve education of children in rural and remote Indonesian schools.

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Physics Teachers' Conception of a Supportive Learning Environment

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Abstract
The 2018 result of the Programme for International Students Assessment (PISA) shows below-average Filipino students' scientific literacy. Trends in International Mathematics and Science Studies (TIMSS) show the same result even after implementing the country's revised basic education curriculum. These findings from international assessments call for an analysis by researchers and policymakers to explore the possible interplay of curricular variables contributing to the Filipino students' challenged scientific literacy. This research article seeks to account for Filipino physics teachers' experiences and exposition of their patterns of thoughts regarding critical aspects of classroom instruction. Physics teachers from various provinces participated in a semi-structured interview, and their responses were subjected to thematic analysis. The results reveal several factors that contribute to deter the achievement of quality physics classroom instruction. Practitioners in the field cited critical factors that must be considered and subject to continual study to create educational policy support.

Keywords: Physics Education Challenges, Improving Physics Education, Physics Teacher's Experience, Successful Physics Classroom

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Introduction

The low student achievement in Physics of Filipino students is not a new trend in Philippine education. Local studies have long documented this physics education dilemma (Orleans, 2007). International evaluations on the quality of science, mathematics, and reading of Filipino students enrolled in basic education, such as the International Association for the Evaluation of Educational Achievement in 2004, were reported below the international standards threshold. The latest 2018 Programme for International Student Assessment (PISA) result shows that Filipino Students' Mathematical and Scientific Literacy falls below the average standard set by the Organization for Economic Cooperation and Development (OECD). Department of Education (DepEd), as the countries' primary basic education institution, is very keen on recognizing the relevance of PISA and TIMSS's results. In its official statement, the institution (DepEd) has assured the public of its introspection into the gaps and issues hindering the acquisition of the country's quality basic education. These international assessment results provide a fertile ground for introspection by educational researchers, practitioners, and policymakers. It is important to note that a comparison between the international competencies measured by TIMSS and the local competencies as stipulated by the K-12 curriculum showed remarkable disparity (Balagtas, et.al., 2019). In the sciences, competencies included in the assessment done by TIMSS were not present in the curriculum for that grade level but are present for the next grade level. Hence, it comes with a minor surprise that the evaluation would yield poor results. Equally important is the research's context of secondary education curriculum and not on primary education curriculum. Only primary education participated in the latest TIMSS and not the high school.

A complete understanding of this phenomenon is inarguably not a straightforward task. It possibly involves complex factors and complex relationships among variables that consequently led to the country's below-average performance in mathematics and scientific literacy. It is noteworthy that the Philippines transitioned from its 10-year basic education to 12-year basic education in 2013. With the Department of Education's ardent hope, its participation in the 2019 TIMSS could gauge the effectiveness of this new enhanced 12-year basic education curriculum and its delivery system. Moreover, this descriptive research aims to provide an introspection to the dynamics inside the science classrooms and the teaching-learning process. The problem of curricular competencies disparity between international assessment and our local curriculum is not the focus of this study. However, we have set our research on how our teachers are doing concerning the acquisition of our local curriculum. Setting the lens of our analysis on the actual classrooms will provide us with a perspective on the actual dynamics of teaching and learning and rid ourselves of the preconceived conceptions explaining science and mathematics achievement's status quo. The analysis is centered not on the intended or written curriculum such as that of Balagtas, et.al. 2019 but will focus on less looked upon aspects of the curriculum. These curricular aspects may be unknown to the researcher and will be deducted from the qualitative data through thematic coding.

In gathering the qualitative data, the semi-structured interview is purposively utilized to allow a maximum degree of freedom for the teachers to express their patterns of thoughts over the open-ended questions. In this manner, the researchers can directly probe into implicit reasoning in their responses and allow a thorough exposition of the teachers' viewpoint, reasoning, and thought patterns over critical questions on their classroom experience. This research article will allow researchers and science educators a radical exposition of the lived

experiences of the physics teachers and their viewpoint on critical issues affecting the Philippine basic education classroom.

Methodology

Data

Several teachers were sent letters of invitation to participate in the study along with the consent form explicitly stating the extent and nature of their involvement in the study and how their anonymity is secured. Among them, eight in-service physics teachers responded positively and undertook a semi-structured interview. The minimum inclusion criterion is that the teacher respondents must have taught physics in secondary schools for at least two (2) years. This ensures that they have an experiential grasp with which they will base their responses on the question. Moreover, this ensures that they have mandatorily undergone the Teacher Induction Program (TIP) by the Department of Education (DepEd). TIP is an institutionalized continuing professional development program designed to provide a comprehensive and systematic support system for teachers from 0-3 years of experience (DepEd). The teacher respondents' range of teaching experience ranges from 2 years to 11 years. Three (3) of which have master's degree in Science Education, four (4) are working with their master's degree, and one (1) bachelor's degree. They are scattered in three adjacent provinces in Mindanao, and the schools with which they are affiliated include rural and urban settings. Each of them is coded as follows [ISTI1,…, ISTI8], which means In-service teacher 1 and so on.

Instrument

The interview questions were carefully drafted and deliberated among the authors to ensure no leading question and the questions are as open-ended as possible. In the interest of probing into the implicit reasoning of the participants' responses to the questions, a semi-structured interview is fitting to exposit their patterns of thoughts to allow a more significant opportunity for expression.

Data Analysis

Recorded interviews were transcribed for qualitative analysis. The authors carefully read through individually transcribed interview responses, and anecdotes were taken. Individual anecdotes were further summarized in the second analysis cycle based on individual responses to the open-ended questions. In the third analysis cycle, patterns were deduced from their individual responses. When individual patterns were deduced from individual interviews, it is compared among the eight (8) responses to see which themes are interlinked and supported across the responses. This leads to the figures in this study that synthesize the themes from the quantitative analysis of data.

Findings and Discussion

This section deals with the discussion of the interview responses on the conducted semi-structured interview with in-service teachers. This will provide us with an overview of the challenges encountered in physics instruction, the skills they deemed essential to develop in the students, and how each of these constructs is related to each other. Although the sample cannot be taken as a complete representation of the population due to its small sample size, it

can describe the in-service teachers' statuesque. This can serve as an essential piece of information that could help direct interventions and support that is aimed with their context.

1. Teachers' Conception of a Successful Physics Classroom

The teacher-respondents show a consensus that a successful physics classroom is tied with sufficient hands-on instrument. It is essential to point out that what they mean by an instrument is solely referring to "laboratory equipment" and less on other instruments such as computers, televisions, and projectors. It is also noteworthy that this is a typical response for both local and urban schools. This agrees with the belief that Physics is a discipline founded on a conceptual basis but is grounded on experimentation (Ince et.al., 2015). The emphasis is heavily stressed on the hands-on instrument and is evident in their responses, which could be evidence of its lack. Studies reveal that material insufficiency is one of the frequently experienced challenges in teaching Physics through hands-on methods. Consequently, teachers' rate of experimental application in class is meager (Onyesolu, 2009). To quote one of the verbatim responses of ISTI7, "It is very hard to let them understand if you will not use experiments. If you just keep on talk and talk, it is in vain, the students will not understand. You should be able to visualize and do hands-on. It is also documented that insufficient funding for equipment and supplies is the most severe concern for the secondary physics teachers (Tesfaye & White, 2007). This study is in the context of a U.S. classroom, a more affluent country in terms of financial resources. Suppose material and fund insufficiency persists on this country. In that case, it does not come as a surprise that it is also among the challenge grappled in developing countries, such as the Philippines.

Although the interviewed in-service teachers utilize alternatives such as simulations, videos, localized demonstrations, and materials, they use these to ameliorate the lack of a hands-on instrument. After analyzing the interview transcripts and how they respond to the questions, alternatives are their last resort. It could be avoided if hands-on equipment in Physics is available.

In addition to the necessity of instruments for a successful Physics classroom, the utilization of rich-activities in the classroom is another defining attribute of a successful Physics classroom. National Science Teacher Association (NSTA, 2007) highlighted the role of hands-on activities in improving students' acquisition of science skills and sustained interest. The respondents uphold the firm belief that interactive activities are indispensable for an ideal physics classroom. Moreover, in-service teachers argued that these activities must be anchored on real-life daily experiences of the learners. This allows students to easily relate to the learning material and be actively engaged since it is within their grasp of reality. They claimed that even abstract topics must be crafted with an activity that is relatable to the students, although they conceded that it is not always possible. The utilization of rich-activity such as laboratory experiments is one efficient means of comprehending complicated and abstract theories more straightforward with greater clarity (McDermott, 2001). The extent of real-life application is limited to the way activities are designed and the regular daily conversation of the students.

A respondent stressed that it is a mark of success in Physics instruction when the taught concepts are seen in the learners' daily conversational dialogues. This means that the students recognized the mechanisms and physics principles at work as they observed their immediate surroundings and experiences.

Aside from these, respondents also expressed the need for innovative pedagogy. Innovative pedagogy is vital since the teacher who serves as a facilitator must be cautious in designing the learning environment. They argued that instruments and activities are rendered useless unless the teacher employs innovative pedagogy. Hence, it veers away from the traditional chalk-and-talk technique, which involves computer technology in instruction. As Edgar Dale pointed out in his second revision of the cone of experience in 1954, a teacher must consider carefully planning and using media in classroom instruction to create a rich learning experience. Dale describes a rich learning experience as a learning experience that revolves around more concrete level activities and considers the interplay of concrete and abstract levels depending on the classroom's need and the nature of the learning task (Garrett, 1997).

2. Skills Teachers' Deemed Most Important

Norris and Ennis in 1989, defined critical thinking as rational thinking that is focused on decision making what to do and what to believe (Garcia, 2015). In a psychological context, it is defined as "the mental process, strategies and representations people use to solve problems, make decisions, and learn new concepts" (Sternberg, 2000; Lai, 2011). Critical Thinking is the most commonly cited skills by the respondents. It is reported that this is one of the skills where Filipino students are having difficulty with (Marquez, 2017; Ramos, 2018). The Manila Times article in 2018 shows the decline of Filipino critical thinking from an already low base. Researchers attributed this to the rote memorization present on the schools' pedagogy. Teachers' challenge in the students' critical thinking spans students' logical understanding of solving word problems, following logical inferences in a word problem, and rational decision-making in solving students' problems. On a more modest scale, teachers documented that simple analysis of video and simulations poses challenges to some learners. Hence, these teachers practice modifying the questioning patterns in the activity and simplifying what is meant to facilitate the learners' analysis and comprehension. Although it was reported to provide promising results in the students, the teacher's instructional time is consumed.

Equally important is the skill of comprehension. In our context, respondents define comprehension as understanding the written texts, analyzing the given variables, and what is asked. Comprehension primarily needs the students' ability to read sentences and make sense of what they are reading. Although relatively few, students who have not fully mastered the reading skills have reached high school. One respondent admitted that the result of Phil-IRI (Revised Philippine Informal Reading Inventory) in their school revealed that they have high school students who are non-readers. Phil-IRI is an assessment tool utilized by the Department of Education (DepEd) in measuring and gauging students' reading performance. DepEd recognizes literacy improvement as a pressing concern for the country's education and has launched its flagship program, "Every Child A Reader Program" in 2017. Although these studies do not claim representation of the country's population, evidence from interviewed teachers that the unmastered reading skills are persisting even in high school. Logically, the development of comprehension skills is hampered and rendered impossible because of the students' very fundamental problem of reading readiness.

In addition, to aid in the achievement of comprehension is the need for hands-on manipulation. According to the physics teachers, this is one of the most stressed attributes of a successful Physics classroom. The hands-on manipulation anchored on real-life situation activities leads to an easier understanding and appreciation of a concept. This is similar to McDermott's statement in 2011. A rich-learning activity such as a laboratory experiment is

one efficient means of making the comprehension of complex and abstract theories simpler and more straightforward. Moreover, the skill of hands-on manipulation can be supported by the use of technology and computers. Most of the high-end laboratory equipment today utilizes computers to manipulate, gather, store and analyze data. Hence, basic computer skills are an essential skill in this technology-driven age in our educational context. Physics teachers have utilized PhET simulations and localization whenever an actual physics instrument is non-existent in the school. The use of simulations is their means of providing a closer experience to the real thing.

Numeracy is also an essential skill that must be developed in the learners. It covers basic arithmetic operation, upgrading to algebraic manipulation, and its application in Physics contexts such as formula manipulation and problem-solving calculation. The majority of the respondents argued that the basic arithmetic skill is a fundamental skill that should have been developed before entering high school. However, this is not the case, and it further complicates the achievement of the curriculum's intended learning outcomes, especially on competencies that require mathematics skills.

Overarching the core skills such as critical thinking skills, comprehension skills, and numeracy skills is problem-solving. Problem-solving, which is reported as an essential part of teaching Physics by the respondents, needs the development of critical thinking, comprehension, and numeracy as prerequisite skills. Thus, it poses a significant challenge for a teacher employing problem-solving in Physics when either one or all of these prerequisite skills are unmastered or underdeveloped. This relationship can be illustrated in the figure below.

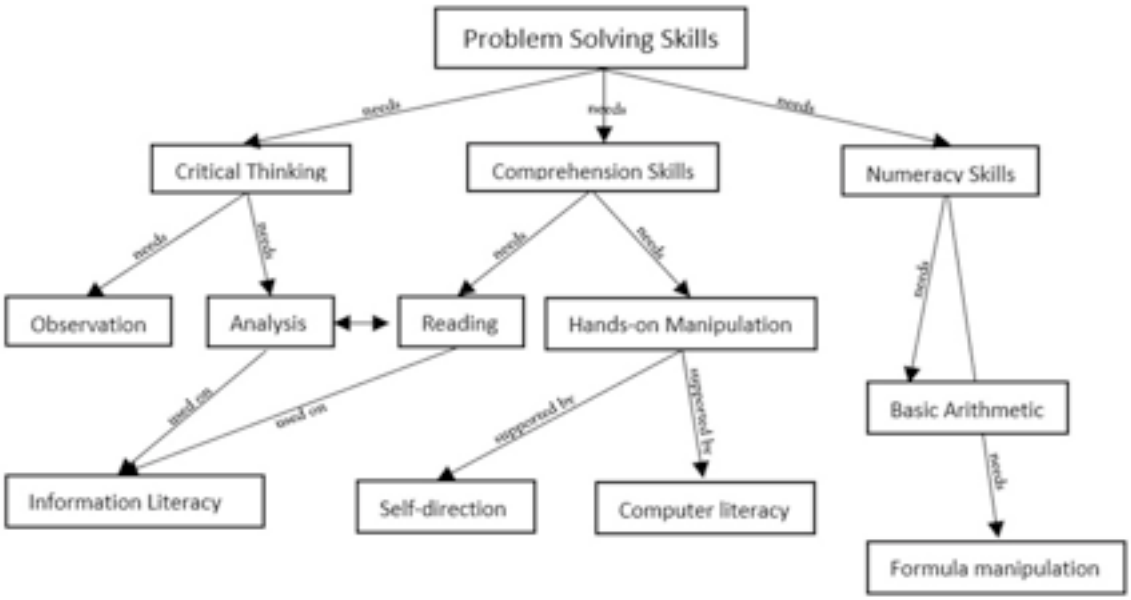

Figure 1: Necessary Skills to Be Developed

Challenges Encountered in Teaching Physics

The challenges met by the respondents can be summarized into four (4) broad categories. These are literacy, numeracy, facilities, and real-life application. This is reflected in the figure below.

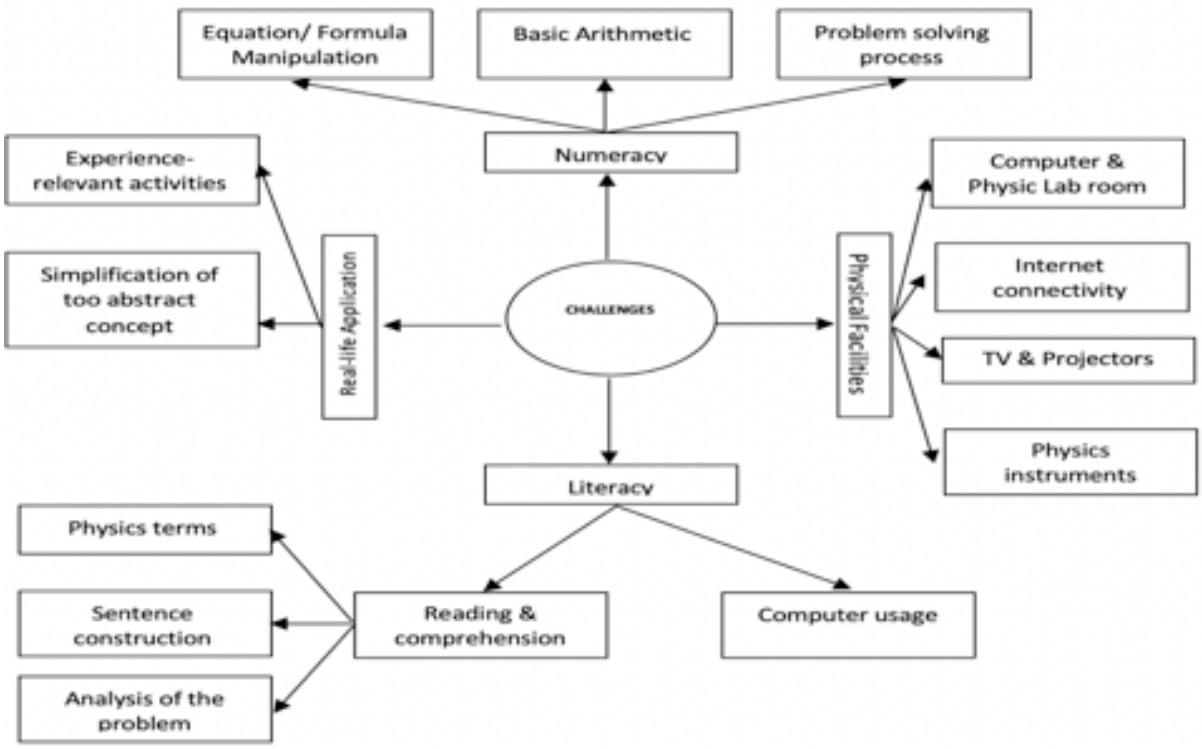

Figure 2: Challenges Met in Physics Instruction

All of the respondents experience the challenge of unmastered numeracy skills. The numeracy challenge covers basic arithmetic, manipulation of formulas or equations, and the standard process of solution generation. One extreme example is reported for a Grade 12 student who cannot perform basic division [ISTI7]. It is also documented that students cannot add simple fractions even in Grade 10 [ISTI5]. Although a generalization should not be made, most of these cases are isolated to hinterland schools. Urban school communities experience the problem but relatively mild compared to the hinterland school community. This means that this problem persists for Grade 7, but as grade level progresses, it becomes less and less of a problem. On the justification of hinterland school communities, a possible reason for very low numeracy is cited by one respondent [ISTI3] who said that her students' priority is on farming and providing for their basic needs. Hence, education is regarded as a less priority.

On equation and formula manipulation, it is reported that students find it challenging to manipulate the arrangement of variables in an equation to get the desired arrangement depending on what is asked in a problem. It is also related to a documented case, where students know the equations to be utilized but are clueless on how to proceed or where to start. Even identifying variables such as initial pressure and final volume is still a challenge for some high school students. Consequently, the process of solution generation in arriving at an answer is a challenge for the learners.

In literacy, it is divided into two: reading comprehension and computer literacy. Although it is reported to be very few in a classroom population, students who cannot read are present in every sampled school community. As reflected by a Philippine-classroom context study, “students exhibit struggles in understanding the concepts of science as well as exercising the skills needed to be a proficient reader” (Imam et.al., 2014). The respondents report that the reading comprehension challenge's nature is on understanding the sentence and the technical

terms involved in physics. Consequently, teachers allocate extra time, which could have been used for other purposes, just to refine and simplify their way of delivering questions, simplify the instruction, and even to the point of vernacular translation.

Surprisingly, it is reported that when a vernacular translation is used, the students can arrive at the solution. This means that the problem is really comprehending the word problem in the English language and not the word problem itself, as is claimed by [ISTI7, ISTI6, ISTI2]. Problem-solving of Filipino-English bilingual students suggested that the difficulties that the students experienced in understanding arithmetic word problems are possibly magnified for students who have to solve the word problem written in their second language (Bernardo, 2002). This leads to the teachers to simplify the problem whenever possible and avoid the use of unfamiliar terms. Also, visualization of the problems or concept through sketches is a useful tool to understand better. This is also done to avoid misconceptions generated through an individual's own imagination of the concept.

Computer illiteracy is also reported for the majority of the respondents. Even the operation of turning on a computer and basic encoding is already a challenge for many students. This is supported by the data gathered by South East Asian Ministers of Education Organization-Innovation and Technology (SEAMEO INNOTECH) Philippines in 2001 where among the 45, 811 schools, only 14.28% or 5, 217 schools have computers, 18.24 % of the schools have proficient staff in terms of computer use and a minute 13.13% have schools' heads with ICT training in the last five (5) years (Bonifacio, 2013). These challenges faced by the teacher can be attributed to the lack of computers at home, and their use in school is deprived due to the absence of computer labs, or if there is, it is allocated for the use of a specialized strand or subject. However, it is reported that even in the hinterland school community that uses solar panels as an energy source, the wide use of android phones. The respondent estimates that 80% of his class has a mobile phone supported by the android operating system.

Facilities in schools is one of the highlighted problems by the respondents. This includes the insufficiency of physics laboratory instruments, physics laboratory rooms, computer laboratory, computer and internet access, T.V. and projector. Insufficiency of physics laboratory instrument is the primary concern of the respondents. They reported an insufficiency of available resources that they can use in teaching specific concepts in Physics. A similar observation in a Philippine classroom is documented.

"The lack of advanced laboratory materials and equipment also exacerbate the poor condition of teaching-learning process and the insufficient resources of a teaching tool, techniques, and strategies in science aggravate the difficulty to achieve the desired skills and competencies". (Linog et.al., 2013, p.47)

Moreover, the lack of hands-on approach deprives the students of collaboration, which may facilitate peer-learning (Scheckler, 2003). As a resolution, they resort to the use of simulation and videos instead. It is clear from their manner of answering that they prefer the actual tangible physics instrument over the "sensually-limited" simulations and video. This is reflected in their view of a successful Physics classroom as highly facilitative of hands-on learning. The use of simulation and video is also far from ideal because of the lack of computers to cater to individual students. Although Dep-Ed has provided tablets in the two hinterland schools where our teacher respondents are currently teaching, it is not readily available for the former school; the latter school has an issue of 9 tablets allocated for 23 students. As a result, very few of the students can readily participate in the actual

manipulation of the simulation. Moreover, a worst-case scenario was reported where the teacher [ISTI3] just showed a video or simulation on her laptop towards 37 students. According to her, that set-up was not ideal for students, but it is the best they can do with the state of their resources.

The final challenge cited is on real-life application. The respondents find it challenging to create an activity relatable for the students who have experienced it first hand. They also noted that some aspect of the concept is too abstract and contains too much idealization or assumption which is not the case in an actual situation. Laboratory experiment utilization is a viable suggestion for practice (McDermott, 2001). However, lack of instruments is a problem that is currently experienced in almost every interviewed respondent. One teacher's [ISTI1] initiative in letting them experience projectile motion in the real-life application allows her students to play volleyball. She noted that it is a very crude experience compared to the theoretical aspect of projectile, where one can easily manipulate the projection angle. In real life, that is simply too complex to do. In terms of too complicated and too abstract Physics concepts, they reported having the most significant challenge in simplifying the activity and crafting it so that students have an experiential grasp of the concept presented in an activity.

Conclusions

The study results reveal that the challenges faced by Physics teachers can be broadly categorized into literacy, numeracy, physical facilities, and real-life application. Among others, the availability of instruments in teaching Physics is one of the most stressed defining attributes of a successful Physics classroom. However, it is also where the teachers find most challenging to acquire in their school localities. Classroom instruction in Physics is significantly deterred and affected because of this persisting problem in public schools. In addition, literacy and numeracy challenges and the lack of physical facilities further amplify the current dilemma. If unaddressed, it will continue to impact the quality of science education in the country negatively. It is also important to point out that the ideal classroom that the teachers defined is also the same thing that they find challenging in their practice given the current state of educational support from the government. In technological resources, laboratory materials, learning spaces, and teaching aids, a supported curriculum is a determining factor in impeding instruction's successful delivery. The study's result also showed that the skills deemed necessary by the teachers in a science classroom are the same set of skills that they are having difficulty developing. This is interesting because it reveals that the teachers in their classroom instruction are deeply aware of the set of skills needed by their students, such as critical thinking, numeracy, and comprehension, yet have a hard time developing these skills. Future quantitative studies are suggested to look for correlation, if there is, between the level of supported curriculum and these skills' achievement. Also, cross-analysis on how these cited challenges mediate the result of skill acquisition is promising for research exploration.

Suppose the Philippines basic education sector envisions the improvement of science literacy. Focused attention must be addressed to the teachers' challenges, such as literacy and numeracy problems of high school students, which should have been developed in early elementary education. Government support on providing laboratory equipment in every classroom should be of prime importance since this is one of the hallmarks of a successful physics classroom as defined by the teachers. Relevant training and ongoing professional development should also be implemented to allow teachers to apply promising innovative pedagogy such as STEM education that is timely and relevant. Consideration should be in

mind such that they are provided support and training towards developing those necessary skills that they find challenging to develop in their students.

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The Effect of Gender and Learning Styles on L2 Learners' Writing Performance at Higher Education

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Abstract
The study attempted to measure the interaction effects of gender and learning styles toward writing performance. This study applied expost facto research design using questionnaire and test as instruments. The participants were 80 learners at IAIN Palangka Raya of 2019/ 2020 academic year consisting of 38 males and 42 females; 23 visual, 33 auditory, and 24 kinesthetic learners. A two way Anova test was implemented to analyze data. The analysis confirmed that gender (F= 5.248, p= 0.025), and learning styles (F= 8.722; p=0.000) contributed to give effect on writing performance. The study revealed that female was higher than male; and the visual learners got the highest score, followed by auditory and kinesthetic learners in their writing performance. On the contrary, between gender and learning styles (F=0.036, p= 0.956> 0.05 gave no interaction effect simultaneously on writing performance. It was suggested that lecturers provide the class appropriately to facilitate a variety of learning styles of learners. Further studies on learning styles with wider sample size in writing class was recommended.

Keywords: Gender, Learning Styles, Writing Performance, Higher Education

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Introduction

Despite the facts that there has been widely discussed about learners' learning style preferences, (Chen, S., & Zhang, J. (2008); Nuzhat, Salem, Quadri, & AlHamdan, 2011), there were still limited researches discussing the learning styles in the context of L2 Kalimantan learners at higher education. This study fills those gaps by considering gender. In fact, understanding learners' learning styles in L2 writing class is an important thing for L2 teachers. In EFL context, learning style deals with students' way to process information of a language. Moreover, Vester (2005) defines it as the way a learner perceives, organizes and recalls information. Many educators confirmed learning styles as one reason behind learner' unique (Nygaard, C., Højlt, T., & Hermansen, M., 2008). David Kolb was an expert of learning styles (1984). After that, Neil Fleming proposed VAK model (2001): visual, auditory, and kinesthetic learners. VAK is three types of learning style to exhibit learners preference by seeing, listening and touching. Moreover, Mackay (2011, p. 205) believes that VAK learning style can increase thelearners' ability. It is concluded that VAK is a learning style combining three sensory modalities by seeing,hearing and moving. Walsh (2010, p.8) states that it consists of visual, auditory and kinesthetic one. DePorter & Hernacki (1999, p.112) confirmed that the first important thing is to classify a learner's style: visual, auditory, or kinesthetic ones. Gholami (2013, p.70) believed that visual learners would like studying using visual ways, such as reading and viewing. The auditory prefer studying using discussion, conversation, and group work. Then, kinesthetic prefer studying using physical involvement. Moreover, Ghaedi & Jam (2014, p.1234) confirmed that the VAK model prefered to use of sight, hearing, and touch in learning process. In EFL classes, especially in L2 writing class, learners used various learning styles. Learners can prefer more than one of learning styles. In this case, teachers should use as many as possible of various teaching methods to provide learners' learning styles (Cuaresma, 2008). Instructor has to apply appropriate teaching method so that it is more appropriate with learners' learning style.

Some experts considered learning styles is important in language class (Rourke & Lysynchuck, 2000; Cassidy & Eachus, 2000; Ounwattana & Moungchoo, 2009). The study conducted by Naimie, at.al. (2010) revealed that agreement between teaching method and learning styles can improve better on learners' outcome. Then, Gilakjani (2012) found that visual and auditory were more preferred by learners. Gender also plays an important thing in students' learning styles. Next, Dobson (2010) found the correlation among learning style, gender and learning achievement. In contrast, Bidabadi and Yamat (2010) found that gender did not give effect on writing performance. Next, Wehrwein, Lujan, and DiCarlo (2007) showed that gender gave facilitative effect on learning styles.

Different with those researches, the study would like to contribute to the existing research by focusing on the simultaneous effect of gender and learning types on the learners' writing performance at higher education. The research questions of the study: (a) Do EFL learners with different gender differ significantly in their writing performance? (b) Do EFL learners with different types of learning styles differ significantly in their writing performance? (c) Do EFL learners with different gender and learning styles differ significantly in their writing performance? The aim is to measure wether there is a simultaneously influence or not of gender and learning types on the learners' writing performance. The novelty is that gender and learning types as variables that assumed to influence the learners' writing performance.

Method

This part covered the research method, design, participants, procedures, and analysis of data. The study belonged to quantitative paradigm of non experimental research. This study applied an expost facto research design using questionnaire and test as research instruments (Ary, at.al. 2010, p.641). This study also called causal comparative study. Here, the different characteristics of the participants were already existed. The questionnaire was used to determine the learners' preference on their types of learning style and their gender. The VAK model of learning style as proposed by Fleming (2001) was used in this study. Meanwhile, the writing test was done to see writing performance. The subjects were 80 L2 learners consisting of 38 males and 42 females; 23 visual, 33 auditory, and 24 kinesthetic learners as illustrated in Table 1.

Table 1. The Distribution of the Participants

Types of Learning Styles	**Gender**		**Total**
	Male	**Female**	
Visual learners	8	15	23
Auditory learners	28	5	33
Kinesthetic learners	2	22	24
Sub total	38	42	80
Total	80		

Procedures

The beginning step of this research, the questionnaire of 30 items was distributed to the learners to classify the learning style preferences. Then, the subjects were assigned to make a composition on the selected topic. Before analysing the data**,** the assumption test for analysis of variance (ANOVA) was conducted, such as testing the normality using Kolmogorov Smirnof test (Sig.0.343 > p. 0.050, and testing homogeneity (Sig. 0.773> p.0.050 (Pallant, 2000, p. 2) The output revealed that the data were normally distributed and not violated the homogeneity.

The null hypotheses were: (a) L2 learners with different gender did not differ significantly in their writing performance; (b) L2 learners with different types of learning styles did not differ significantly in their writing performance? (c) L2 learners with different gender and learning styles did not differ significantly in their writing performance. Here, there were two categorical independent variables: gender (male- female), learners' learning styles (Visual, Auditory and Kinesthetic learners); and one dependent variable: learners' writing performance. To analyse the data, a two way Anova was employed. Finally, the interpretation was made to see the interaction between gender and types of learning styles on the learners' writing performance.

Result

Data Presentation

The test was followed by 80 participants consisting of 38 males and 42 females; 23 visual, 33 auditory, and 24 kinesthetic learners.To respond the three research questions, the learners' composition were scored. The inter-rater reliability of the raters' scores was observed and it

was found to be 0.785, showing that both raters gave the balanced scores about learners' composition. The learners' writing performance was described in Table 2.

Table 2. The Learners' Writing Accuracy

Gender (X1)	Learning Styles (X2)	Mean	Std. Deviation	N
Male	Visual	72.7500	11.79285	8
	Auditory	64.2500	8.68214	28
	Kinesthetic	55.0000	7.07107	2
	Total	65.5526	10.05847	38
Female	Visual	79.4000	9.75998	15
	Auditory	71.0000	11.40175	5
	Kinesthetic	63.8182	10.33550	22
	Total	70.2381	12.36204	42
Total	Visual	77.0870	10.74038	23
	Auditory	65.2727	9.26780	33
	Kinesthetic	63.0833	10.29105	24
	Total	68.0125	11.49958	80

The table indicated that the average scores of each group as follows. The mean score of male visual learners was 72.75; Auditory 64.25; Kinesthetic 55.00. The mean score of female visual learners was 79.40; Auditory 71.00; Kinesthetic 63.81. The average score of both male and female visual leaners was 77.09; Auditory 65.27; Kinesthetic 63.08. The average score of male without involving learning styles was 65.55 and female was 70.23. The average score of all learners was 68.01. The learners' writing performance was described in Figure 1.

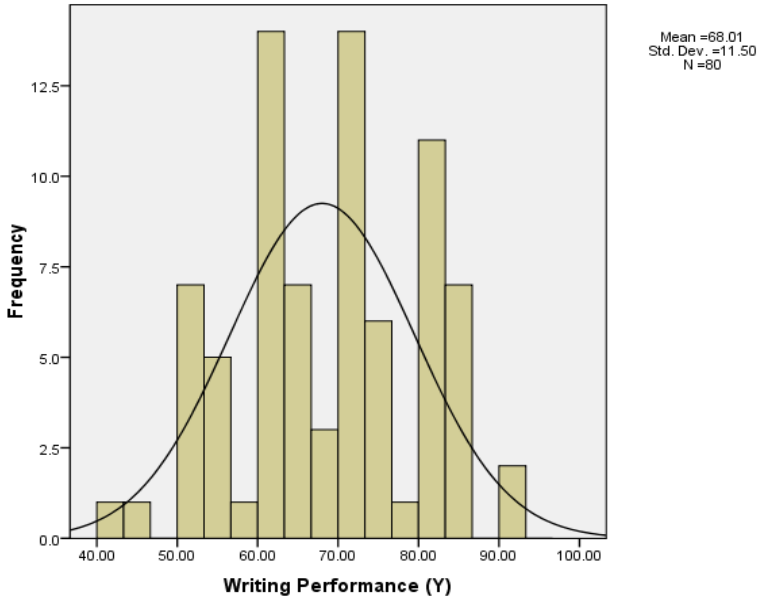

Figure 1. The Learners' Writing Performance

Testing Hypothesis

To respond the three research questions, the the two-way ANOVA table described as illustrated in Table 3.

Table 3. Tests of Between Subjects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3291.365[a]	5	658.273	6.808	.000
Intercept	169620.878	1	169620.878	1.754E3	.000
gender	507.432	1	507.432	5.248	.025
learningstyles	1686.765	2	843.383	8.722	.000
gender * learningstyles	6.947	2	3.474	.036	.965
Error	7155.623	74	96.698		
Total	380503.000	80			
Corrected Total	10446.988	79			

The output explained that the sig. value of the corrected model was 0.000 < 0.050 and F=6.808; it meant that it was valid to measure the interaction effect among the variables. Then, the sig of intercept was 0.000 and F=1.754E3 or less than 0.05. It meant that the intercept was significant. It meant the score, without influenced by other variables, gave contribution to learners' writing performance.The gender's sig.value was 0.025 or lower than 0.05; it confirmed that gender contributed to writing peformance. The significance value of learning styles was 0.000< 0.05; meaning that learning styles contributed to writing accuracy. The sig value of gender and learning styles was 0.965 >0.05; meaning that gender and learning styles simultaneously did not contribute to writing accuracy. The further explanation was as follows:

EFL Learners with Different Gender Do Not Differ in their Writing Performance

To response the RQ1: "Do EFL learners with different gender differ significantly in their writing performance?" the two-way ANOVA table explained the answer, as explained in Table 3 above. The output indicated that F= 5.248 (for gender) and sig. was 0.025 or lower than 0.05. It showed that there were a significant difference on writing performance caused by gender factor. In this case, female was higher than male in their writing performance. The average score of male was 64.00 and female was 71.41, as illustrated in Table 4.

Table 4. Gender (X1)

Dependent Variable: Writing Performance (Y)

Gender (X1)	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Male	64.000	2.664	58.691	69.309
Female	71.406	1.831	67.757	75.055

Then, based on Pairwise Comparison Table, it revealed the mean difference between male and female was 7.406 and the sig. value was 0.025. The difference mean occured between male and female on the learners' writing performance, as illustrated in Table 5.

Table 5. Pairwise Comparisons

(I) gender (X1)	(J) gender (X1)	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a] Lower Bound	Upper Bound
Male	Female	-7.406*	3.233	.025	-13.848	-.964
Female	Male	7.406*	3.233	.025	.964	13.848

EFL Learners with Different Learning Styles Do Not Differ in their Writing Performance

The output from Table 3 also indicated that the F=8.722 (for learning styles) and the sig was 0.000, or smaller than 0.05. It meant that there were significant differences on writing performance caused by learning styles factor. It indicated that visual, aditory, and kinesthetic learners differed significantly in their writing performance. The mean score of visual leaners was 76.08; Auditory 67.63; Kinesthetic 59.41. Here, the visual learners got the highest score, followed by auditory and kinesthetic learners, as explained in Table 6.

Table 6. Learning Styles (X2)
Dependent Variable: Writing Performance (Y)

Learning Styles (X2)	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Visual	76.075	2.153	71.786	80.364
Auditory	67.625	2.387	62.869	72.381
Kinesthetic	59.409	3.631	52.174	66.645

EFL Learners with Different Gender and Learning Styles Do Not Differ in their Writing Performance

The output of Table 3 also indicated that the F= 0.036 (for gender and learning styles) and the sig was 0.965> 0.05. This meant that differences did not occur on writing performance caused by gender and learning styles factors. It meant that both gender and learning styles did not give facilitative effect to their writing performance, as explained in Table 7.

Table 7. Gender (X1) * Learning Styles (X2)
Dependent Variable:Writing Performance (Y)

Gender (X1)	Learning Styles (X2)	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
Male	Visual	72.750	3.477	65.823	79.677
	Auditory	64.250	1.858	60.547	67.953
	Kinesthetic	55.000	6.953	41.145	68.855

Female	Visual	79.400	2.539	74.341	84.459
	Auditory	71.000	4.398	62.237	79.763
	Kinesthetic	63.818	2.097	59.641	67.996

This indicated that all independent variable did not give effect simultaneously toward learners' writing performance. Then, the value of R squared was 0.315. This indicated that the correlation was moderate. Next, the two way ANOVA was continued to pos hoc test. It was done to see the significant difference among the groups, as described in Table 8.

Table 8. Multiple Comparisons

Writing Performance (Y)

(I) learning styles (X2)	**(J) learning styles (X2)**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Visual	Auditory	11.8142*	2.67104	.000	5.4257	18.2027
	Kinesthetic	14.0036*	2.86937	.000	7.1408	20.8665
Auditory	Visual	-11.8142*	2.67104	.000	-18.2027	-5.4257
	Kinesthetic	2.1894	2.63805	.686	-4.1202	8.4990
Kinesthetic	Visual	-14.0036*	2.86937	.000	-20.8665	-7.1408
	Auditory	-2.1894	2.63805	.686	-8.4990	4.1202

The table showed the mean difference between Visual and Auditory was 11.8142* (Sig. 0.000) or lower than 0.05. This confirmed the difference occured among Visual and Auditory learners in their writing performance. Then, the mean difference between Visual and Kinesthetic was 14.0036* (Sig. 0.000) or lower than 0.05. This confirmed the difference occured between Visual and Kinesthetic learners in their writing performance. Next, the mean difference between Auditory and Kinesthetic was 2.1894 (Sig. 0. 686) >p=0.05. It was said that the difference did not occur between Visual and Kinesthetic learners. To see the further explanation on interaction effect among variables was illustrated in Figure 2.

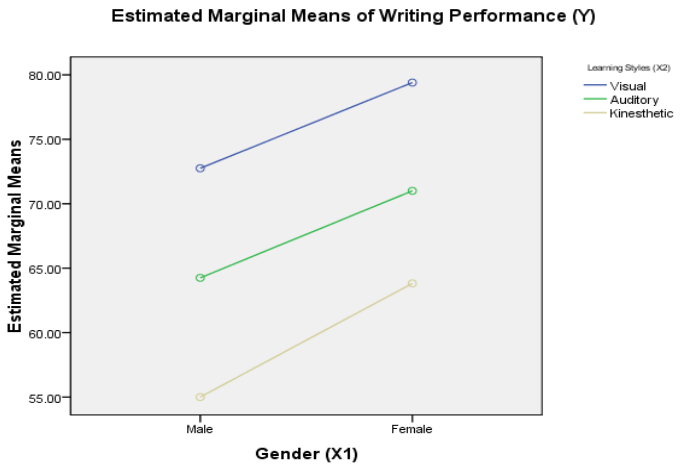

Figure 2. The Interaction Effect among Variables

Discussion & Conclusion

The analysis concluded that gender (F= 5.248, p= 0.025), and learning styles (F= 8.722; p=0.000) gave effect on writing performance. In contrast, there was no interaction between gender and learning styles was (F=0.036, p= 0.956) on the learners' writing performance. It indicated that both gender and learning styles did not give effect simultaneously on writing performance. This finding was supported with Ahmed (2012), Rambe and Zainuddin (2014), Rasool & Rawaf (2008). The finding was also in line with Gilakjani (2012), Dobson (2010), Solvie & Kloek, 2007; Chen, S., & Zhang, J. (2008); Pashler, McDaniel, Rohrer, & Bjork (2008); Franzoni & Assar, 2009; Kumar, Voralu, Pani, & Sethuraman, 2009; Nuzhat, Salem, Quadri, & AlHamdan, 2011).

The result confirmed that language instructors have to be aware of the learning style preferred by students. By doing so, teachers can choose appropriate teaching method in classroom setting. However, the learning style is just one important variable affecting the learning achievement. There were still many other variables affecting the successful learning. The research suggested that learners be aware of their learning style preferences. For pedagogical implications, lecturers should provide various teaching methods to facilitate different learning styles of students. The study has some limitations of this study. The participants of study were only 80 learners. Therefore, the finding could not be generalized to the targetted population in the university. It also only emphasized on gender and three types of learning style in L2 writing class. Therefore, the further studies are recommended to include some other variables such as, education background, learners' economic status, motivation, and multicultural background involved in the future study.

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Technology Integration: Implication for Teachers' Professional Development

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Abstract
The technology of today shortly becomes the technology of yesterday in education. The demand for Technology Integration is increasing as schools in the Philippines and abroad were required to keep up with the 21st century learners. It is quite a challenge to point out a starting ground without having to understand what it is and what is not. Studying related literature and reports have made it possible for the researcher to identify models which can effectively bring up success in the process of integration. Teachers must keep abreast with the changing nature of technology and provide learning opportunities effectively. This is because the integration process does not just fall on the specification of technology and application to be used, but more on understanding how to adapt it in the pedagogy of each subject area, how to equip teachers through continuous training programs, and most especially, moving towards professional development to empower the teachers. In order to understand Technology Integration, it would be helpful to look into how scholars define the term, explore how teachers can prepare, and how it is implemented as an educational experience. It is best when the focus lies on learning with technology rather than learning about technology, technology integration becomes more achievable because it is beyond what the tangible products may serve. The focus is how to use and when to use it more appropriately, having the pedagogy in mind.

Keywords: Pedagogy, Technology Integration, Professional Development

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Introduction

In the Philippine setting, schools have been trying to make efforts in Technology Integration. The Enhanced Basic Education Act under RA 10533 imposes quality education that is globally competitive through the Information and Communications Technology. One of the pressing issue today is how to prepare the teachers in implementing it. By the beginning of the 21st Century, School leaders were still faced with a major dilemma on how to effectively integrate technology into student learning experiences (Graesser, 2013). The onset of using technology in the classroom has been in the field for practice. Paperless classrooms have developed and teachers were becoming more aware of the usefulness of technology. It is when opportunities for professional growth and development come with more collaborative tasks for students in the classroom setting. What is very interesting in this study is the dilemma that the teachers face when it comes to integration. It is but a necessity today to be at par with globalization, but the starting ground may still be vague and needs full direction.

Today, school leaders have been in the process of keeping their teachers and staff updated through workshops, with the goal of bringing technology in a more proactive use. Administrators can only do so much in providing seminars and workshops, new technologies for usage, building computer laboratories, and the like. Conversely, one cannot just expect overnight success even if when all the technology at hand. There will always be different perspectives on how teachers use it in their level of teaching. Needless to say, the teachers are the key persons in implementing this as a classroom experience. According to Stobaugh and Tassell (2010), the application of digital technologies is no longer considered optional skills in the workforce. This is the time where technology is constantly changing, thus, it requires continuous adaptation to new tools. Considering that technology -- integrated with learning, -- is perceived to be difficult, research indicates that specific uses of technology support the improvement of student outcomes (Moeller & Reitzes, 2011).

It can be quite a drastic move to replace teachers with technology in the sense of leaving the technology on their hands without proper intervention. Teachers will always play a very important role in making the students realize how technology can be useful in enhancing learning experiences. Our students deserve to have teachers, including novice teachers, who are fully- prepared to meet their needs. In today's technology-rich world, it means educators need to be prepared to meaningfully incorporate technology into their practice immediately upon entering the classroom. Given the rapid pace at which technology evolves, faculty members need regular opportunities to both refresh their capacity and share innovative tools and strategies with other professors and teachers in the field, to ensure their technology use is contributing to learning and achievement. (Stokes-Beverley, C., Simoy, I., & Department of Education (ED), O. T. 2016). Technology integration perhaps has its way to alleviate not only the learning process of the students, but also the professional development of the teachers. New opportunities for growth are expected for both student and teacher because integration is a process of testing what is more likely conducive in a particular lesson, class, or setting.

One can expect the highs and lows of technology integration in every institution. Challenges will always be a learning ground to adapt and manage technology in ways that can provide an avenue for growth and development. It should be considered as an investment because there is no other way but to move towards innovation. This movement will not only support the needs of the students, but it will guarantee the entire institution a steadfast foundation when it comes to collaboration. Although it has been becoming a trend in the 21st century

curriculum, welcoming birth pains in accordance to the curriculum, content, and implementation, may not be free from criticisms and setbacks. Some researchers attribute the deficiency of effective technology-integration transfer in student learning to teachers simply not integrating technology into content areas, while other researchers believe that teachers struggle in using proficiency with technology (Davies & West, 2013).

Teachers are important providers of educational sustainability. Teachers' ability to adapt themselves to rapidly-developing technologies applicable to learning environments is connected to technology integration (Bentham, 2013). The factors influencing technology integration include human resources, as well as technological resources. In addition, administrators must also be aware of the current availability of resources that their school could offer. It is through an open mind that investments shall be made in order to provide quality technology. The market today has built varied computers, laptops and tablets which are kid-friendly, but the main concern lies on the planning. Teachers must be equipped with the skills to integrate technology seamlessly into their instruction, in ways that move beyond mere presentation and communication, to a place of creation, innovation, and problem-solving (Stokes-Beverley, C., Simoy, I., & Department of Education (ED), O. T. 2016). Therefore, there should be a significant move with the use of technology, from mere substitution to exploring further on the active use of technology.

If the curriculum dictates how our lesson plans should be conducted, then integration should also be first rooted on how curriculums are crafted. Technology may become so overwhelming, that it may not give desired results. When educators are driven with informal and vague instructions to implement such efforts, then proper orientation must first be made. In order to alleviate common problems and enable teachers to use technology effectively in their own teaching, teachers should be equipped with knowledge and skills to enable them to use such technology. (Erdemir, Bakirci., & Eyduran, 2009). Therefore, it is important that training should include technological tools appropriate to the subject matter, and provide teachers with on-going professional development.

Statement of the Problem

Technology integration in education has a multidimensional structure that consists of various components and indicators. In this vein, the factors influencing technology integration include human resources, as well as technological resources. Technology integration is defined as an efficient and effective use of technology embracing all aspects of learning and teaching processes, including learning and teaching environments, curriculum, and infrastructure (Yalin, Karadeniz & Sahin, 2007).

Specifically, this research essay will answer the following questions:
1. What are the important benefits of technology integration?
2. What are some of the suggested models being discussed in technology integration?

Review of Related Literature

This chapter presents a review of the literature and studies made about technology integration, models and framework, and the challenges of teaching with technology.

What is Technology Integration?

In order to understand Technology Integration, it would be helpful to look into how scholars define the term, explore how teachers can prepare, and how technology integration is implemented as an educational experience.

A study by Jolene Dockstader discusses the integration of technology into elementary and secondary school classrooms based on experiences at the Jerome Joint School District in the state of Idaho in the US, A definition was made possible by first determining what it is not, then gathering points on what constitutes its definition. She places importance in the notion that Integration is not putting computers in the classroom without teacher training. Integration is not substituting 30 minutes of reading for 30 minutes of computer skill development. It is, however, using computers to teach 30 minutes of reading. Integration is not providing application software, such as electronic encyclopedias, spreadsheets, databases, etc. without purpose. It is not pre-packaged programs that are often unrelated activities clustered around a particular topic that address few higher concepts or goals. Nor is it teacher-created programs that cover special interests and/or technical expertise, but do not fit content-area curriculum. Defining what technology integration is and is not is the first step in deciding how to integrate it into the classroom.

Integration is incorporating technology in a manner that enhances student learning. It is using software supported by the business world for real-world applications, so students learn to use computers flexibly, purposefully and creatively. Technology integration is having the curriculum drive technology usage, not having technology drive the curriculum. Finally, it is when the goals of curriculum and technology are well-coordinated and harmonious whole.

Dockstader proposes that in order to prepare 21st century students, teachers need to take the challenge of finding instructional techniques that will best suit their profile, and integrate the curriculum with technology.

In this regard, the teacher has been marked as a prime mover of the process. The teacher is the one who determines what and when a technology will come to play in the classroom's day to day activities. The choices made are based on the beliefs and practices that can contribute more into the learning experience of students.

Technological advances have led to a revolution in education, a revolution which has caused a multitude of changes not only in the way we learn, but also in the way that teachers are able to teach their students. With this, we have also seen an important change in the way education is perceived. We are now constantly researching and developing new teaching methodologies, which have radically changed the way teachers now approach the practice of teaching (Peris-Ortiz, M., Garrigós-Simón, F. J., & Gil Pechuán, I. 2014).

It has been well-established that technology is not a cure-all for improving classroom instruction (Ertmer, 2005); and within the classroom, an instructor must be able to use technology and connect it to the content (Pierson, 2001; Stobaugh & Tassell, 2011). A deficiency in either area can lead to failure; yet content and pedagogical knowledge are often seen as precursors to successful technology integration - a good teacher should be able to use technology in a pedagogically-sound way. Research over the last ten years suggests that in order for technology integration to be fully accepted in the classroom, the teacher needs to be a key stakeholder in the adoption process and help create the active learning process that will

allow technology to take root and grow as an indispensable tool of education (e.g., Arrowood et al., 2010; Ertmer et al., 2012). Both theoretical and practical research have focused on teacher beliefs (Dexter & Anderson, 2002; Hadley & Sheingold, 1993) in order to pinpoint how technology is integrated effectively into the classroom.

Theoretical Framework for Technology Integration

TPACK: Technological Pedagogical Content Knowledge (TPACK) Framework

Technological Pedagogical Content Knowledge (TPACK) attempts to identify the nature of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge. The TPACK framework extends Shulman's idea of Pedagogical Content Knowledge.

Technology knowledge is about certain ways of thinking about, and working with technology, tools and resources and working with technology can apply to all technology tools and resources. This includes understanding information technology broadly enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able continually adapt to changes in information technology (Koehler & Mishra, 2009).

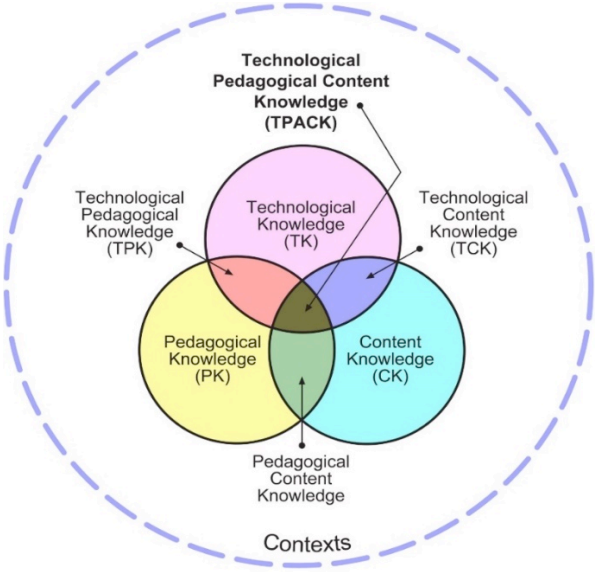

Figure 1: TPACK Framework

At the heart of the TPACK framework is the complex interplay of three primary forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). The TPACK approach goes beyond seeing these three knowledge bases in isolation. The TPACK framework goes further by emphasizing the kinds of knowledge that lie at the intersections between three primary forms: Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK).

Successful technology integration is rooted primarily in curriculum content and content-related learning processes, and secondarily in savvy use of educational technologies (Harris, Mishra, & Koehler, 2009). To effectively integrate educational technologies into instruction, K–12 teachers' planning must occur at the nexus of curriculum requirements, students'

learning needs, available technologies' affordances and constraints, and the realities of school and classroom contexts. The complex knowledge needed for such planning is known as technological pedagogical content knowledge (Mishra & Koehler, 2006) —"the total package" of technology, pedagogy, content, and context knowledge (TPACK) (Thompson & Mishra, 2007–2008).

Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts. Individual teachers, grade-level, school-specific factors, demographics, culture, and other factors ensure that every situation is unique, and no single combination of content, technology, and pedagogy will apply for every teacher, every course, or every view of teaching.

TPACK is not a brand new idea, nor is it owned by anyone. A range of other scholars have argued that knowledge about technology cannot be treated as context-free, and that good teaching requires an understanding of how technology relates to the pedagogy and content. The TPACK framework is gaining popularity among researchers and scholars. This makes tracking the progress of TPACK difficult, but for those getting started, the seminal description of TPACK (by that particular name) can be found in Mishra and Koehler, 2006.

Note that the emphasis in this approach to technology integration was upon content-based learning activities rather than the affordances and constraints of educational technologies that can support learning activities for students (e.g., Freidhoff, 2008). Because teachers' planning is conceptualized around content goals and organized according to learning activities, technology integration methods should be similarly focused. Possibilities for technology use should be considered according to the types of learning activities that have been selected, which, in turn, have been chosen to match students' learning needs and preferences (Harris, J. & Hofer, M. 2017).

SAMR Model

The Substitution, Augmentation, Modification, and Redefinition (SAMR) model is a four-level, taxonomy-based approach for selecting, using, and evaluating technology in K-12 settings (Puentedura 2006).

Puentedura's (2006) Substitution, Augmentation, Modification, and Redefinition (SAMR) model is a recent addition to K-12 teacher learning and professional development with respect to educational technology. According to the International Society for Technology in Education (2015) website, at the 2013 ISTE conference, only one session out of approximately 800 included the term SAMR. The 2014 Conference program featured 30 SAMR-related workshops and presentations out of approximately 900 total sessions; and among 1000 sessions at the 2015 ISTE conference, only 44 included SAMR (Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. 2016).

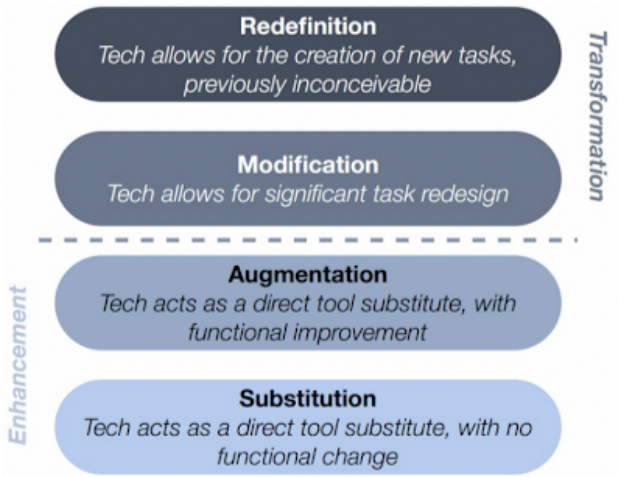

Figure 2: Puentedura's (2006) Substitution, Augmentation, Modification, and Redefinition (SAMR) Model (Retrieved from Http://Www.Hippasus. Com/Rrpweblog/)

According to Puentedura,the SAMR Model consists of the following four classifications of technology use for learning activities:

- Substitution: The technology provides a substitute for other learning activities without functional change.
- Augmentation: The technology provides a substitute for other learning activities but with functional improvements.
- Modification: The technology allows the learning activity to be redesigned.
- Redefinition: The technology allows for the creation of tasks that could not have been done without the use of the technology.

The SAMR model is rooted in its essence of proving an evolution of knowledge through the use of technology. Its vital part is identifying the use of various technology in the overall instructional design at each level of the SAMR model. It is progressive in nature and enhancements were made to transition from one level to another.

SAMR is a model designed to help educators infuse technology into teaching and learning."7 The model's purpose is to help teachers and professors design, create and implement learning activities which make use of technology, to transform and improve the learning experience for students. The model makes it possible to classify the cognitive levels applied in each learning activity paired to a specific level in the framework which has a form of a ladder (Schrock, K. 2018).

Despite its increasing popularity, there is not yet a theoretical explanation of the SAMR model in the peer-reviewed literature. Moreover, the only reference to its lack of theoretical explanation was found in Linderoth's (2013) blog post, in which the author shared in an open letter to Puentedura, inviting further dialogue and discussion. Puentedura shares his SAMR-related work–which largely consists of copies of presentation slides–via his website. Within these web- based materials, there exists limited explanations or details on how to understand, interpret, and apply the SAMR model – in part or as a whole. Moreover, there are few connections to theory and prior research, and there is limited qualitative or quantitative evidence to support the differentiation of the SAMR levels. As a result of this lack of theoretical explanations or explorations of the SAMR model, both teachers and others involved with educational technology integration, such as professional development

providers and technology specialists, may be led to interpret and represent the SAMR model in different ways.

In the SAMR model, the emphasis remains on the levels of technology use that teachers should align themselves with in order to move themselves along the hierarchical continuum of SAMR. This minimizes the more important focus on using technology in ways that emphasize shifting pedagogy or classroom practices to enhance teaching and learning (Hennessey et al. 2005; Hughes 2005; Windschitl and Sahl 2002).

Holistic Technology Integration: The P4 Framework for Professional Development

The P4 Framework for Professional Development considers not only the "tools" but the use of technology to enhance instructional practices, as well as the professional development of the teacher and general workplace productivity. This framework encapsulates more than just the use of technology in the classroom, but also extends to the pedagogical practices extending into the practical aspects of technology and teaching.

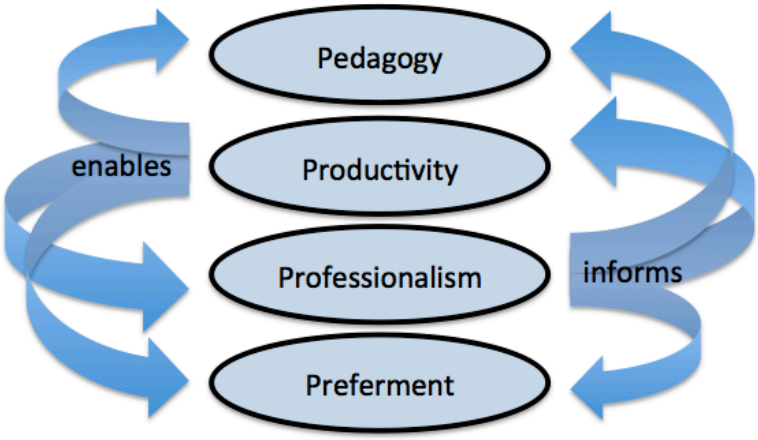

Figure 3: The P4 Framework p.11 (Jason, S. 2017)

It is important to understand the model by discussing Professionalism and Productivity first as a pre-requisite of the next elements which are Preferment and Pedagogy. Such order was made by Siko in the attempt to have teachers take ownership of their professional development (Professionalism); provide teachers with skills and knowledge needed to efficiently expand their knowledge base and create network of peers (Productivity); provide teachers with the underlying currents in educational technology (Preferment;) and relating technology decisions to pedagogy (Pedagogy).

Professionalism

Siko has taken the course of debate to define what a profession is. He acknowledged Finn (1953), as he was able to describe a profession as having:

1. an intellectual technique
2. an application of that technique to the practical affairs of man
3. a period of long training necessary before entering into the profession
4. an association of the members of the profession into a closely-knit group with high quality of communication between members
5. a series of standards and a statement of ethics which is enforced
6. an organized body of intellectual theory constantly expanding by research.

Having so, this builds into a Personal Learning Network (PLN). Teacher educators and leaders need to encourage teachers to seek out knowledge rather than expect it from their leaders. Teachers leaving a pre-service preparation program should have the tools to continue to learn outside of the classroom. Veteran teachers need the ability to continue their learning and access just-in-time learning. This is the goal of a Personal Learning Network (Siko, J. 2017).

The four Ps enable and inform the other, and thus are helpful in reaching a more efficient technology integration more appropriately based on the helpfulness in the learning environment. There has been a lot of framework made that focuses on the Pedagogy of the subject matter like Dewey's (1902) ICCE framework was an early attempt to define how instructional media could be used for student learning. More recently, the TPACK framework (Koehler & Mishra, 2009) emphasizes specific knowledge of teaching content as well as the application of technology in that content. Hughes et al. (2006) created a continuum of educational activities using technology and how it alters the activity in minor to transformative ways. However, this framework focuses more on the professional growth of the teacher having the pedagogy in mind and what it does to the educator in his attempt to enrich his professional growth with the use of technology (Jason, S. 2017).

Productivity

Educators may often complain that eight hours a day of teaching and grading is not enough. Some may tend to bring home paper works due to the high demand of tasks given, aside from usual teaching work such as preparation of reports, committee works, and other co-curricular activities. Therefore, when given technology-development courses, time is of the essence to study and implement new strategies in a given period. However, it is very important to identify the benefits of technology into their system.

Malcolm Knowles's theory of adult learning has listed six traits of adult learners that should drive professional development initiative. It is the learner's need to know; self-concept of the learner; prior experience of the learner; readiness to learn; orientation to learning; and Motivation to learn (Knowles, Holton & Swanson, 2005.)

According to Siko, one of the major hurdles when incorporating technology in professional development is getting staff to buy in. Teachers who want to further professional development must dedicate a substantial amount of their time. The instructional routine in integration takes a long period of time to alter current procedural practices.

He explains how avenues such as infrastructure, department or grade level, and the individual, can affect productivity in the school setting. Addressing the issues requires attention and resolution from the management in order to prepare and implement integration plans. Therefore, proper communication must be made to open the channels for specific needs and actions to be taken.

Preferment

Siko settled on the term *preferment*, which means advancement. Preferment is not simply teaching students how to use technology, but more importantly, giving them an assigned task which utilizes technology in a different way more than just substituting pen and papers.

Furthermore, it is not enough to simply teach students how to use technology. Many of them already know how, and many can probably operate devices better than the teacher in the classroom. However, just plunking down laptops or tablets in the hands of every student in the room does not increase academic achievement, nor does it create tech wizards of the future. He insisted that the problem is that we often mistaken consumption for production. Achievement has not increased because what teachers give them is basically the same and repeated. So then, the interest in technology wanes.

There is a wide variety of technology and how K-12 suggests using it. Taking into consideration the benefits of technology before having them use it is a very important aspect. The sense of using the technology to claim integration is not a shortcut to integration. The choice of technology, how and when to use it, should be carefully planned before any implementation.

Pedagogy

Pedagogy can be very specific to a content area and grade level. Siko's perspective in the planning stage suggested that teachers should be more hands-on when deciding on the range and content of pedagogies. Those who are well-versed on the everyday classroom setup and daily routine have the most knowledge on what the students need. In other words, the teacher in science has more profound ways of identifying pedagogies compared to a teacher from another subject. The best practices and strategies can be identified and determined from the previous experiences and the learning objective. In line with this, technology comes in with the instructional strategy of the teacher.

According to Siko, the approach with technology should be to solve some problems associated with the learning outcome. He pointed out how essential it is to identify what we want our students to attain that is measurable and not just the usual "what the students will know..." Specificity on the content areas are much appreciated in terms of identifying the instructional strategies. Alongside, the collection of data must be made while the strategy is being implemented.

Conclusions

Technology Integration is a struggle in today's curriculum. If not clearly defined, the efforts and financial initiative may not deliver a successful implementation. It is very important to first identify the definition of what it truly means to integrate technology in the school setting. Following Jolene Dockstader's view, technology integration is using computers effectively and efficiently in the general content areas to allow students to learn how to apply computer skills in meaningful ways. Discrete computer skills take on new meaning when integrated within the curriculum. Integration is incorporating technology in a manner that enhances student learning. It is using software supported by the business world for real-world applications, so students learn to use computers flexibly, purposefully and creatively. Technology integration is having the curriculum drive technology usage, not having technology drive the curriculum.

However, the definition may not supply sufficient answer on how to do it. During the course of literature review, strong and effective technology integration includes professional development. The paper suggests following Jason Siko's P4 Framework for Professional Development, A Holistic Technology Integration approach.

The same framework with TPACK and SAMR, which focuses on the pedagogy and level of cognitive use being defined, The P4 Framework added the value of Professional Development and Productivity. This addresses the importance of the teachers being the facilitator inside the classroom. The model suggests to empower the teacher to play a role in the decision making instead of being imposed on without proper consultation and background orientation. Policy makers in the school should consider providing proper guidance and distribute decision making at the system level. Collaboration with colleagues are highly recommended because when teachers, administration, staff and IT personnel exercise good collaboration practices, it brings about effective technology integration in the classroom.

In addition, it highlights the confidence of the teachers to implement and see the value of the process when being guided and equipped with professional development activities and support. Aside from the usefulness of TPACK and SAMR to strengthen pedagogical use of technology, the research essay found out that preparing teachers is more than just the technical skills. Studies suggests to dig deeper into *what* these technologies can offer and *how* those can contribute to teachers and students. It is best when the focus lies on learning *with* technology rather than learning *about* technology, technology integration becomes more achievable because it is beyond what the tangible products may serve. The focus is how to use and when to use it more appropriately, having the pedagogy in mind.

Professional development is a process and not an event. In order to alleviate the barriers with the digital divide, on-going professional development activities should be addressed. It is a learning process for teachers to incorporate it successfully in the classroom. Training is the key to on-going and relevant professional development, and so essential that it can greatly benefit the success of Technology Integration.

The study highlighted that Technology Integration is not a product of overnight planning and one-time implementation. It is not buying technology without further study of when and how to use it. Technology integration is a process and is significantly related to the teacher, who plays a very important factor in the success of the process. The study found out that what is lacking in today's famous models or framework is the involvement of professional development in teachers. It aims to introduce the importance of training and continuous involvement of teachers to empower them because professional development provides opportunities essential to effective use of technology.

While the P4 Framework needs more significant testing for validation of its success, the author believes firmly that Technology Integration when implemented along with Professional Development activities can provide educators the opportunity to understand new advancements in technology and adapt it to their teaching style and pedagogy.

Based on the studies, models and barriers of Technology Integration discussed, the author concludes that technology, pedagogy, teacher training, and professional development must be taken into consideration in the process of integration. This is because the integration process do not just fall on the specification of technology and application to be used, but more on understanding how to adapt it in the pedagogy of each subject area, how to equip teachers through continuous training programs and most especially, moving towards professional development to empower the teachers. This makes the teachers more engaged in the decision making and implementation of the effective use of available educational enhancements. It is important to note, however, that learning about technology is not technology integration per se but it is learning with technology that makes it more meaningful.

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A Within-Asia Comparison in English Language Classroom Anxiety

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Abstract
Anxiety in foreign language classrooms is often considered one of the primary sources of students' reticence and shyness, frequently reported as one of the common characteristics of Asian learners. However, do all Asian students share the same characteristics in the setting of language learning? There might be some differences even if they share the primary traits. In order to investigate this question, we have conducted a questionnaire survey in Japan and Indonesia, using the framework of FLCAS (Foreign Language Classroom Anxiety Scale) developed by Horwitz et al. (1986), which employs a five-point Likert scale. Japanese and Indonesian language versions of the questionnaire were prepared and administered online in both countries. Roughly 180 students from different universities in Japan and about 90 students from a university in Indonesia responded to the survey. Our preliminary analyses found no significant difference between the overall means between the two groups. However, comparisons of individual items uncovered some differences. They suggested that Indonesian students seem to be self-aware of embarrassment in the classroom, and Japanese students respond strongly to the negatively worded question items. This is a part of a larger research project that tries to understand the differences in behaviors of language learners in East and Southeast Asian countries. In addition, we are interested in cultural differences such as group orientation, confidence levels in public speaking, or openness to criticisms. In the future, we are looking to study how to overcome the problem of anxiety, hopefully adding more countries in the region to the survey.

Keywords: Foreign Language Classroom Anxiety, East-Asian Comparison, English Classroom, Cultural Difference

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Introduction

Anxiety in the second or foreign language classrooms is defined as specific anxiety that learners experience in a specific situation. People who are usually good learners in other situations have a mental block or feel tongue-tied in foreign language classrooms or in front of a native speaker of the target language. Under the influence of this specific anxiety, a thought block is triggered when asked to speak up, or they might even feel stomach pain before the foreign language classroom (Horwitz et al. 1986). There has been a long history of research and discussions on the nature of foreign language anxiety (FLA) and its relationship with other cognitive processes (MacIntyre & Gardner, 1991, 1994).

It is often claimed that Asian students are reluctant to speak up in class. (Tuyen 2017) writes, "it is well-documented that teachers of English and even of other subjects in Asia often complain continually about their students' reticence in class (p. 179)." Similarly, Cheng (2000) summarizes previous claims at the beginning of his paper as follows:

> *"In recent ESL/EFL literature, Asian (especially East Asian) learners of English as a foreign/second language have been arguably reported as reticent and passive learners. The most common allegations are that these students are reluctant to participate in classroom discourse; they are unwilling to give responses; they do not ask questions; and they are passive and over-dependent on the teacher (Jones et al., 1993; Braddock et al., 1995; Cortazzi and Jin, 1996; Tsui, 1996). (Chen, 2000, p. 435)*

Anxiety should be closely related to this trait of Asian students (IRWanti n.d.; Liu and Jackson 2011; R. S. and H. S. 2013). In fact, there are various reports on FLA among Asian learners; Japanese students (Andrade and Williams 2009; Effiong 2016; Matsumoto et al. 1988; Saito and Samimy 1996; Williams and Andrade 2008), Chinese and Taiwanese students (Cheng and Erben 2012; GUO 2011; Mak 2011; Malik et al. 2020), and Indonesian students (Anandari 2015; Djafri and Wimbarti 2018; Marwan 2007).

However, to what extent do students from different countries in Asia share FLA? Most of the works that studied FLA on Asian students have focused on the learners from one country. This study attempts to identify how and to what extent FLA is manifested in Indonesian and Japanese students learning English at the tertiary level.

In the following, we report on the results of questionnaire surveys conducted in Japan and Indonesia, employing the framework of FLCAS (Foreign Language Classroom Anxiety Scale) proposed by Horwitz et al.(1986).

The results of this research will eventually help researchers determine the role of culture in FLA studies. Beyond, it may help teachers do reflective practice and seek out possible strategies to reduce anxiety among their students while keeping these pathways open for possible evaluations in the future.

Method

Questionnaire Survey

A questionnaire survey was conducted using FLCAS (Foreign Language Classroom Anxiety Scale), which was proposed by (Horwitz et al., 1986), and used widely in the English

pedagogy research (GUO 2011; Kitano 2001; MacIntyre and Gardner 1989; Mak 2011; Marcos-Llinás and Garau 2009; Paredes and Muller-Alouf 2000; Szyszka 2017).

FLCAS includes 33 question items that ask various aspects of anxiety in foreign language classrooms. Table 1 has sample questions:

Item No.	Questions
1	I never feel quite sure of myself when I am speaking in my foreign language class.
2	I don't worry about making mistakes in language class.
3	I tremble when I know that I'm going to be called on in language class.
4	It frightens me when I don't understand what the teacher is saying in the foreign language.

Table 1: FLCAS (Foreign Language Classroom Anxiety Scale) Sample Questions

Each question item uses a five-point Likert scale and asks the participant to choose one among five choices; namely,

1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree

For most question items, choosing 5, "Strongly Agree," indicates that the respondent has intense anxiety represented by the question. However, there are reversed-polarity items dispersed in the questionnaire. Look at item No. 2 in Table 1. For this question, choosing "Strongly Agree" indicates the least anxiety about making mistakes in language class.

The entire question items are listed in Appendix1.

Participants

The participants were university students from Japan and Indonesia. The Japanese participants study at several universities in the greater Tokyo area in the engineering or the healthcare department. Most Indonesian participants major in business or social science at State Polytechnic of Malang.

Students were invited to participate in the questionnaire survey by the class teachers with explanations that the questionnaire would not affect their course grades. 182 students in Japan and 91 students in Indonesia responded.

Figure 1: Google form for FLACS Survey

Procedure

The original English FLACS question items were translated into Japanese and Bahasa Indonesia. The team's translation was checked by other members of the team who speak the same language.

Google form was used to administer the survey in both countries. Students were given the URL and accessed the questionnaire survey site. At the beginning of the form, it was repeated that their participation is optional and voluntary, and no information identifying the participant, such as names or email addresses, would not be asked or collected. After agreeing to take the survey, it first asked the gender and the age range of the respondent, and then they will be presented with the series of questions of LACS. The order of questions was altered from the original version. Figure 1 shows an image of the question page of the questionnaire form.

Surveys were conducted in July 2020 in Japan and November 2020 in Indonesia.

Results and Analysis

Since the questions were all specified as mandatory in the Google form, there was no missing data.

The purpose of this survey was to compare Japanese and Indonesian participants. A sample comparison is shown in Figure 2, and all results can be seen in Appendix 2.

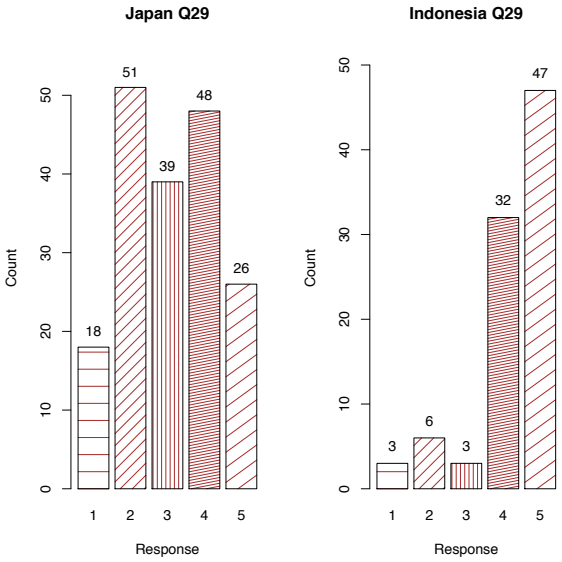

Figure 2: Question Item 2 Comparison

Reversed Polarity Items

The counts of reversed polarity items (also called "reverse coded" or "negatively worded" items) were reversed before analysis and comparison. For example, the original counts for the question item 2 (see Table 1), shown in Figure 3, were reversed around the neutral option (3) to those in Figure 4. All nine reversed polarity items were adjusted in the same way for both countries. The Cronbach's alpha, the consistency measure, improved from 0.773 to 0.946 for Japan and from 0.8 to 0.913 for Indonesia.

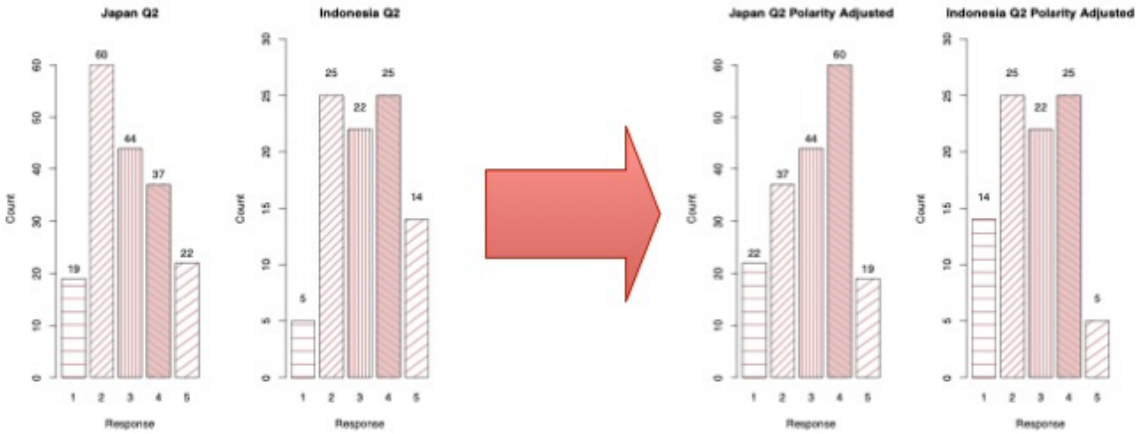

Figure 3: Original Counts for Item No. 3

Figure 4: Polarity Adjusted Counts

Overall Comparison

After the polarity adjustments, the averages for each question item were calculated for each country. Figure 5 shows the bar graph for all 33 items, comparing the two countries side by side. It is possible to see that Japanese students have higher anxiety for some items, and Indonesian students show higher values for some other items.

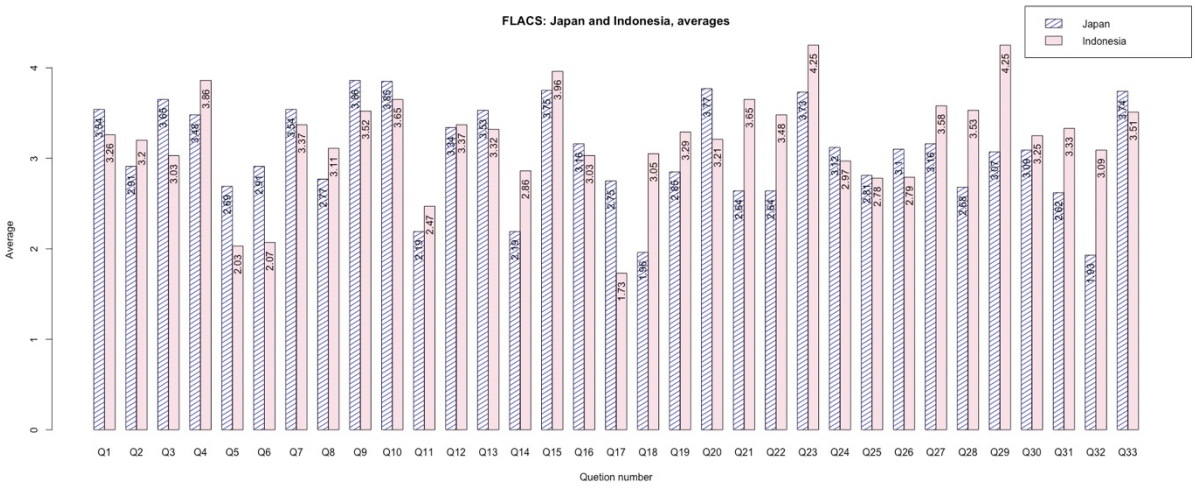

Figure 5: Average Scores for Each Item: Japan and Indonesia

The bar graph is not easy to see an overall picture. Figure 6 is a scatter plot with the average values of Japanese students on the horizontal axis and Indonesian values on the vertical axis. The correlation between the average values of the two countries was not statistically significant, r = .29, p = .10). The regression line shown in red in the plot was significant at the 5% level, though the R-squared value is .14, which means that the regression line can explain only 14% of the data variation.

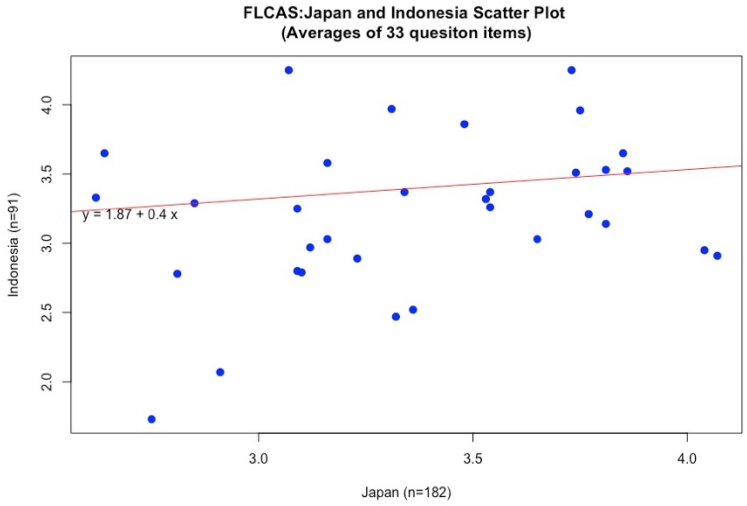

Figure 6: Correlation of average values for Japan and Indonesia

The overall average or mean for Japan was 3.36, and 3.22 for Indonesia. A comparison by Welch t-test did not reach significance between the means of the two groups (t(58.44) = 1.23, p = .22).

Item-wise Comparison

For each question item, a t-test was applied to compare the averages of the data sets from the two countries. The comparison was conducted in the R 4.1 environment using the Welch Two Sample t-test for all question pairs. The following shows the output for the comparison of question item 29, which had the greatest difference between the average values of anxiety scales of the two countries.

Sample Output from the t.test function of R 4.1:
Welch Two Sample t-test

Data: AnxJap$q29 and AnxInd$q29t = -8.3653, df = 211.17, p-value = 8.14e-15alternative hypothesis: true difference in means is not equal to 095 percent confidence interval: -1.4596936 -0.9029437sample estimates: mean of x mean of y 3.071429 4.252747

Among the total 33 items, Japanese students had significantly higher averages for 11 items, Indonesian students had higher values for eight items, and there were no significant differences for the remaining14 items. The following is the summary of comparisons. The asterisks are the standard significance codes, and the question numbers in brackets indicate they are revered polarity items.

Results of item-wise comparisons:

- 19 out of 33 items had significant differences
  - 11 items: Japanese students had higher averages
    - Q3***, Q6***, [Q8]*, Q9*, [Q14]***, Q17***, [Q18]***, Q20***, [Q22]***, [Q28]***, [Q32]***
  - 8 items: Indonesian students had higher averages
    - Q4**, [Q5]***, Q19**, Q21***, Q23***, Q27*, Q29***, Q31***
- 14 items did not reach significance
  - Q1, [Q2], Q7, Q10, Q11, Q12, Q13, Q15, Q16, Q24, Q25, Q26, Q30, Q33

(Significance codes:0 '***' 0.001 '**' 0.01 '*' 0.05 ; [Q#]: Qs with reversed polarity)

In order to see the question items together with the comparison results of average values of the two countries, three tables were prepared. The first one, Figure 7, shows the items for which Japanese students scored higher in the anxiety scale based on t-tests.

Q No	mean Japan	J >< Ind	mean Indonesia	Reversed	t-value	df	p-value	Sig.	questions
3	3.65	>	3.03		3.851	147	0.000	***	I tremble when I know that I'm going to be called on in language class.
6	2.91	>	2.07		6.148	191	0.000	***	During language class, I find myself thinking about things that have nothing to do with the course.
8	3.23	>	2.89	1	2.493	205	0.013	*	I am usually at ease during tests in my language class.
9	3.86	>	3.52		2.085	158	0.039	*	I start to panic when I have to speak without preparation in language class.

14	3.81	>	3.14	1	4.543	188	0.000	***	I would not be nervous speaking the foreign language with native speakers.
17	2.75	>	1.73		7.107	227	0.000	***	I often feel like not going to my language class.
18	4.04	>	2.95	1	7.687	165	0.000	***	I feel confident when I speak in foreign language class.
20	3.77	>	3.21		3.477	156	0.001	***	I can feel my heart pounding when I'm going to be called on in language class.
22	3.36	>	2.52	1	5.566	184	0.000	***	I don't feel pressure to prepare very well for language class.
28	3.32	>	2.47	1	6.778	230	0.000	***	When I'm on my way to language class, I feel very sure and relaxed.
32	4.07	>	2.91	1	7.530	157	0.000	***	I would probably feel comfortable around native speakers of the foreign language.

Table 2: Anxiety scale comparison: Japanese > Indonesia

Note the reversed polarity items in Table 2. There are nine reversed polarity items in total, and six of them appear in this table.

Next, there were eight items for which Indonesian students had higher anxiety values. Table 3 has the details. Note that there is only one reversed polarity item.

Q No	mean Japan	J >< Ind	mean Indonesia	Reversed	t-value	df	p-value	Sig.	questions
4	3.48	<	3.86		-2.678	212	0.008	**	It frightens me when I don't understand what the teacher is saying in the foreign language.
5	3.31	<	3.97	1	-4.482	208	0.000	***	It wouldn't bother me at all to take more foreign language classes.
19	2.85	<	3.29		-2.778	180	0.006	**	I am afraid that my language teacher is ready to correct every mistake I make.

21	2.64	<	3.65		-6.422	193	0.000	***	The more I study for a language test, the more confused I get.
23	3.73	<	4.25		-3.932	193	0.000	***	I always feel that the other students speak the foreign language better than I do.
27	3.16	<	3.58		-2.551	171	0.012	*	I get nervous and confused when I am speaking in my language class.
29	3.07	<	4.25		-8.365	211	0.000	***	I get nervous when I don't understand every word the language teacher says.
31	2.62	<	3.33		-3.956	152	0.000	***	I am afraid that the other students will laugh at me when I speak the foreign language.

Table 3:Anxiety Scale Comparison: Indonesian Students > Japanese Students

For the remaining 14 items, there were no significant differences between the two countries. Table 4 has the details.

Q No	mean Japan	J >< Ind	mean Indonesia	Reversed	t-value	df	p-value	Sig.	questions
1	3.54		3.26		1.795	168	0.074		I never feel quite sure of myself when I am speaking in my foreign language class.
2	3.09		2.80	1	1.928	184	0.055		I don’t worry about making mistakes in language class.
7	3.54		3.37		0.925	162	0.356		I keep thinking that the other students are better at languages than I am.
10	3.85		3.65		1.210	189	0.228		I worry about the consequences of failing my foreign language class.
11	3.81		3.53	1	1.921	180	0.056		I don’t understand why some people get so upset over foreign language classes.
12	3.34		3.37		-0.235	163	0.815		In language class, I can get so nervous I forget things I know.

13	3.53		3.32		1.347	154	0.180		It embarrasses me to volunteer answers in my language class.
15	3.75		3.96		-1.592	183	0.113		I get upset when I don't understand what the teacher is correcting.
16	3.16		3.03		0.848	209	0.398		Even if I am well prepared for language class, I feel anxious about it.
24	3.12		2.97		1.052	166	0.294		I feel very self-conscious about speaking the foreign language in frontof other students.
25	2.81		2.78		0.169	175	0.866		Language class moves so quickly I worry about getting left behind.
26	3.10		2.79		1.812	190	0.072		I feel more tense and nervous in my language class than in my other classes.
30	3.09		3.25		-0.969	168	0.334		I feel overwhelmed by the number of rules you have to learn to speak a foreign language.
33	3.74		3.51		1.555	161	0.122		I get nervous when the language teacher asks questions which I haven't prepared in advance.

Table 4: Anxiety Scale Comparison: Items with No Difference between Japan and Indonesia

Observations and Discussion

Although the overall difference between the anxiety levels between Japanese and Indonesian students was not significant, item-wise analyses revealed that Japanese students had higher anxiety levels for some items and Indonesian students had higher anxiety levels for some other items.

If we look at Table 3, which shows the items Indonesian students had significantly higher anxiety levels, it seems possible that they are aware of what others think in an embarrassing situation. Question items 23 and 31 have reference to "other students" in the questions, and question 31 makes us imagine an embarrassment when other students are laughing after saying something in English in class. Question 19 reminds us of a situation in which the teacher corrects each mistake made by a student. Questions 4 and 29 also refer to "teacher," and even though it does not refer to an embarrassment directly, one can easily imagine those situations can lead to a humiliating situation. Thus, it seems that Indonesian students tend to be self-conscious and avoid embarrassment in the classroom.

On the other hand, question items in Table 2, which shows higher anxiety items for the Japanese students, do not show an apparent reference to embarrassment or humiliation.

Questions 3, 9, and 20 refer to the nervousness and frightening sensations, which are understandable as a direct reflection of language class anxiety.

However, there is another intriguing characteristic for the Japanese participants. In Table 2, six of the items, namely q8, q14, q18, q22, q28, and q32, are all reversed polarity items. There are only nine reversed items, and six of them appear in this list, suggesting that the Japanese participants respond strongly to some feature of reversed items. The reversed items negate the nervousness and use words contrary to anxiety, such as “confidence” or “relaxed.” It is not clear whether this phenomenon indicates that Japanese students feel more anxiety related to these items since they might be responding to these expressions that reject the existence of anxiety when they are taking a survey on foreign language class anxiety.

For the question items in Table 4, it is not easy to find a common feature among the 14 items. The questions include reference to nervousness (q13, q26, q33) and embarrassment and self-consciousness (q13, q24), the difficulty of the subject (q30), and test anxiety (q10). The existence of these factors makes it difficult to give a simple characterization of these question items. Still, even though the averages of some items go down below 3.0, such as q26 for both countries, q2 and q26 for Indonesia, the averages for all other items were above 3.0. This shows that students from both countries are having intense anxiety about these items.

Conclusion

This study aimed to investigate the differences between Japan and Indonesia in English language classroom anxiety. A questionnaire survey framework of FLCAS (Foreign language Classroom Anxiety Scale) was used to measure the levels of students’ anxiety. When the overall means of both countries for all survey items were compared, there was no statistically significant difference. When individual items were compared, there were 11 items for which Japanese students had higher anxiety levels among 33 items. Indonesian students felt more anxiety than their Japanese counterparts for eight items, while no significant differences were detected for the remaining 14 items. Those items that Indonesian students scored higher on the anxiety scale seemed to indicate that they are self-conscious of embarrassment in the classroom. For the items that Japanese students had more substantial anxiety than Indonesian students, they seemed to respond strongly to the negative expression or refer to confidence and being relaxed in the reversed polarity items in the questions.

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Appendices

Appendix 1: FLACS Question Items

Item No.	Quetion
1	I never feel quite sure of myself when I am speaking in my foreign language class.
2	I don't worry about making mistakes in language class.
3	I tremble when I know that I'm going to be called on in language class.
4	It frightens me when I don't understand what the teacher is saying in the foreign language.
5	It wouldn't bother me at all to take more foreign language classes.
6	During language class, I find myself thinking about things that have nothing to do with the course.
7	I keep thinking that the other students are better at languages than I am.
8	I am usually at ease during tests in my language class.
9	I start to panic when I have to speak without preparation in language class.
10	I worry about the consequences of failing my foreign language class.
11	I don't understand why some people get so upset over foreign language classes.
12	In language class, I can get so nervous I forget things I know.
13	It embarrasses me to volunteer answers in my language class.
14	I would not be nervous speaking the foreign language with native speakers.
15	I get upset when I don't understand what the teacher is correcting.
16	Even if I am well prepared for language class, I feel anxious about it.
17	I often feel like not going to my language class.
18	I feel confident when I speak in foreign language class.
19	I am afraid that my language teacher is ready to correct every mistake I make.
20	I can feel my heart pounding when I'm going to be called on in language class.
21	The more I study for a language test, the more con- fused I get.
22	I don't feel pressure to prepare very well for language class.
23	I always feel that the other students speak the foreign language better

	than I do.
24	I feel very self-conscious about speaking the foreign language in frontof other students.
25	Language class moves so quickly I worry about getting left behind.
26	I feel more tense and nervous in my language class than in my other classes.
27	I get nervous and confused when I am speaking in my language class.
28	When I'm on my way to language class, I feel very sure and relaxed.
29	I get nervous when I don't understand every word the language teacher says.
30	I feel overwhelmed by the number of rules you have to learn to speak a foreign language.
31	I am afraid that the other students will laugh at me when I speak the foreign language.
32	I would probably feel comfortable around native speakers of the foreign language.
33	I get nervous when the language teacher asks questions which I haven't prepared in advance.

(Note: The highlighted are reversed polarity items.)

Appendix 2: FLCAS survey results
(The percentages of response choices to each question item.)

Japan							Indonesia					
Option	1	2	3	4	5		Opiton	1	2	3	4	5
q1	5.5	14.8	22.0	35.2	22.5		q1	6.6	27.5	18.7	27.5	19.8
q2	12.1	20.3	24.2	33.0	10.4		q2	15.4	27.5	24.2	27.5	5.5
q3	3.8	9.9	25.8	37.9	22.5		q3	15.4	26.4	13.2	29.7	15.4
q4	7.1	17.6	20.3	30.2	24.7		q4	2.2	11.0	14.3	44.0	28.6
q5	8.2	19.8	28.0	20.3	23.6		q5	3.3	7.7	15.4	36.3	37.4
q6	10.4	28.6	27.5	26.9	6.6		q6	35.2	36.3	17.6	8.8	2.2
q7	8.2	17.6	17.6	24.7	31.9		q7	14.3	20.9	12.1	18.7	34.1
q8	7.1	20.3	30.2	27.5	14.8		q8	7.7	28.6	34.1	26.4	3.3
q9	3.8	12.1	15.9	30.2	37.9		q9	11.0	18.7	4.4	39.6	26.4
q10	8.2	10.4	14.3	22.5	44.5		q10	9.9	12.1	5.5	48.4	24.2
q11	6.0	7.7	18.7	34.1	33.5		q11	5.5	13.2	28.6	28.6	24.2
q12	6.0	22.0	22.5	31.3	18.1		q12	11.0	19.8	12.1	35.2	22.0

q13	6.0	10.4	25.8	39.6	18.1		q13	12.1	17.6	16.5	34.1	19.8
q14	6.0	8.8	17.6	33.5	34.1		q14	9.9	16.5	33.0	30.8	9.9
q15	3.3	8.8	19.8	45.6	22.5		q15	4.4	3.3	14.3	48.4	29.7
q16	14.8	19.8	18.1	28.6	18.7		q16	11.0	23.1	24.2	35.2	6.6
q17	21.4	24.2	26.4	13.7	14.3		q17	54.9	27.5	11.0	3.3	3.3
q18	2.7	5.5	18.7	30.8	42.3		q18	12.1	27.5	18.7	37.4	4.4
q19	13.7	30.2	26.9	15.9	13.2		q19	6.6	26.4	17.6	30.8	18.7
q20	6.0	6.6	19.8	39.6	28.0		q20	11.0	26.4	12.1	31.9	18.7
q21	22.5	27.5	24.2	14.8	11.0		q21	2.2	22.0	14.3	31.9	29.7
q22	7.1	18.7	24.7	30.2	19.2		q22	22.0	34.1	17.6	23.1	3.3
q23	3.3	9.9	26.4	31.3	29.1		q23	3.3	4.4	7.7	33.0	51.6
q24	4.4	25.8	32.4	28.6	8.8		q24	6.6	34.1	26.4	22.0	11.0
q25	17.0	26.4	25.8	20.3	10.4		q25	18.7	29.7	15.4	27.5	8.8
q26	16.5	22.0	14.8	28.6	18.1		q26	16.5	31.9	22.0	15.4	14.3
q27	9.3	23.6	26.9	22.0	18.1		q27	8.8	19.8	3.3	40.7	27.5
q28	7.1	17.6	28.0	30.2	17.0		q28	11.0	44.0	33.0	11.0	1.1
q29	9.9	28.0	21.4	26.4	14.3		q29	3.3	6.6	3.3	35.2	51.6
q30	9.9	22.5	33.0	17.6	17.0		q30	9.9	24.2	18.7	25.3	22.0
q31	22.0	28.0	23.1	20.3	6.6		q31	17.6	15.4	14.3	22.0	30.8
q32	2.7	7.7	13.7	31.9	44.0		q32	13.2	31.9	16.5	27.5	11.0
q33	4.4	8.8	21.4	39.0	26.4		q33	8.8	15.4	13.2	41.8	20.9

Design Thinking Applied to Advertising Design Courses to Enhance Students' Learning Achievement

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Abstract
At the time when technology is booming, the definition of advertising is no longer advertised through traditional mass media, but a trend that everything is advertising. Advertising design is not just about creating beautiful and emotional content. It must be customer-centric to make consumers feel that advertising is meaningful and worthy of action. In Taiwan, traditional design education focuses on teaching professional skills, but lacks the exploration and thinking of design issues, as well as the cultivation of students' self-thought and values. In this study, 48 students from the advertising design course were randomly divided into 13 creative teams by convenience sampling. The teaching experiment was carried out through the control-group-treatment-group design, the control group implemented the formal teaching, and the treatment group implemented the design thinking method proposed by Stanford University. This study aimed to find out whether design thinking can improve students' learning achievements in advertising design and whether it interacts with learning achievements under the mediation of empathy, define, ideate, prototype and test. The results can provide advanced advertising design and serve as a reference for teaching design-related courses.

Keywords: Augmented Reality (AR), Advertising Design, Design Thinking, Design Education

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Introduction

Design education originated from art education, and talent incubation in this domain revolves around teaching forms, materials, and technical skills (Chao, H. L. & Kao, C. F., 2017). A survey on advertising design education in Taiwan indicated that it is based on lecturing theories, followed by manual practice. Students often fail to understand the connection between theory and practice; this is the source of the long-term problem of what teachers teach and what students actually learn. The maturation of the Internet and advanced digital technology have altered the ecology of advertising message dissemination. Advertising is no longer defined as informing through the expansiveness of traditional mass media but rather represents a trend of "everything is advertising." Advertising strategies are oriented toward an integrated communication design for comprehensive marketing, and the aspects considered have become extremely complicated. In practice, advertising design implies characteristics of marketing and brand design; the design content and purpose involve advertising and marketing theories, creativity, visual style, media communication, new digital thinking, and technology (Zhu, J. X., 2017). Advertising design combines marketing strategy with creativity. The objective of this study was to transform the traditional model of advertising design courses and enhance students' understanding of advertising design.

Regarding current teaching approaches to advertising design, instructors tend to focus on visual communication in advertising. Students are trained to present refined graphic forms and styles. Lacking creativity in shaping the uniqueness of a brand, students generally tend to explore brand elements through overly linear and one-dimensional thinking and fail to integrate needs related to society, the environment, the market, or target users into the design in a diverse, multidimensional manner (Gong, S. Z., 2013). Advertising design education should veer toward innovative methods of design teaching. Design thinking is generally defined as an analytic and creative process. Participants form insights regarding consumer needs and design through experience, observation, feedback, and prototype experimentation. Valued in both academia and industry, design thinking is widely used by companies to address commercial and societal issues. However, applying design thinking to design teaching and thus influencing student learning achievement has rarely been studied (Tu, Liu, & Wu, 2018). Design thinking is a methodology based on innovative thinking (Melles, Howard, & Thompson, 2012) and a type of creative thinking pertaining to sentiment analyses (Razzouk & Shute, 2011). Traditional analytic thinking pertains to rational thinking, whereas design thinking is more human-centered; it helps designers gain insights into consumer mentality, penetrate the real needs of consumers, and suggest reasonable design ideas that consider such needs (Dunne & Martin, 2006; Yang & Hsu, 2020). Therefore, this study used methods of design thinking to train the students in advertising courses to reflect on advertising design in multidimensional ways to enhance their sense of achievement in learning advertising design.

In Taiwan, fostering student creativity is an orientation in pedagogical development and an approach to enhancing national competitiveness. In operating auxiliary tools for design thinking, the student participants were guided to perceive consumer needs, which facilitated creativity development and model testing, thus achieving design performance that met consumer needs. This study analyzed whether design thinking-based teaching methods affected the effectiveness of learning augmented reality-based advertising design and whether design thinking-based teaching mediated by "empathy," "define," "ideate," "prototype," and "test" affected learning results.

Literature Review

Teaching of Advertising Design in the Digital Age

Advertising is a major form of commercial promotion and an effective means of conveying commercial information. Following developments in science and technology, concepts in contemporary advertising have shifted greatly. Advertising design extensively incorporates theories from social science, economics, aesthetics, marketing, psychology, communication science, and statistics. The boundless creative possibilities of advertising which, combined with technology, have made thinking-oriented advertising design much more challenging (Burke et al., 1990). Only advertisements giving rise to unique ideas and commercial value can stand out and attract consumer attention. Training in traditional advertising design courses focus on craftsmanship. Students with favorable execution skills can create a beautiful advertisement design that, nevertheless, may fail to consider actual market and consumer needs. Regarding advertisement design performance in the digital age, Gong J. R. (2017) indicated that it is not characterized only by logical and persuasive messaging; exquisite techniques developed from combining artificial intelligence and technology have also given rise to production modes that are beyond traditional advertising design. Advertisements should be concerned with perceiving human nature and consider flow and participants' user experience with particular platforms; an advertisement designed with consideration of human aspects corresponds more closely with consumer needs. Griffin (2008) investigated advertising students at two universities and developed an advertising design teaching mode to study the differences in the creative processes of beginner and advanced students; the results confirmed differences that existed in their creative processes. The advanced students often re-examined their thoughts, which gave rise to more resources in their thinking process. Execution was absent from their descriptions of the creative process. For a creative thinker, insight allows mastering the orientation of a process, which contributes to idea generation.

Waarde and Vroombout (2012) proposed nine reflections for those formulating design education strategies: (1) consider visual configurations; (2) consider the situation; (3) consider the problem; (4) consider perspective; (5) consider modification for production; (6) consider evaluation and testing; (7) consider presentation and argumentation; (8) consider operational planning and execution; and (9) consider personal development.

A successful advertisement must be novel, interesting, and innovative; at the same time, it should be functional and reasonable to meet customer demands and achieve the goal of communication (Cheung, 2011). The act of advertising design is a problem-solving process using technical skills with considerations regarding aesthetics, social issues, culture, and consumer needs. Based on the relationship between advertising education and industry, Johnson and Jones (2010) suggested that the speed of digital marketing reform has surpassed that of the cycles of pedagogic adjustment in schools, but companies expect graduates to showcase creativity and technical execution skills nonetheless. Design education should evolve with time, and the courses that incubate advertising design talents should combine both conceptual thinking and technical skills to confront the frequent changes in our environment regarding the demands for advertising design and the career expectations of talents required by the industry (Habib, 2015). Based on the aforementioned aspects, Hypothesis 1 (H1) was formulated as follows:
H1: Design thinking-based teaching positively affects learning achievement.

Design Thinking

Design thinking is a design method for applying and fostering creativity. The method was initially used by architects and urban planners to reflect on issues (Rowe, 1987). Later, it was introduced by David Kelley, the founder of the design company IDEO, into the field of industrial design. Based on a designer's understanding and sensitivity regarding a problem, aspects of the problem are integrally considered to inspire reflection on the feasibility of solutions and to obtain complete concepts regarding innovative issues (Brown, 2009). The Institute of Design at Stanford University proposed the following five steps of design thinking: (1) "empathy": understanding the user before solving a problem and thinking about user needs from the user's perspective and through empathy; (2) "define": classify the collected data, identify key issues, and clearly define each issue; (3) "ideate": seek feasible solutions through brainstorming; (4) "prototype": make semi-finished products by hand and actually simulate any problem regarding the creative imagination and the prototype; and (5) "test": after a prototype is completed, revise it according to user feedback following user tests (Plattner, 2010). Figure 1 depicts these five steps of design thinking.

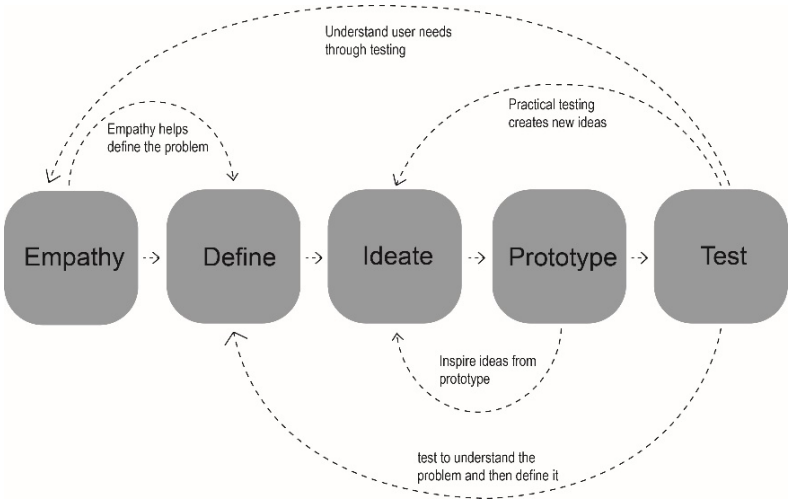

Figure 1: The Five Steps of Design Thinking.

Razzouk and Shute (2011) suggested that design thinking is a method for proposing solutions to a problem through group discussion. Hawryszkiewycz (2013) proposed that the design thinking-based method differs from "traditional" analytic thinking. It is based on creative and intuitive thinking. Analytic thinking is a part of design thinking; design thinking requires both logical force and creativity to combine analytical thinking, intuitive thinking, and creative thinking in an innovation process (Bauer & Eagen, 2008). Dunne and Martin (2006) argued that design thinking integrates the ideas of group members, and the optimal solution is obtained through team collaboration; it can be used in product creation, organizational management, and solving social challenges. Tu, Liu, and Wu (2018) used action research based on dialog and interviews with14 students in a design institute. They also used questionnaires, records, and triangulation to investigate how learning effectiveness was affected by introducing design thinking into design courses. Their findings indicated that in-depth discussion of design issues was enhanced by exploring tool operations and understanding the needs of target groups, which also improved the classroom atmosphere for learning and facilitated design teaching. Based on the aforementioned arguments, the following hypotheses were advanced:

Hypothesis 2 (H2): Empathy-mediated design thinking-based teaching affects learning achievement;

Hypothesis 3 (H3): Define-mediated design thinking-based teaching affects learning achievement;
Hypothesis 4 (H4): Ideate-mediated design thinking-based teaching affects learning achievement;
Hypothesis 5 (H5): Prototype-mediated design thinking-based teaching affects learning achievement; and
Hypothesis 6 (H6): Test-mediated design thinking-based teaching affects learning achievement.

Research Method

Experimental Design

This study investigated whether student design performance was positively affected by introducing design thinking-based training into design teaching, operating design thinking by following relevant steps, and designing augmented reality advertising, and whether this further led to positive learning achievement. The independent variable was teaching mode used with the control group and the treatment group; the mediating variables were satisfactions with design thinking based on "empathy," "define," "ideate," "prototype," and "test"; the dependent variable was learning achievement. The study structure is presented in Figure 2.

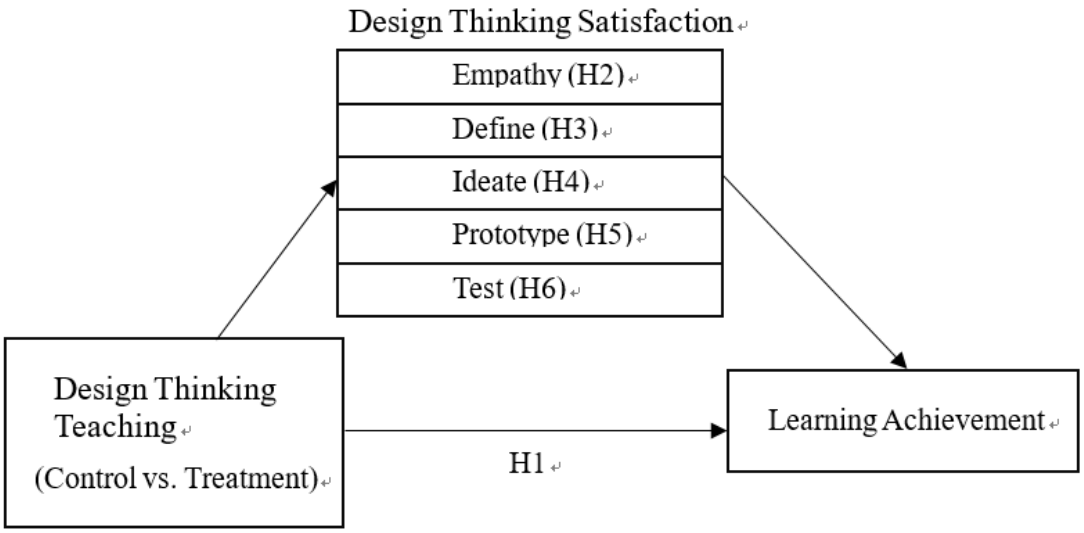

Figure 2: The Experimental Framework

Participants and Procedure

Convenience sampling was used to recruit a total of 48 third-year students (7 men and 41 women) interested in enrolling in an advertising design course of the Commercial Design Dept. of Ming Chung University. The participant students were randomly divided into 13 groups each with 3 to 5 members. At the beginning of the teaching experiment, the students were informed of the course learning objectives and teaching methods; the students were allowed to stop and abstain from participating in the experiment. The study procedure complied completely with ethics in academic research. The course-experiment was conducted in two stages. The first stage addressed the control group and was held 3 hours per week for 5 weeks; the teaching method was teacher-oriented for 1.5 hours of traditional teaching and 1.5 hours of peer discussion. The course highlighted professions related to advertising design, including marketing, communication, technology, and design thinking, as well as advertising cases and

design productions. During the fifth week, the groups proposed advertising designs, and their presentations were evaluated by experts, who offered suggestions. In addition, each student completed a design thinking test. The second stage addressed the treatment group (i.e., the experimental group) and was also held for 5 weeks; the teaching method was participant-oriented with instructor guidance on design thinking, covering activities such as field research, empathy mapping, customer journey mapping, and brainstorming meetings on consumer needs, ideas, and prototype design and testing. During the final week, the participants presented advertising designs by group, followed by suggestions and evaluations by experts. Each student similarly took a design thinking test.

Operational Definitions of Variables and Questionnaire Design

Below are the operational definitions of the five mediator variables of this study:
(1) Empathy: guiding students to observe consumers, participate in branding issues through field research, and create empathy maps, personas, and customer journey maps.
(2) Define: redefining the problem according to the messages collected in the "empathy" phase and determining the real needs of the user, then defining then with a short phrase.
(3) Ideate: team brainstorming through an "ideate" process based on the principle of "three don'ts and five dos," that is, "don't interrupt, don't criticize, and don't digress; do extend others' ideas, draw pictures, be crazy, produce numerous ideas, and write titles," to trigger ideas and finally determine the most suitable solution.
(4) Prototype: guiding students to evolve and embody their ideas by focusing on target consumers, making drafts, and discussing and completing prototypes before optimization.
(5) Test: actually placing the prototype work on the market, understanding the feasibility of the prototype through experience, and determining the direction of optimization.

The questionnaire contained a revision of the scale for design thinking-based learning proposed by Tu, Liu, and Wu (2018), with seven items on "empathy," seven on "define," seven on "ideate," seven on "prototype," six on "test," and four on the teaching approach overall, totaling thirty-eight items. A 5-point Likert-type scale was adopted.

Results and Discussion

Sample Characteristics; Reliability and Validity Analysis

In all, 48 students participated in the study: 41 (85.4%) and 7 (14.6%) were women and men, respectively. Regarding the departments to which the participants belonged, 39 were in the commercial design department (81.3%). In terms of education and training, 46 (95.8%) and 2 (4.2%) were and were not trained in design, respectively. A confirmatory factor analysis (CFA) was conducted using Mplus 8.1 to test the reliability and validity of the latent variables, namely "empathy" (6 items), "define" (7 items), "ideate" (7 items), "prototype" (7 items), and "test" (7 items). The results indicated that the sample data and the measurement model fitted well and exhibited good convergent validity; the Cronbach's α of the correlation matrix and internal consistency index of the latent variables were as follows: "empathy" = 0.84, "define" = 0.79, "ideate" = 0.87, "prototype" = 0.83, and "test" = 0.81. The combined reliability of the variables were as follows: "empathy" = 0.84, "define" = 0.78, "ideate" = 0.87, "prototype" = 0.82, and "test" = 0.81 (Table 1). The results indicated high internal consistency between the measurement items. Positive correlations were observed among all the relevant coefficients of the variables, and the confidence intervals of all correlation coefficients did not include 1. On

the whole, the data measured for the study had the reliability and validity required for hypothesis verification.

Table 1: Correlation Matrix and Internal Consistency Indicators

		M	*SD*	1	2	3	4	5
1.	empathy	3.84	0.53	***0.84***				
2.	define	3.8	0.55	0.92***	***0.79***			
3.	ideate	3.56	0.61	0.62***	0.71***	***0.87***		
4.	prototype	3.81	0.48	0.60***	0.75***	0.68***	***0.83***	
5.	test	3.75	0.59	0.49***	0.65***	0.57***	0.57***	***0.81***
	CR			0.84	0.78	0.87	0.82	0.81
	AVE			0.47	0.42	0.57	0.44	0.46

***p<0.001. Note: The diagonal value of the correlation matrix is the Cronbach's α value of each measurement variable.

Manipulation Check on the Treatment and Control Groups

A manipulation check was conducted through applying different teaching modes to the treatment group and the control group. To guarantee consistency between participant perception and the experimental manipulation design, participant thoughts were measured using four items ("On the whole, I have applied design thinking in this project to understand consumer needs"; "On the whole, I have applied design thinking in this project to develop design concepts"; "On the whole, I have applied design thinking in this project to enter the design context more smoothly"; and "On the whole, I have applied design thinking in this project to enhance my design performance"). An assessment was conducted using Likert's 5-point scale; higher scores meant greater perception of design thinking-based teaching. The results indicated that after the treatment group experienced the design thinking-based teaching mode, their average score was significantly higher than that of the control group (did not experience design thinking-based teaching; $M_{\text{treatment group}} = 4.14$ vs. $M_{\text{control group}} = 3.41$, $t = 6.13$, $p < 0.001$). Thus, the manipulation of the treatment and control groups was successful. In addition, to exclude the effect of other variables, a potential covariate test on individual difference variables that might affect learning achievement (i.e., sex and department) was conducted. The results indicated that neither gender ($F = 2.85$, $p = 0.10$) nor department ($F = 2.45$, $p = 0.09$) had a significant effect on learning achievement; the two covariates were thus excluded from the subsequent analysis.

Research Hypothesis Verification

Analysis of variance (ANOVA) was performed to verify H1 and test the influence on learning achievement in the treatment and control groups. The results indicated a significant main effect (F (1,94) = 46.29, $p < 0.001$) (Table 2) on the treatment group. Additional analysis indicated that after the treatment group adopted the teaching mode based on design thinking methods, they achieved higher learning achievement than did the control group ($M_{\text{treatment group}} = 86.10$ vs. $M_{\text{control group}} = 74.29$). Thus, H1 ("Design thinking-based teaching positively affects learning achievement") was supported.

Table 2: Variance Analysis Results

Variables Sources	*SS*	*df*	*MS*	*F*	*Sig.*
ECM	3348.84	1	3348.84	46.29***	0.00
Intercept	617443.76	1	617443.76	8534.76***	0.00
Design Thinking Teaching	3348.84	1	3348.84	46.29***	0.00
Error	6800.40	94	72.34		
Total	627593.00	96			
Corrected Total	10149.24	95			

Note: 1.***p<0.001; 2. R^2=0.33

To verify whether satisfaction with design thinking was a mediating mechanism in design thinking-teaching affecting learning achievement, the mediating effect test techniques of Baron and Kenny (1986) as well as Hayes (2013) were referred to in order to determine whether H2 through H6 were mediators. First, coefficient "a" was the effect of the independent variable (design thinking-based teaching) in influencing the mediator variables ("empathy," "define," "ideate ," "prototype," and "test"). Coefficient "b" was the effect of mediator variables influencing the dependent variable (i.e., learning achievement). Coefficient "c" was the effect of the independent variable in influencing the dependent variable (i.e., direct effect); Coefficient "c'" was the effect of the independent variable in influencing the dependent variable after the mediator variables were controlled. According to Baron and Kenny (1986), four conditions are required for the existence of a mediating effect: (1) an independent variable can predict the dependent variable ("c" must be significant); (2) the independent variable can predict the mediator variable ("a" must be significant); (3) the mediator variable can predict the dependent variable ("b" must be significant); and (4) when both the independent variable and the mediator variable can predict the dependent variable, the effect of the initial independent variable in influencing the dependent variable must decrease or be nonsignificant (c' < c or c' was nonsignificant).

The test on the mediating effect of "empathy" revealed positive significant correlation between the treatment group and learning achievement ($\beta = 11.81$, $t = 6.80$, $p < 0.001$; "c" was significant), and the effect on "empathy" was positive and significant ($\beta = 0.39$, $t = 3.82$, $p < 0.001$; "a" was significant). When the learning achievement of the treatment group was predicted by design thinking-based teaching and "empathy" simultaneously, "empathy" positively and significantly affected learning achievement ($\beta = 3.14$, $t = 2.09$, $p < 0.05$; "b" was significant), and the effect of design thinking-based teaching in influencing learning achievement was significant ($\beta = 11.88$, $t = 6.33$, $p < 0.001$) but greater than the initial effect (c' > c). PROCESS v3.5 by Hayes (2013; Model 4) was adopted to calculate the mediating effect. A test using bootstrapping on 5,000 samples revealed that the coefficient "ab" (i.e., mediating effect) was −0.07, and the confidence interval at the 95% confidence level ranged from −1.38 to 0.88 and included 0, indicating that "empathy" had no mediating effect. Thus, H2 was not supported; "empathy" did not mediate the effect of design thinking-based teaching in influencing learning achievement (Figure 3).

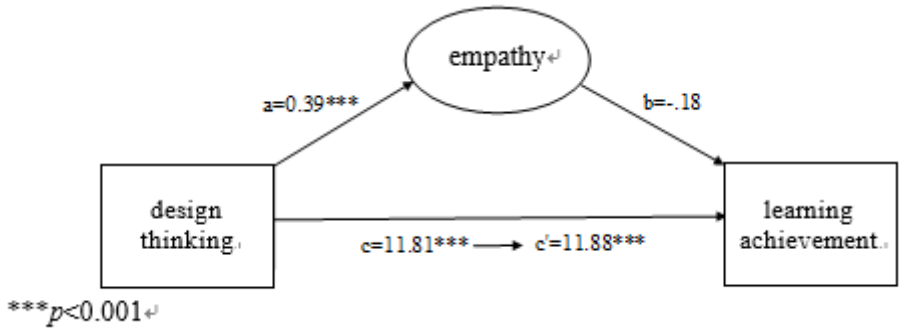

Figure 3: The Mediation Model with Empathy as Mediation Variable

The test on the mediating effect of "define" revealed that design thinking-based teaching was positively and significantly correlated with learning achievement ($\beta = 11.81$, $t = 6.80$, $p < 0.001$; "c" was significant), and the effect on "define" was positive and significant ($\beta = 0.41$, $t = 3.95$, $p < 0.001$; "a" was significant). When learning achievement was predicted by design thinking-based teaching and "define," the latter positively affected learning achievement, but the effect was not statistically significant ($\beta = 0.47$, $t = 0.27$, $p = 0.79$; "b" was insignificant); the effect of design thinking-based teaching in influencing learning achievement was significant ($\beta = 11.62$, $t = 6.17$, $p < 0.001$) but inferior to the initial effect (c' < c). A test using bootstrapping revealed that the coefficient "ab" (i.e., mediating effect) was 0.19, and the confidence interval at the 95% confidence level ranged from −1.28 to 1.30 and included 0, meaning that "define" had no mediating effect. Thus, H3 was not supported, and "define" did not mediate the effect of design thinking-based teaching influencing learning achievement (Figure 4).

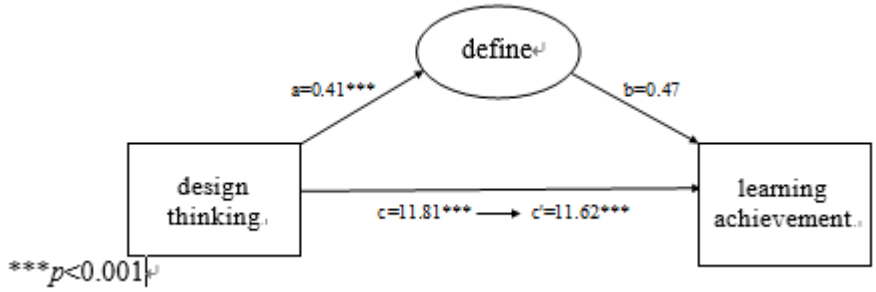

Figure 4: The Mediation Model with Define as the Mediation Variable

The test on the mediating effect of "ideate" revealed that design thinking-based teaching was positively and significantly correlated with learning achievement ($\beta = 11.81$, $t = 6.80$, $p < 0.001$; "c" was significant), and the effect on "ideate" was positive and significant ($\beta=0.39$, $t=3.34$, $p<0.001$; "a" was significant). When learning achievement was predicted by design thinking-based teaching and "ideate," the latter positively affected learning achievement, but the effect was not statistically significant ($\beta=3.14$, $t=2.09$, $p<0.05$; "b" was insignificant); the effect of design thinking-based teaching in influencing learning achievement was significant ($\beta=10.58$, $t=5.87$, $p<0.001$) but inferior to the initial effect (c' < c). A test using bootstrapping revealed that the coefficient "ab" (i.e., mediating effect) was 1.23, and the confidence interval at the 95% confidence level ranged from −0.40 to 2.15and not included 0, meaning that "define" had no mediating effect. Thus, H4 was supported, and "ideate" did mediate the effect of design thinking-based teaching influencing learning achievement (Figure 5).

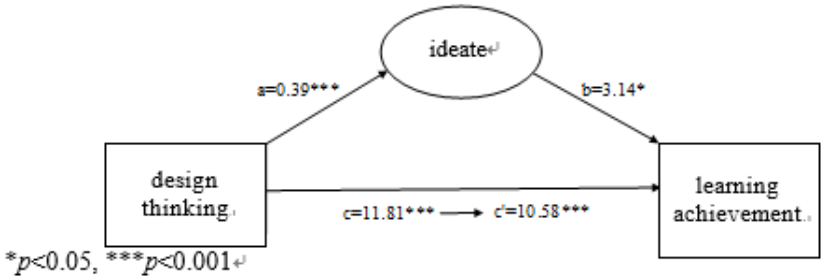

Figure 5: The Mediation Model with Ideate as the Mediation Variable

The test on the mediating effect of "prototype" revealed that design thinking-based teaching was positively and significantly correlated with learning achievement ($\beta = 11.81$, $t = 6.80$, $p < 0.001$; "c" was significant), and the effect on "prototype" was positive and significant (β=0.31, t=3.25, p<0.001; "a" was significant). When learning achievement was predicted by design thinking-based teaching and "prototype," the latter positively affected learning achievement, but the effect was not statistically significant (β=1.38, t=0.72, p=0.47; "b" was insignificant); the effect of design thinking-based teaching in influencing learning achievement was significant (β=11.39, t=6.20, p<0.001) but inferior to the initial effect (c' < c). A test using bootstrapping revealed that the coefficient "ab" (i.e., mediating effect) was 0.42, and the confidence interval at the 95% confidence level ranged from -0.73 to 1.71and included 0, meaning that "prototype" had no mediating effect. Thus, H5 was not supported; "prototype" did not mediate the effect of design thinking-based teaching in influencing learning achievement (Figure 6).

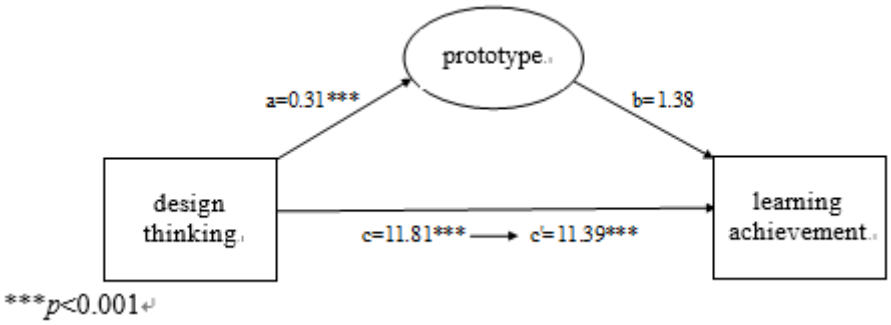

Figure 6: The Mediation Model with Prototype as the Mediation Variable

The test on the mediating effect of "test" revealed that design thinking-based teaching was positively and significantly correlated with learning achievement ($\beta = 11.81$, $t = 6.80$, $p < 0.001$; "c" was significant), and the effect on "test" was positive and significant (β=0.34, t=2.97, p<0.01; "a" was significant). When learning achievement was predicted by design thinking-based teaching and "test," the latter positively affected learning achievement, but the effect was not statistically significant (β=6.37, t=4.48, p<0.001; "b" was insignifican; the effect of design thinking-based teaching in influencing learning achievement was significant (β=9.63, t=4.48, p<0.001) but inferior to the initial effect (c' < c). A test using bootstrapping revealed that the coefficient "ab" (i.e., mediating effect) was 2.18, and the confidence interval at the 95% confidence level ranged from 0.42 to 4.87and not included 0, meaning that "test" had no mediating effect. Thus, H6 was supported; "test" did mediate the effect of design thinking-based teaching in influencing learning achievement (Figure 7).

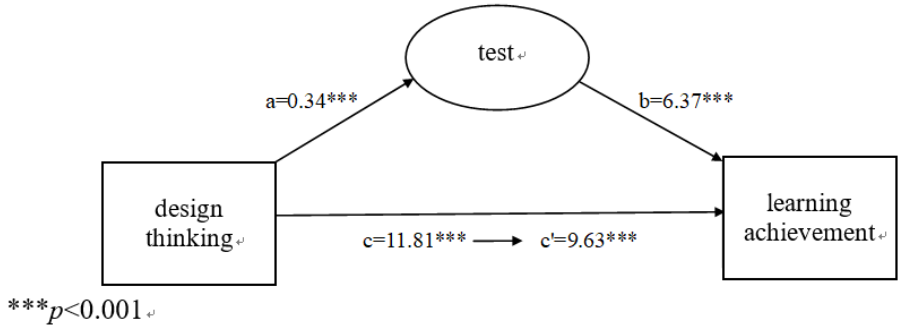

Figure 7: The Mediation Model with Test as the Mediation Variable

Conclusions

Advertising is a profession with complex forms and numerous aspects of communication. In design education, instructors should reflect on suitable teaching methods for advertising design. In this study, two teaching modes were used with the student participants. The control group received traditional teaching based on lectures delivering design knowledge and skills. The treatment group adopted the innovative method of design thinking advocated by Stanford University; through the student-oriented method, the students were guided to explore issues including "empathy," "define," "ideate," "prototype," and "test." As the findings proved, compared with the traditional teaching method, operating the methods of design thinking in class both enhanced student participation in advertising issues and facilitated interaction and effective communication between team members as well as instructors and students, finally yielding a positive effect on learning achievement.

Contemporary changes have led to the emergence of innovative advertising media. Moreover, diverse forms for expressing advertising creativity have been extended through combinations of new technologies such as artificial intelligence, augmented reality (AR), and virtual reality, thus providing various storytelling forms and experiences for brands. This study addressed five variables in design thinking ("empathy," "define," "ideate," "prototype," and "test") and explored their mediating effects on design thinking-based teaching. The findings indicated that two variables in design thinking, namely "ideate" and "test," had a mediating effect on enhancing learning achievement regarding AR advertising design. Deriving more interactive creativities by integrating technologies into advertising design has become a trend. The employment of AR will not completely replace two-dimensional advertising modalities. Rather, through experience, AR yields a multiplying effect for the original presentation of media. Through AR creativity, rigid two-dimensional advertisements become more topical and interesting. Therefore, in conducting AR advertising design, instructors are suggested to use design thinking tools such as empathy maps, personas, and customer journey maps to guide students to penetrate the technology acceptance modes of consumers and users, and participate in technology-based contexts for inspiration. Finally, designs were completed through prototyping to test the pros and cons of the design results, followed by optimization and improvement. In design thinking, the learning objective is to make every student an innovator. In the AR advertising design process in this study, the students were trained to depart from traditional analytic thinking and exert innovative analytic thinking to make advertising design course material more interesting, which further enhanced learning achievement. The results of the study serve as a pedagogical reference for instructors in the design profession.

Acknowledgements

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Stories and Experiences in the Time of Pandemic: Online Conversations of Filipino Student Affairs and Services Practitioners

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Abstract
The implementation of the enhanced community quarantine as a preventive measure in the widespread of the COVID-19 pandemic has halted the face-to-face delivery of classes in Higher Educational Institutions (HEI) in the Philippines. Many of the institutions have resorted to continue the learning process on online platforms. Because of this, the student affairs and services (SAS) practitioners were compelled to assist the students on the issues and concerns related to online classes and learning. The situation also disrupted the implementation of SAS programs and activities. Using Constructivist Grounded Theory as a method and approach, the participants were engaged in online conversations to gather their stories and experiences as SAS practitioners during the pandemic. This revealed emergent themes from the narratives gathered through focus group discussion format. Findings include issues and challenges on academics, mental health, student development and formation, and the welfare of the practitioners. It also revealed new approaches in responding to the concerns like the gathering of data, migration to online platforms, and skills development and training. The documentation and analysis resulted in a deeper understanding of their experiences prompting actions such as professional development programs and guidelines to assist SAS practitioners in moving forward in the new normal.

Keywords: Issues and Challenges for SAS, New Approaches, Student Affairs and Services in the New Normal, Student Development, Student Welfare

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Introduction

The COVID-19 pandemic has greatly affected many countries around the world and the Philippines is among the countries with a rapidly increasing number of positive cases in the Western Pacific region (World Health Organization [WHO], 2020). Because of this, public health measures were put in place which caused limitations on the mobility of the people and suspension of face-to-face delivery of education. This pandemic has certainly caused the largest disruption in education history having affected learners and teachers from around the world (UN, 2020). According to Kandri (2020), the pandemic that has greatly affected the economies around the world has also battered education systems. As a response, many have immediately shifted to remote or online classes which raised numerous concerns coming from students and other stakeholders.

Higher education institutions (HEI) appear to be distinctive and somehow prepared as compared to other levels of education considering that the students are old enough to adjust to the rudiments of online classes and activities and are digital natives who can utilize online platforms. However, the real concern lies in the challenges of choosing the right technologies and approaches for the continuous education and engagement of students (Kandri, 2020). This experience has dramatically transformed the delivery of learning activities as well as student support services and programs.

The HEIs' response to the crisis varies depending on their capacity. Some would depend on whether the government has concrete emergency preparedness plans in place. Others had concerns about the placement of technological systems and facilities, availability and access to the internet, the preparation of hard copies of learning materials, and provision for a conducive working environment for teachers and educational staff (Martinez, 2020). The situation has forced all members of the academic community to find solutions to ensure that the learning process continues despite the threats of the pandemic. It has revolutionized the landscape of education and has forced higher educational institutions to create a new normal that will still be responsive to the learning needs of the students.

The student affairs and services (SAS) is one of the sectors in educational institutions that have taken key roles in attending to the issues, concerns, and well-being of the students during the abrupt transition of the education platform. This is in response to the goal of supporting students in their learning and development (Roberts, 2014; Osfield, et al., 2016). The same is true with Filipino SAS practitioners. Taking by heart their function and mission, they have lived up to the definition of SAS as stated in the CHED Memorandum Order No. 9, series 2013, which describes student affairs and services as “the services and programs in higher education institutions that are concerned with the academic support experience for the student to attain holistic development.”

The SAS practitioners have played an important role in being front-liners who received the immediate concerns of the students. They have also greatly contributed to the discussions on how to attend to the needs of the students and provided the necessary data for consideration on the decisions of the top administration. Despite being in the same “storm” as the students and teachers, they have acted responsibly in performing their duties. This study documented and analyzed the stories and experiences of the Filipino SAS practitioners in attending to the concerns of the students during the pandemic through online conversations.

Online Conversations of Filipino SAS Practitioners

Considering the uniqueness of the situation, the SAS practitioners are faced with new challenges in addressing the immediate concerns of the students and of creatively delivering programs and services amidst the pandemic. It is in this light that the officers of the Philippine Association of Practitioners of Student Affairs and Services (PAPSAS), Inc. have decided to reach out to the SAS practitioners in the country through the PAPSAS Online Conversations. The said initiative intends to know and listen to the current concerns and challenges faced by the SAS practitioners in attending to the needs of the students because of the pandemic and the migration of student learning and development to remote or online platforms.

Given the limitations set to curb the crisis, the most convenient option to reach out and connect with the SAS practitioners is through an online gathering and forum. Online interaction has certainly contributed to increasing engagement with civic activities (Pendry & Salvatore, 2015) especially during these times of uncertainties and doubt. Due to the quarantine, many practitioners experienced depleted opportunities to physically gather and implement the usual SAS programs and services. Online interactions have certainly supplemented the need for social interaction as the internet provided social support regardless of the users' physical location (Subrahmanyam, Reich, Waechter, & Espinoza, 2008; Pendry & Salvatore, 2015).

Generally, the goal of the said initiative was to provide an opportunity for the SAS practitioners to have a platform to share their experiences in attending to the concerns of the students in line with the changes in modality of providing student learning and development. The activity also intended to document the actions and initiatives of the SAS practitioners and their respective institutions in response to the needs and concerns of the students during these trying times. The sharing also revealed speculations and projections of the future on how to move forward given the new normal.

The online conversations served as an online forum platform to share voices to gain a better understanding of the participants' present disposition (Pendry & Salvatore, 2015). It presented opportunities in gathering information on the issues, concerns, and challenges in the time of the pandemic. It stimulated discussions on their experiences in performing their role as SAS practitioners during the crisis. It also enabled the sharing of best practices and possible action points that could be responsive to the new normal.

It may be difficult for the SAS practitioners to even begin addressing the concerns of the students. But SAS practitioners have always excelled at adapting and thriving, even in stressful circumstances (McCarthy, 2020). That is why it is important to learn from other sources. This may be done by connecting to the right people and organization. One way is through direct online communication with experts and leaders who have already devised ways of adjusting. Another is through participation in organized online sessions like webinars, online forums, and online conversations.

Most Filipino SAS practitioners may have experienced difficulty in responding to the immediate needs of their students in the time of the pandemic. It was necessary to engage as SAS practitioners surely know the value of supporting one another by sharing lessons learned (McCarthy, 2020) during a crisis. Shared voices and reflections through online means can generate solutions (Sy et al., 2020). The opportunity to engage in online conversations empowered the SAS practitioners to come up with solutions and immediate responses to the expressed issues and concerns.

Constructivist Grounded Theory as Method and Approach

Constructivist grounded theory (CGT) is a method and approach in a qualitative study that is used to understand a social process or phenomenon inductively, and knowledge is constructed from the participants' experiences (Melvin & Ginsburg, 2019). CGT was used as a method and approach in this study as an inductive approach was considered to generate a new framework and propositions that would best explain the data gathered from the experiences of the participants. The approach is grounded in the participants' own words and narratives of the experiences relevant to the topic at hand (Charmaz, 2006). The study is constructivist as the evolving theory or subject experience was constructed by the researcher and the participants. This was easily done considering that the researcher is also a SAS practitioner and the lead facilitator of all the sessions for the online conversations. The researcher managed to have direct access to the data and information provided by the participants.

The participants of the conversations were scheduled per region. This is to easily gather similarities on the concerns experienced in the area. The participants were from Higher Educational Institutions (Private Schools, State Universities and Colleges (SUC), and Local Colleges and Universities (LCU) coming from the NCR, Luzon, Visayas, and Mindanao regions. There were also representatives from the Commission on Higher Education (CHED) regional offices (V and IX) who listened to the sharing and noted the concerns of the SAS practitioners.

Sessions	Number of Participants	Private Schools	SUC/LCU	CHED
NCR Batch 1	16	16		
NCR Batch 2	15	14	1	
Luzon Batch 1	11	9	1	1
Luzon Batch 2	7	4	3	
Visayas	11	9	2	
Mindanao	15	10	3	2
Total	**75**	62	10	3

Table 1. Distribution of Participants per Region

The participants of the online conversations were the SAS practitioners handling the different offices/units of student affairs and services in their respective HEIs. Those who participated in the conversations were assigned to guidance and counseling, student development, student leadership and training, student residents, student discipline, scholarships, and general student affairs and services administration. The majority are SAS practitioners in higher education while some are also handling senior high school. One participant is from academic affairs who also shared experiences and actions on the academic side.

The data was gathered through focus group discussions facilitated in the online conversations with the SAS practitioners from the different regions of the country – NCR, Luzon, Visayas, and Mindanao. The online conversations with participants from these regions were done by batch to ensure that all participants will be able to share their stories and experiences within the given time frame. The participants were properly oriented about the intention and purpose of the activity which is to know and document the stories and experiences of the SAS practitioners in the time of the pandemic. The main question asked was "What is your experience in the time of pandemic?" Probing questions followed picking up from the responses of the participants.

In analyzing the gathered data, the transcript of the conversations was coded to identify patterns. Open coding, where the text was analytically read by the researcher was done followed by the constant comparison of codes to define and refine the features of each category. Axial coding was then done to explore the relationship between the codes that were then organized into themes. Continuous analytical engagement with the data helped the researcher understand the relationship of the codes with the categories and the themes and sub-themes raising the patterns to a conceptual level.

Melvin and Ginsburg (2019) reiterate that the goal of CGT is to develop a conceptual model or theory that describes the social process in question and Charmaz (2006) prefers the term theorizing which is an interpretive practice of engaging with the world and constructing an abstract understanding of it. Adopting CGT as a method and approach in facilitating the online conversation and analyzing the gathered data has enabled the researcher to theorize the experience of the participant SAS practitioners and developed a conceptual model that expressed the realities and response to the phenomenon.

Stories and Experiences of Filipino SAS Practitioners in the Time of Pandemic

The data gathered from the online conversations with the Filipino SAS practitioners was processed and analyzed leading to the documentation of the emergent themes and sub-themes. The iterative categories were translated to emergent themes such as the issues and challenges experienced by the SAS practitioners and the approaches in delivering the programs and services in the new normal. The sub-themes further support the emergent themes and were considered to highlight the common and related stories and experiences of the participants.

	Emergent Themes	Sub-themes
Stories and Experiences of the Filipino SAS Practitioners in the Time of Pandemic	Issues and Challenges Experienced by the SAS Practitioners	Academic Concerns
		Mental Health and Wellness of Students
		Student Training and Activities
		Stranded Students
		Online Behavior of Students
		Job Security of SAS Practitioners
	Approaches in Delivering SAS Programs and Services	Gathering of Data about the Students
		Migration to Online Platforms
		Skills Development and Training

Table 2. Emergent Themes from Stories and Experiences of Filipino SAS Practitioners

Issues and Challenges Experienced by the SAS Practitioners

First on the agenda of the online conversations was to know the stories and experiences of the Filipino SAS practitioners in the time of the pandemic. Common in the facilitated conversations is the narratives that pertain to issues and challenges experienced by the SAS practitioners in addressing student concerns during the pandemic. Ludeman et al. (2009) posited that higher education institutions must have a set of values and principles that accounts for the expressed needs of the students. The imposition of the enhanced community quarantine (ECQ) disrupted the education sector and school officials had to come up with immediate actions. It was not only the academics that were abruptly affected but also the functions of the student affairs and services. The SAS practitioners have played an important role in dealing with the situation of the students and the online conversations became a platform for them to share their notable stories about issues and challenges they experienced.

Academic Concerns

All of the SAS practitioners who participated in the conversations have shared their stories on how their respective institutions have handled the academics. The colleges and universities following the new calendar were in the middle of their term/semester when the ECQ-suspension of classes was declared. Those who follow the old calendar are in the latter part of their school year having their final examinations and summer activities disrupted by the situation. This prompted the HEIs concerned to migrate to online platforms to continue with the learning process. Teachers and administrators were tasked to revise course syllabi to make them adaptive to the remote teaching modes whether synchronous or asynchronous (Simbulan, 2020).

Most of the HEIs have addressed these concerns and practiced leniency and flexibility in the completion of online requirements. Others have done the extra mile of reaching out to each of their students to know about their conditions and apply other modes of a more applicable learning process. They have also determined the end of the term/semester and implemented a grading system favorable to the students. Many have also given refunds of unused school fees.

Mental Health and Wellness of the Students

The experience of the pandemic and the limitations set by the ECQ have caused additional stress on the students and other members of the academic community. It took a while before they were able to adjust to the new learning and living system taking into primary account their health and safety as well as the needs of their own families. These changes have aggravated some pre-existing conditions and mental health concerns of some students.

Mental health issues are believed to be the leading impediment to academic success and students' mental health in higher education has become an increasing concern as the COVID-19 pandemic has brought this vulnerable population to renewed focus (Son, et al., 2020). That is why most HEIs represented in the conversations immediately activated their guidance and counseling services and offered online counseling. Some considered the ethical issues and appropriateness of the situation as limiting factors in delivering online counseling sessions while others have become bolder in finding ways to extend psychological assistance to the students in need.

Many guidance counselors took advantage of the free online webinars on topics that will help improve their skills in facilitating online counseling activities. Some institutions have also provided support for counselors in terms of equipment and connectivity to deliver this kind of service for the students and other members of the academic community.

Student Training and Activities

The ECQ did not only affect the conduct of the academic classes but also disrupted the scheduled activities for student development and training and other regular school activities like graduation. Because of the pandemic, the SAS practitioners had to defer the conduct of their regular activities including leadership training, the election of officers, retreat and recollections, outreach activities, entrance exams and admission of new students, orientation for new students, and awards and recognitions.

In consideration of the health and safety of the participants and observance of social distancing, many of these activities were no longer be conducted physically. They are already considering migrating the programs and activities to online platforms but there is still no clarity on how it will be done and if it will effectively achieve the program goals and objectives.

The student leaders of some of the colleges and universities have also initiated online activities to divert the attention of the students and promote holistic development and wellness amidst the pandemic. Despite the low turnout of participants, the student leaders still managed to facilitate the activities and provide a sense of connection that is believed to lessen the students' feeling of isolation (McCarthy, 2020). The student leaders have also helped collect data and information particularly on the living condition, needs, and situations of their fellow students. Although done online, interaction with fellow students would still be a defining experience of college life (Soon, 2020).

Stranded Students

Another issue handled by many of the participating SAS practitioners was the concern on students who were stranded in the college or university dormitories and nearby private boarding houses. Because of the limitation on the availability of transportation and the strict quarantine rules implemented in some areas, many students were not able to go home to their respective families. These are students residing in dormitories, who are either scholars or student athletes, and the regular and international students renting rooms or apartments who hailed from other cities, provinces, and countries. The same is true in the case of students stranded at the place of their internship or On-the-Job Training.

As a response, the SAS practitioners have initiated donation drives and collected support from the administration, alumni, and other stakeholders to provide for the basic needs, like food, of the stranded students. Some of them have also coordinated with the local government units for assistance in bringing home the students living in nearby towns and cities. Some of the students heeded the free transportation services while others opted to stay in their dormitories and boarding houses as they find it more conducive for them especially the availability of internet connection for their online learning.

Online Behavior of Students

One observation that is noteworthy to include in this report is the behavior shown by students online towards the decisions of the different higher educational institutions. Many were triggered by the determination of the schools to continue the learning process by migrating the classes to online platforms. This has earned various criticisms from the students and other parties that were immensely expressed in the different social media platforms.

Many have expressed their disappointments as they argue that the present situation does not promote a healthy learning environment. Some also claimed that continuous online classes are affecting their mental health. They have shared valid reasons while some have posted derogatory remarks towards their schools and their administration.

Some of the participants have shared how they responded to this issue. Many of them handled the situation in a positive and formative manner and have reached out to those students who have strong positions and comments online. They also practiced maximum tolerance and took the situation as an opportunity to dialogue with the students.

Job Security of SAS Practitioners

The current situation did not only cause stress and anxiety on the students but also with many SAS practitioners as they fear the uncertainties that go along with the pandemic. The business side of education most especially for private HEIs was affected. The participants representing this group have shared the impending possibility of applying for the no work no pay policy on them. This is due to the deficiency in the school's cash flow as they have not fully collected payments for tuition and fees.

They have also expressed their worries that their job functions may not be relevant and useful in this kind of situation which may result in being furloughed or downsized. They fear that they might be counted in the estimated 5 million Filipinos who would lose their jobs to the pandemic (Rodriguez, 2020). This fear stems from the premise that the SAS work relies mostly on close interactions and relationships with the students and translating it to a remote platform remains to be a challenge. Others were able to creatively justify the continuation of their duties and responsibilities and submit productivity reports while working at home to their school officials in exchange for their continuous pay while some have resorted to using their leave credits.

Approaches in Delivering SAS Programs and Services

Other than the issues and challenges experienced by the SAS practitioners, the conversation also opened discussions on the action points and plans in moving forward. All the participants acknowledged the fact that there is a need to adapt to new systems. Many have already started discussions within their units on reinventing the delivery of their programs and services. They focused on the most immediate concerns and explored technological alternatives as a new approach to responding. Some are still lost on how to move forward and lack guidance from their school officials as they are still busy addressing the academic concerns and business continuity of the institution. Just the same, many were able to share initial initiatives as an immediate response.

Gathering of Data on the Condition of Students

The initial response of most SAS practitioners a few weeks after the class suspension was to gather data. They have conducted surveys to know the condition of their students and their capability to participate in online classes. The data gathered served as one of the bases for the decisions of the school officials on how to deal with the needs and concerns of the students. Many of the participants expressed their intention to continue gathering information about the students so they will be guided on how to proceed in continuously delivering services for them. They were so also considering strategies on how to reach students who are not online.

Migration to Online Platforms

All of the participants have seen the value of technology as an alternative platform in these trying times. According to Soon (2020), “E-learning has become a vital tool to ensure the continuity of learning and education” in the time of the pandemic. Many HEIs were already in the process of migrating their programs and services online. All agreed that despite the situation, student formation and development should not stop and so they are considering maximizing the use of technology and connect the students with online services. Some have already started encouraging student leaders to conduct online activities. They also plan to deliver their development programs in webinar format. Others shared that they still need to

figure out how to conduct other activities like the election of officers, orientation for incoming students, entrance examinations, etc. They also plan to revisit their policies on student discipline and review how to make it responsive to the current scenario.

Skills Development and Training

In anticipation of the changes in the delivery of programs and services, the SAS practitioners also mentioned the need to build the capacity in using the available technology. It will entail the development of new skills and readiness from among their staff as some are not yet well-versed with the online platforms. They will have to learn how to produce online materials that are interactive and interesting. The participating administrators shared the importance of being adept with risk and crisis management to handle certain situations similar to this. They also need to be creative in thinking of ways to continuously deliver for the students. They will also have to be innovative and consider alternative practices to effectively reinvent the programs and services. The training can improve student learning in educational programming to facilitate the goals aligned to the learning goals of HEI (Ludeman et al., 2009; Toquero, C.M., 2020)

Student Affairs and Services in the New Normal

After careful analysis of the gathered stories and experiences of the SAS practitioners, it was then theorized that the main subject is on the state of Student Affairs and Services in the New Normal. Ideally, SAS practitioners must gain a better understanding of the needs of the students to serve in the new normal (McCarthy, 2020). Through the analytical engagement with the developed themes, certain action points and a conceptual model were conceived to help in the seamless transition of SAS practitioners to the new normal.

The action points must be led by the following key players involved:

1. *Commission on Higher Education* – to develop and release a standard guide for all Filipino SAS practitioners on the flexible delivery of SAS programs and services in the new normal. This guide may be based on the current CMO governing the SAS practice in the country which could be translated in practical ways on handling specific functions and expectations from the SAS sectors of student development, student welfare, and the institutional programs.
2. *PAPSAS, Inc.* – to initiate professional development programs that will enhance the skills and capabilities of the SAS practitioners in leading and managing their offices emphasizing the impacts of the new normal. This may be done through webinars and opportunities for online sharing of best practices. The association may also lead in benchmarking with international organizations and institutions through collaborative programs and platforms that will help expose the Filipino SAS practitioners.
3. *SAS practitioners* - as an output of gathering their shared stories and experiences, the following salient points that may be considered as guidelines in addressing the conditions brought about by the new normal are hereby given:

a. Prioritize the safety of the students and employees at all times.
b. Set clear strategic direction in handling and adjusting to the new normal.
c. Develop internal guidelines that will serve as points for consideration.
d. Ensure continuity of the delivery of programs and services.
e. Assess the different situations and capacities of all students and the employees.
f. Build scenarios and consider the worse and best cases possible.
g. Create programs that will apply to the situation of each group of students.

h. Set realistic expectations on the workload and deliverables of personnel.
i. Encourage the development of new skills especially in the use of technology.
j. Add a personal touch that can humanize online student affairs and services.
k. Involve and consult students in the planning and decisions that would affect them.
l. Expand your network and benchmark for best practices from other institutions and organizations.

The issues and challenges experienced as well as the new approaches in the delivery of the programs and services may be simplified with the consideration of the 3 Is – *Innovation, Involvement, and Infrastructure*. The different sub-themes were clustered according to the appropriate response that should be given.

Emergent Themes	Sub-themes	Response
Issues and Challenges Experienced by the SAS Practitioners Approaches in Delivering Programs and Services in the New Normal	Academic Concerns	Innovation
	Gathering of Data about the Students	
	Student Training and Activities	
	Mental Health and Wellness of Students	Involvement
	Stranded Students	
	Online Behavior of Students	
	Job Security of SAS Practitioners	Infrastructure
	Migration to Online Platforms	
	Skills Development and Training	

Table 3. Responses to the Themes

Another way of looking at the themes that iteratively emerged in the course of discussions is through the conceptual model that can help facilitate the development of response in addressing the need for the SAS practitioners to be able to cope with the impacts of the new normal.

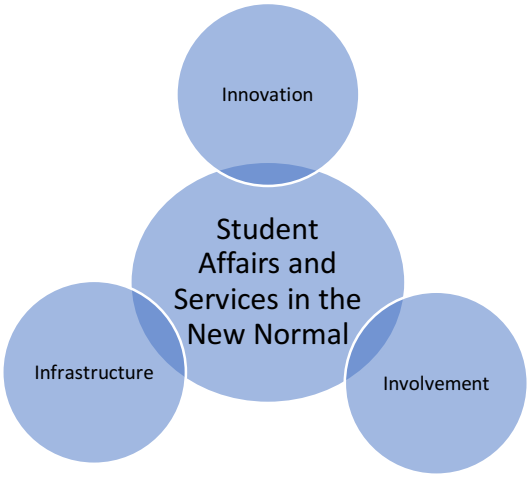

Figure 1: The 3Is Model for Student Affairs and Services in the New Normal

This model highlights the consideration of the 3 Is as practitioners reimagine student affairs and services in the new normal.

Innovation should be considered in the delivery of programs and services as the pandemic may also be seen as an opportunity to upgrade the mode of delivery of education and divert attention to emerging technologies (Toquero, 2020). Innovation is not only limited to the use of advanced technology, it also encourages the sense of creativity in implementing online activities and interactions. It may not be a creation of a new program and service but could be the continuation of old and usual activities delivered innovatively. This could also open opportunities for students to share their creative and innovative ideas.

The involvement of students in online activities may truly be a concern as SAS practitioners keep in mind their varied situations and limitations. However, it is still important to encourage the students to engage and support their need to connect and lessen the feeling of isolation (McCarthy, 2020). Increasing student participation may be done by clearly orienting them to the value of their participation and what they can gain with the engagement. Students may be involved by giving them roles and the tasks of organizing online events which may also develop their project management skills. It also entails implementing interesting and quality activities that students can relate to. There is also a need to increase the online presence of the SAS office and the student leaders to remain in the consciousness of the students catered.

Infrastructure pertains to the platforms that will be used to deliver the SAS programs and services. These are the online spaces where the students are and the SAS practitioners must be there as well. It is important to keep these spaces safe and conducive for learning and interaction that promoted the building of healthy relationships. Having the infrastructure is also about having the systems in place like clear policies and guidelines that will assist the students and the SAS practitioners in traversing the paths of the new normal. Inclusion and accessibility must also be considered in setting up the appropriate infrastructure.

The propositions and conceptual model may be applied generally as SAS practitioners take the lead in inspiring students towards productivity and continuous development as they surpass the challenges of the new normal.

Conclusions

The stories shared by the participants have revealed important points in attending to student affairs and services in the new normal. The insights coming from the discussions from fellow SAS practitioners resulted in the following realizations:

Disruption in the learning process – the pandemic has surely affected a lot, if not all, aspects of human life including education. The quarantine period has affected the delivery of education and has abruptly disrupted the learning process. It has changed the general narrative of physical classroom learning founded on interaction and relationships. Other aspects of student life were also compromised as there is a need to defer the activities intended for student development and welfare.

Validation and Evolution of the Role of SAS Practitioners – the actions taken as a response to the situation have validated the role of the SAS practitioners. It emphasized how supportive the SAS work is with the academics and other sectors in the school community. It also showed how responsive the SAS practitioners were in addressing the concerns of the students. They served as a bridge that connected the students to the rest of the academic community. The general role of the SAS practitioners will remain the same however, the manner of executing the function will again have to evolve and be attuned with the changing times. This extraordinary time showed the dynamism of the SAS practice. It revealed how the practitioners

are quick to respond and in developing strategies keeping in mind the overall welfare of the students.

***The Need for Continuity* –** the SAS practitioner recognizes that the support for students must be the top priority in a crisis like this. It is necessary to ensure the continuity of providing services for the students. This was evident in the desire of all the participants to develop online versions of the programs and services and make them accessible despite the limitation on physical contact. The online versions may not be as effective as the usual format but it is better than not offering anything at all. To continue, the SAS practitioners also aired out the need for support from the school administration.

***Readiness of the SAS Practitioners in Response to the New Normal* –** being prepared and capacitated is important especially in using the modes of technology that would allow continuity of the services. The training and skills development may be initiated institutionally and through public offerings. This will also make the SAS practitioners more confident in handling their jobs and managing the expectations both of the students and the school administration.

There is also a need to improve future interactions in which the participants have mentioned the involvement of more SAS practitioners in the online activities and for the key players like the PAPSAS, Inc., as the national association for Filipino SAS practitioners, to organize online seminars and training programs, and to provide opportunities for more conversations, continuous learning, and sharing of best practices.

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A Critical Analysis of Prevention Science Framework: An Examination of Student Discipline Programs

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Abstract
Intervention programs have been mostly the focus of many organizations in facilitating behavioral improvements. Given that mostly one of the goals of the academe is the formation of particular universal values we collectively affirm, this paper zooms into the existing programs that aim to address, on the prevention side, student discipline issues in the university. The purpose of this study is to look at prevention science, a thought system prevailing in the wider research arena, if it can be adopted to the specific setting. This paper presents a critical analysis of prevention science framework as used in proponent studies in psychology, clinical research and politics. Findings show that a prevention science research should consider risk and protective factors, developmental theory and processes, ecological analysis, good research practices and programmatic intervention research. These framework elements were used to examine the existing programs designed for the prevention of student discipline violations in a university. Gaps in the existing prevention programs as advocated by the framework, as well as the implications for student discipline program development, implementation and evaluation, are also discussed.

Keywords: Prevention Science Framework, Student Discipline, Critical Analysis

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Introduction

Intervention programs have been mostly the focus of many organizations in facilitating behavioral improvements. Such practice is also exercised in educational institutions particularly where student misbehavior is presented. With well-meaning intentions and evidence-based programs developed in the educational setting, one can help but wonder if there is still something more that can be done. Given that mostly one of the goals of the academe is the formation of particular universal values we collectively affirm, this study zooms into the existing programs that aim to address, on the prevention side, student conduct issues in the university.

Academic establishments have instituted offices that provide student services and programs that serve the needs of the student population and special groups. One such service is the student conduct office, in the Philippines, usually called the student discipline office. This office primarily caters to students who have violated the university codes of student conduct as stipulated in the student manual. Upon offense, academic institutions have processes they follow in order to address the violations. Penalties, sanctions and even restorative practices to the academic community have been instituted and administered to students depending on the gravity of the violation.

Whilst effectiveness of the interventions provided have yet to be seen, it is of the author's concern that prevention programs being implemented are of equal relevance to the academic community, if not a little weightier. The purpose of this study is to look at prevention science, a thought system prevailing in the wider research arena, if it can be adopted to the specific setting.

There is a plethora of prevention programs being used in the mainstream of program implementation. However, prevention science, as this study will delve into, differentiates itself in the strict sense of utilizing this framework as developed and advocated by its proponents.

Prevention science, as the term implies, has had the predominance in Western organizations, covering fields from medicine to economics, mathematics, even criminology. MacQueen and Cates (2005) suggest that "an effective prevention science research enterprise requires that they be coordinated and integrated through all research stages—from the conceptual, to the experimental, and ultimately to the applied." Looking into the existing programs primarily designed to prevent conduct problems among university students, it is the hope of this study to consider the areas that need particular focus in program development and evaluation. Thus, using the preventive science framework, a close look at the existing programs will consider the present programs in the office, primarily those implemented to prevent occurrence of student conduct violations. Such programs are profiled based on the target behaviors, recipients and expected behavioral outcomes. Ultimately, the main purpose of this analysis will be considering how the prevention science framework can be used for student conduct violations prevention programs. This study may be significant to a paradigm shift in the mainstream practices of discipline offices. It is the belief of the author that as the cliche goes, 'an ounce of prevention is worth a pound of cure.'

Prevention Science and Research

"Prevention Science is a framework for research on how to prevent and/or moderate negative medical, social, and emotional impacts before they occur" (https://projectteachny.org). A

systematic study of preventive interventions, it aims to reduce maladaptive behaviors and to promote adaptive behaviors (http://euspr.org/prevention-science/). Hence, prevention science is about identification of risks and risk factors putting to light the observations that these risks pose on at-risk subjects of a certain phenomenon in question. Such phenomenon is what calls for interventions that prevent its occurrence (Roumeliotis, 2015).

Driven primarily from medical epidemiological research (Cates, 1995), prevention science research has spanned economics, criminology, social, behavioral and the educational arenas. Over the years, prevention research has also branched in the education setting on themes such as drug abuse, sexual violence, antisocial behavior (Miller, Brehm & Whitehouse, 1998), and bullying (Rivara, 2016).

Prevention science's risk and protective factor model is rooted in 30 years of research and evaluation. Perez-Gomez, et.al (2016) advocates this paradigm as the fundamental approach to impact in preventing behavior problems among youth.

Rivara (2016) adopts a muti-tiered prevention framework with universal, selective and indicated preventive interventions. Universal prevention programs expose all members of the target population to the intervention; at-risk youth for the problematic behavior undergo selective preventive intervention while indicated preventive intervention for those already manifesting problem behavior, in the case of their advocacy, bullying.

Developing an anti-social prevention program, Miller, Brehm and Whitehouse (1998) suggest promoting competence and resilience**,** setting clear behavioral expectations, positive behavior management, and skills training - protective factors that mitigate risks. Conyne (2010) summarizes that prevention programs should follow best practices, in which he also provided best practice prevention guidelines.

Prevention science is also being advocated in an emerging adults study that aim to interfere with potentially destructive behaviors in this life stage in between adolescence and adulthood (Schwartz & Petrova, 2019).

Method

The prevention science paradigm has been in the literature for quite some time yet, amazingly, at the time of writing this, it seems that it is not well-utilized in our country. Prevention programs are aplenty as every social institution has them in one way or another but not prevention as a science, certainly not prevention science. Thus, although helpful and interesting, this study excluded articles that are merely about prevention programs. The rationale behind such an approach is to look closely at this already existing research discipline from a critical perspective and see how these can be adopted to the current programs being run in the university where I was affiliated.

Six journal articles, particularly from proponents of the paradigm from different fields, discussing prevention science research are subjected to critical analysis of the elements advocated by the prevention science research discipline. Two of the journal papers were developmental articles in the frontiers of psychology and mental health (Coie, et al, 1993; Heller, 1996); one in social development (Catalano, et al, 2002); two in clinical research and epidemiology (MacQueen and Cates, 2005; Herman, et al, 2012); and one in politics (Roumeliotis, 2015). I was particularly interested in the development of prevention science that

the selection and inclusion of articles that discussed its framework. From a critical standpoint, a table of analysis was constructed for every article to record the prevention science framework components in their descriptive phase. Coding was undertaken for each article's descriptions. Analytical themes were developed. Notes and observations during thematic analysis were also discussed.

The critical analysis included a rigorous examination of prevention science articles that fleshed the elements of prevention science framework over the years. It should be noted that because of the remarkable pragmatism of prevention science, prevention research has ramified into different knowledge and practical spheres, as shown in the journal articles taken for the analysis. However, despite the pervasiveness of prevention science in many research domains, in multi-disciplines and multi-sectors, the analysis was focused on articles that examined prevention science more deeply than mere application of the framework alone.

The findings from the analysis were used for an overview examination of the existing programs for preventing student conduct violations. Developments in the framework seen in the articles are explored against the existing discipline preventive programs implemented in a university.

Findings: The Prevention Science Framework

Prevention science research, originally advocated in public health studies, has diverged into different disciplines. Psychologists, mental health practitioners, social and educational program developers and clinical researchers see the value in looking at prevention instead of the usual intervention approaches. A National Prevention Summit in Australia summarized that prevention intervention is a good investment and is cost-effective (Sanson, et al, 2011).

The analysis of the prevention science framework underscores the components central to prevention science research. The author's reflection of the analytical undertaking that this study entailed is also provided.

Risk and Protective Factors

Prevention science is a research discipline that primarily addresses risk and protective factors in order to prevent the occurrence of maladaptation and problem behaviors. Heller (1996) describes prevention science research as a discipline "focused primarily on the systematic study of precursors of dysfunction and health called risk factors and protective factors, respectively." Thus, this research discipline is applied before the onset of disorders, diseases or problems and aims to mitigate the risks that would effect such problems. The protective factors aspect, meanwhile, focuses on the buffers against risks for diseases or the "problematic subject" (Roumeliotis, 2015).

Identification of risks and risk factors have been at the forefront of researches conducted using this framework. Coie, et al (1993) defined these risk factors as ranging from generic ones such as family circumstances, emotional difficulties, school problems, ecological context, perinatal complications, interpersonal problems to skill development delays. These risk factors, multiple or shared, are contributory to the manifestation of multiple disorders or problem behaviors. The identification of an object (the problem) as risk, Roumeliotis (2015) accounts may make it possible for observation and measurement and, eventually for intervention, but not for the explanation of the meaning of the risk behaviors.

On the other hand, some protective factors have been cited as psychological resilience, strengths, skills, emotional advantages. These are elements that, when optimized, provides a safety net from developing the dysfunctions.

Herman, et al (2012) refers to both risk and protective factors as meaningful "targets" for assessment and intervention and are related to essential youth outcomes. The thrust, therefore, of prevention research is in the reduction of risks and enhancement of protective factors.

Developmental Theory and Processes

Taking into consideration the risk and protective elements in a prevention research, a holistic approach in preventing health and behavior problems needs to be adopted. Thus, developmental theory and models need to be integrated to better understand, and interrupt, the processes leading to problem behaviors (Catalano et al, 2002). Addressing these underlying processes using developmental theory results in the determination of the causal processes in social and behavioral dysfunctions in each domain of functioning (Coie, et al, 1993; Herman, et-al, 2012).

Moreover, being able to determine the predictors of problem behaviors, theoretical causal models of change processes may be developed in which antecedents of problem behaviors are identified and corresponding prevention interventions are provided, which would be about changing the antecedents. A buffering hypothesis, prosocial adaptation, competencies in the cognitive, social and emotional developmental domains, as well as social systems in place are some of the interventions introduced in the process and serve as buffer to problem behavior manifestation, which then affects behavioral outcomes (Catalano et al, 2002).

Ecological Analysis

Aside from the developmental processes involved in the problematic behavior's occurrence, prevention science researchers emphasize that behavior is ecologically embedded. A myriad of factors external to the person, who is a complicated system in himself, are involved in the production of behavior. Prevention science researches have been conducted with careful notice of the social, cultural and interactional transactions of people with regard to the biological entity that the person is. Thence, such ecological analysis of the manifested problem behavior considers the interdisciplinary systems taking place in the actual conduct of the behavior (Catalano et al, 2002; Heller, K., 1996; Coie, et al, 1993).

With the multi-factors involved, prevention science research calls for a multivariate investigation of causation of the problem behavior including the risk factors that would be looked more closely in this framework.

On the other hand, Roumeliotis (2015) relates this context issue in the problematic as a form of control and political accountability when the elements of the ecological analysis are threshed and enumerated, but not well-defined and understood. As provocative as it appears, this is a clear indication that risk factors for problem behaviors need to be expanded and understood from a different lens, possibly apart from a prevention science framework but clearly an expansion of the concepts or constructs discovered.

Good Practices in Prevention Science Research

Much can be gleaned from the proponents of preventive science in the respective fields this study has analyzed. One outstanding concern in conducting prevention science research is the clamor for good data, empirical evidences of theoretical models and processes and documentation of prevention program effectiveness.

Rigor in the research methodology demands that research processes are addressed in terms of sampling, measurement and appropriateness of statistical models used. Literature reviews in the studies analyzed show that prevention science researches have issues with small sample sizes, which make generalization questionable; participant attrition, in terms of recruitment and retention of participants in the experimental phases; and inadequate long-term follow-ups (Heller, 1996).

Heller continues that a prevention intervention research cycle requires that the development of prevention intervention employed "careful epidemiological and developmental research of risk and protective factors, pilot-tested, evaluated in a larger scale controlled prevention trials." This makes creating community engagement even before the commencement of a program inevitable for success. Herman et al (2012) suggest stages for intervention trials resulting to a strong knowledge base which includes problem and conceptual framework definition, conceptual framework testing, manipulation of hypothesized causal processes in the interventions design and test, successful intervention field extension, and findings dissemination.

Prevention science research is largely experimental and continuously evaluative in nature with the goal of attenuating risk factors and reinforcing protective factors for the prevention of problem issues. Predictors, mediators and outcomes should be considered in the conceptual development of a prevention research. Tools should be developed for measuring the effectiveness of the preventive interventions regardless whether the nature of these preventive interventions are universal (for the general population; mass-based) or more focused (selected population) (Coie, et al, 1993; Herman, et-al, 2012).

Research diffusion, or the dissemination of the prevention research findings, should also be considered when making studies for prevention of dysfunctions. In fact, research effectiveness should be shared in order to provide information that reaches local and state-level policy-makers.

Programmatic Intervention Research

Although programmatic intervention research may be classified in the good research practices section in this study, I opted to place it in a separate section to examine programmatic intervention research more closely.

Design in prevention programming should contain the is developmental and ecological domains and processes of the problem behavior phenomenon. Outcomes identification in the prevention programming phase should be considered in the design and target general outcome measures.

Programmatic intervention research is a "continuous, systematic collection, analysis and interpretation of related processes to guide planning, implementation and evaluation of

practices" (Herman, et-al, 2012). This process of surveillance, of continually measuring and monitoring behavior, just as public health researches monitor diseases, leads to an identification of emerging crisis, determination of intervention impact and program mediators, and ongoing information of the problematic phenomena under scrutiny. Mostly, this research focuses on skills enhancement (Roumeliotis, 2015) as opposed to the dysfunction.

Just as behavioral surveillance proceeds in the programmatic intervention research, there is also constant development, evaluation, experimentation with a continuous feedback loop in the research process. The program is being reconstructed into practical and effective applications that is not only applicable to a select few but reaches mass-based audience through community coalitions and policy levels (MacQueen and Cates, 2005).

Coming from a clinical research context, MacQueen and Cates presented a comprehensive prevention science research framework that advocates an integration of five different layers of a prevention science research from the stages of conceptual development, experimentation to the applied settings. They argue that prevention science research moves in a coordinated and integrated continuum spanning from the research stages of conceptual development to experimentation of these concepts to the applied which then looks into the effectiveness of the former in different situations, and espouse that each aspect of the continuum is made up of various layers consisting of five elements, namely (1) advocacy and policy, (2) community participation, (3) clinical trials research, (4) acceptability research, and (5) operations and program development. Meanwhile, Kellam & Langevin (2003) offer a framework that is multidimensional in order to understand the meaning of evidence in prevention science research. Context, program efficacy, collaboration and acceptance are themes that overlapped with the proposal of MacQueen and Cates' (2005) multi-layered framework.

Analytical Notes

A comprehensive discussion of prevention science framework and its components can be found in the psychological articles. Without prejudice to the field, Coie et al (1993) and Heller (1996) discussed prevention science from the point of view of a continuum. Prevention research, with its concentration to prevention of disorders, these authors started with a step-back approach to the problem. Whereas prevention research does look into the risk factors and preventive factors of disorders, the only element common among all these studies, the way the framework was slated portrayed a full scenario of a research discipline known as prevention science. As if inching towards the disorder, the authors discussed developmental processes through theory and model explications without losing an eye at the big picture, the ecology of the dysfunction. They then proceed to the research arena discussion, explaining methodological rigors then close with a deliberate mention of prevention programming. I find the presentation fascinating.

Comparing and contrasting prevention science with positive youth development framework, Catalano, et al (2002) had may things to say. Although I have seen the effort to present these two related yet separate paradigms coherently, I find the presentation of the framework of prevention science enmeshed with many things at a time, like an excited kid who has a lot of stories to tell yet limited by time, space and attention. However, what I find incredible is the way the pieces come together to create a distinct prevention science framework. The paper also talks so little about the conduct of research aside from the mention of prevention programming.

The clinical researchers in the study (MacQueen and Cates, 2005; Herman et al, 2012) discussed with precision the framework of a prevention science research. MacQueen and Cates'

(2005) proposition of the layers of prevention science research present an apparent parsimony of prevention research only to be lost in the intricacies of the process. How they go back and forth to the layers of advocacy and policy, community participation, prevention research, acceptability, and program operations and effectiveness along the continuum of conceptual, experimental and applied stages felt like a waltz to the entire research process. The dance ends with program effectiveness, community engagement and policy at state levels for a bigger, wider audience feeling like an applause for the completion of the research.

Amidst the journey of a prevention science research, Herman et al (2012) interjects the role of assessment in a prevention science framework. As if walking along the research path, the authors describe what targets to look for; encourage a wide-eyed observation of the environment for what could be luring around the corner; and always on the look-out for answers.

Roumeliotis (2015) provided an eloquent deliberation and philosophical position when he critiqued the framework. It was obvious that the author was not a fan of prevention science as he prefers a deeper understanding of concepts and constructs that were presented as disorders, dysfunctions or problems. When he expounded his thoughts to the larger political spheres, I found it heavy to take in because his contentions on finding meaning and explications for what he calls the "problematic" were not addressed by prevention science. Many of his points, I see, are not within the primary focal concerns of the prevention science research paradigm. However, this calls for a louder voice towards more interdisciplinary ventures on reaching a wider scholarly sphere and answering questions from the joint perspectives of diverse experts.

Summary

Prevention science research in the different fields have yielded considerable similarities in the framework elements. The focal point has always been the emphasis for risk and protective factors. Developmental processes and models have to be considered when doing prevention science research in order to examine the normative and change processes. Ecological analysis need to be undertaken as there are various environmental considerations in crafting prevention intervention research. Good research practices that reflect sound methodology is well advocated with enlistment of processes for a programmatic intervention research.

Exploration of Preventive Science Research to Preventive Programs

The elements of a prevention science framework are examined in light of the student conduct prevention programs in a university. Undertaken to explore the possibilities of the framework to existing programs and its implications for program development, it aims to determine "feasible research designs, sampling methodology and data collection method" (Singh, 2003).

Programs aimed at preventing discipline violations were reviewed based on the program description, objectives, target behaviors, recipients and expected behavioral outcomes using the operations manual which includes a documentation of the program description, processes and practices was examined, including observations in implementation. Core programs were defined and identified.

Assignment to the core program required consideration of the program operations' cost to time, resources and implementation. Thus, with eight (8) identified preventive programs, the core

programs were limited to three (3) in which two run at many points in time during the academic year and, thus, are regularly being conducted, while one is conducted for an entire month.

Prevention Programs in Focus: University Student Conduct Violations

The three core preventive programs identified are the discipline education programs on the university policies, the non-fraternity program of the university and an advocacy program on discipline awareness and formation. These programs are being given to the general student population. However, in terms of implementation, the programs differ considerably.

The discipline education program which contains formation lectures, orientations, symposia, seminars including curriculum integration are designed to inculcate information dissemination on the different university policies on behavior, thus reinforcing the behavior of student compliance to these codes of conduct. Although given as a mass-based program for students, the lectures are mostly introduced during the students' freshmen year, during their early days in the university. It is in this early intervention phase that the goal of preventing conduct violations in order to attain a clean discipline record upon graduation is emphasized.

Especially highlighted in the university discipline expectations is the proscription against students' engagement to fraternities and sororities, thus, the implementation of the non-fraternity program. Aside from being included in the student handbook and covered in the education program, this is further stressed upon the students' submission of a notarized contract of non-fraternity involvement. Students are also randomly chosen for interviews regarding fraternities and possible participation to these non-acknowledged organizations. Students identified to be potential or suspected members are then placed under monitoring.

The advocacy program in the office contains activities and projects that are being run on different time frames. One outstanding annual project that the advocacy section runs for a whole month is known as the discipline awareness and formation month. Similar to the education program, information dissemination is furthered through the different activities that it presents, such as exhibits, interactive games, information booths, mini-concerts and the likes. Discipline formation is a goal to attain as the target recipients are more random and general, catering not only to the first year students but to the whole student body whose presence is randomly situated in the campus. Compliance to the rules of the university is also the slogan for this advocacy. While some students may have incurred infractions already, the month-long activity aims to provide a venue for students to interact with their discipline officers and to curtail or address possible culmination of minor offenses to major violations.

Prevention Science and Existing Prevention Programs

A. Discipline Education

Given a proper understanding of prevention science, a careful review of the program manual explicates the discipline education program is not a preventive program. With emphasis on compliance to the university rules and regulations, this program is not preventive in nature but is promotive. Prevention, as the World Health Organization (2002) defines it, is keeping something from happening, while promotion is to enable people to "increase control over, and to improve their health" or outcomes. In promotion and prevention, these concepts overlap and complement. However, promotion is more in line with the objectives of this program.

B. Non-Fraternity Program

The non-fraternity program, or for the sake of alignment with the goals of this paper, is a fraternity prevention program. As a cultural phenomenon, the prohibition to be part of fraternity or sorority memberships has been a response to the media hype on the disadvantages of the affiliations to such organizations where criminal acts have been tantamount to brotherhood ideology.

Viewed from the lens of prevention science intervention programming, much still needs to be done for one to say that a preventive program exists. A more comprehensive program development of the fraternity prevention program is needed where risk and protective factors can be discussed, developmental processes are shed to light given the life transitions of students from adolescent to emerging adults, and the socio-emotional benefits that fraternity memberships address. Ecologically, the pressures of academics and other impeding variables that effect membership to fraternities need to be further explored through literature review, interviews, focus groups or survey. Although there is a surveillance system in place for monitoring this behavior, good research practices and programmatic preventive intervention will need to identify predictors of this risk behavior and develop tools for monitoring and evaluation of this intervention. Other theoretically sound prevention interventions may also be developed that focus on the protective factors.

C. Advocacy Program

Somewhat similar to the discipline education program, the advocacy program concerns more about the promotion of good student discipline. However, given that this program caters to more random students, some of whom have incurred discipline violations already, prevention of possible culmination of minor offenses and commission of major violations is an objective to pursue. Thus, a student violation prevention program may be considered for development.

Given the range of student violations a student can commit, as stipulated in the university student handbook, research on most violated policies need to be undertaken in order to create a programmatic prevention intervention program. Intervention programs that may be given universally, selectively or indicatively need to be developed bearing in mind the different audience for the programs. Risk and protective factors should also be explored when crafting the student violation preventive intervention program. Acceptability of the program, advocated by MacQueen and Cates (2005), need to be ensured in all levels - hypothetically, clinically, experientially and for the long-term. Thus, program development and operations need to continuously be evaluated and modified to be assured of program effectiveness.

Outcome criteria may also need to be developed and tools for measuring the proposed outcomes. A programmatic preventive intervention program for this type of program may be more comprehensive and might require sub-levels to address individual or clustered violations. This has implications to the office’s research agenda and resources (personnel, logistics, time) and other university stakeholders.

Conclusions and Recommendations

Prevention science research has been around for quite some time. The analysis of the framework showed that the components are centered around risk and protective factors,

developmental theory and processes, ecological analysis, good research practices and programmatic prevention intervention.

Existing programs aimed at preventing student violations in a university were examined in the light of the prevention science framework as critically analyzed. Of the three core programs aimed at prevention, only two of them were considered to be able to adopt prevention science framework.

Much work needs to be done. Adopting a prevention science framework needs to adhere to the rigorous methodological assumptions of its original proponents, clinical research. Thus, a positivist approach is expected in the conduct of this research. However, since social science research inevitably deals with unstructured data, a combination of both constructivist and positivist approaches may be undertaken - quantitative and qualitative research, triangulated in studies often produce studies that are rigorous and well-founded.

This study has been limited to the programs of the student discipline formation office in the current setting. There were currently eight classified preventive programs in the student conduct office. Three has been examined using preventive science research framework. It is recommended to consider conducting the same examination to the rest of the programs to shed light into further developing programs geared towards strengthening prevention of student conduct problems.

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The Relationship between Intercultural Communication Competence and Perceived Challenges and Its Effect on the Perceived Success of International Students in Japan

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Abstract
The number of international students in Japanese higher education institutions (HEIs) has increased significantly in recent years. Aside from Japanese-medium instruction (JMI), English-medium instruction (EMI) has been introduced to the country's HEIs to attract more diverse student groups. Intercultural communication competence (ICC) plays an essential role in improving the on-campus experiences of international students. This study investigated the relationship between students' ICC and perceived challenges and its effect on the perceived success of studying in Japan. We surveyed 113 international students enrolled in a Japanese postgraduate program. Results suggested that in the non-Chinese (N=38) and Chinese (N=35) EMI student groups, ICC negatively and positively affected their perceived challenges, respectively. In comparison, ICC had a less positive effect on the perceived challenges of the JMI student group (N=40). These findings indicated that most non-Chinese EMI students perceived that they were in the high-ICC and low-challenge balance, while most Chinese EMI students were in the high-ICC and high-challenge balance. Although JMI students possessed excellent Japanese language proficiency, most perceived themselves to be in the low-ICC and high-challenge balance category. Overall, the level of students' perceived success decreased in the following order: high-ICC and high-challenge, high-ICC and low-challenge, low-ICC and high-challenge, and low-ICC and low-challenge. In particular, the high-ICC and high-challenge categories led to the highest perceived success. Although international students studying in Japan are highly homogeneous in terms of geographical origins, their ICC and perceptions of challenges show great diversity.

Keywords: English-Medium Instruction (EMI), International Students, Intercultural Communication Competence (ICC), Student Success, On-Campus Experiences, Japan

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Introduction

In addition to traditional Japanese-medium instruction (JMI), Japanese higher education institutions (HEIs) have introduced English-medium instruction (EMI) as a strategy to attract more international students. The number of international students studying in Japanese HEIs has increased dramatically since 2015, and this group is currently dominated by students from Asian countries and regions. International students, who comprise a highly homogeneous group, account for the majority of the population of EMI students in Japan (Shimauchi, 2018). However, only a few studies have investigated international students' EMI experiences in Japan, especially at the graduate level (Rakhshandehroo & Ivanova, 2020). For example, Rose et al. (2020) examined the relationship between undergraduate Japanese students' English language proficiency and their learning success in EMI classes. Sarwari and Wahab (2016) explored the relationship between postgraduate international students' English language proficiency and intercultural communication competence (ICC) in Malaysia. Hanada's (2019) research suggested that studying abroad can affect Japanese undergraduate students' ICC. Nevertheless, there remains a lack of discussion on international graduate students' ICC in relation to their learning experiences in Japan.

Therefore, the current study investigates the relationship between international graduate students' ICC and perceived challenges and its effect on their perceived success in studying in Japan. The following research questions are addressed in this work: (1) What is the relationship between international graduate students' ICC and their perceived challenges? and (2) What kind of effect does the ICC–challenge balance have on international graduate students' perceived success?

Literature Review

In light of the increased pressure to shrink high school graduates' population and the lack of competitiveness with other countries' academic rankings, the Japanese government has introduced and promoted EMI at universities as a solution to attract more international students (Hashimoto, 2018). In 2009, the well-funded Global 30 (G30) Project was launched by Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT), which aggressively established the inclusion of EMI into designated HEIs (Rose & McKinley, 2018). Since then, EMI courses have been integrated into existing JMI courses (Rakhshandehroo & Ivanova, 2020). Government initiatives have prompted HEIs to establish their own EMI projects on a significant scale. Data show that 36% and 16.2% of Japanese universities have implemented EMI courses and full-degree English-taught programs (ETPs) at the graduate level, respectively (MEXT, 2019).

As mentioned previously, the number of international students studying in Japanese HEIs has increased dramatically. According to statistics published by the Japan Student Services Organization (JASSO, 2019), the main characteristic of international students in Japan is that over 90% come from Asia, while only around 5% come from Europe and North America. Thus, on-campus English is "Asian-accented" and dominated by the "Asian variety" (Haswell, 2017). A previous research has identified language and cultural challenges as the two primary issues that students often experience in their EMI programs and courses (Ishikura, 2015).

In a multicultural EMI class, international students experience confused English varieties, a sense of inadequacy, and other negative feelings when using the English language (Haswell,

2017; Murata et al., 2019). It appears that English linguistic challenges are the most frequently cited issues when discussing EMI challenges in the Japanese context. The limited language proficiency of students, professors, and staff can cause linguistic issues for international students (Aizawa & Rose, 2019; Rakhshandehroo & Ivanova, 2020). Furthermore, students' insufficient English language proficiency results in anxiety and frustration, as they cannot participate in or contribute to classroom discussions (Murata et al., 2019).

Cultural issues are also often discussed as an EMI concern regarding international students' learning experiences in Japan. EMI settings create isolation between Japanese and international students, especially those enrolled in full-degree ETPs (Shimauchi, 2017). International students tend to form groups based on their nationality, language, ethnicity, or educational backgrounds (Heigham, 2018). Such isolation makes it difficult for them to make friends with Japanese students (Rakhshandehroo & Ivanova, 2020). Thus, the lack of interaction between international and Japanese students results in the segregation and isolation of international students during their study period (Bradford, 2016; Kunioshi & Nakakoji, 2018; Morita, 2012; Shimauchi, 2017).

Another culture-related challenge involves the different teaching and learning styles applied in EMI courses (Jon & Kim, 2011; Tsuneyoshi, 2005). Students in EMI classrooms tend to sit quietly in accordance with the "culturally conditioned classroom behavior" (Bradford, 2016). The passive one-way lecture style may be an unpleasant experience for international students, and it can be quite challenging for non-native English-speaking students to listen to the lecture for a long period without pause (Heigham, 2018; Horie, 2017). Compared to their home education, international students may experience classroom interactions differently in EMI/ETPs. Asian students are used to the discussion-based classroom style, while Western students find that such an approach lacks the "American style" (Jon & Kim, 2011). The above linguistic and cultural issues are common topics discussed in many previous studies in this field.

Challenge in Flow Theory

For international students, EMI is a unique experience of studying abroad that is filled with opportunities to improve oneself through various challenges. However, this experience also requires individual students to develop their ability to fix different problems. From this perspective, activities related to studying abroad are in line with Csikszentmihalyi's specific definition of "challenge" in flow theory, in which "challenge" is "any activities contains a bunch of opportunities for action" (Csikszentmihalyi,1990, p. 50). Flow mood is not necessarily caused by all related activities, but tensions between skills and challenges in the flow mood force people to improve their abilities in order to perform certain activities (Gjesteland & Vos, 2019).

Furthermore, despite content learning rather than language learning outcomes being the priority in EMI/ETPs (Carty & Susser, 2014), Csikszentmihalyi's flow theory has been tested in foreign or second language learning (Egbert, 2004). Several foreign language scholars have reported that studying abroad can positively influence second language learning and intercultural competence (Salisbury et al., 2013). In the current study, EMI offers a unique learning environment in which to investigate the relationship between ICC and students' perceived challenges.

Based on the definition of "challenge" in flow theory, some specific concerns raised in previous research can be extracted and transformed. Six related items extracted from previous studies were thus divided into language- and culture-related challenge categories in this study (see Table 1).

Category	**Challenge (difficulty or issues)**	**Challenge (flow theory)**
Language-related	"Non-native English speaking students have difficulty in coping with content presented in English" (Bradford, 2013).	To work harder to improve language proficiency
	Speaking English with anxiety and frustration results in their failure to participate or contribute to the discussion (Murata, Iino, & Konakahara, 2019).	To improve communication skills so that they communicate effectively with other students
	Insufficient academic skills are exhibited, such as written English skills, essay organization skills, etc. (Aizawa & Rose, 2019).	To look for extra academic support to overcome academic disadvantages
Culture-related	EMI courses' different teaching and learning styles (Jon & Kim, 2011; Tsuneyoshi, 2005).	To change the past learning style to adjust to the different learning environment/learning styles
	It is challenging for non-native English-speaking students to listen to the lecture for a long time without pause (Horie, 2017).	To pay extra effort to understand the learning materials
	EMI creates isolation among student groups (Shimauchi, 2018). International students tend to form groups based on their nationality, language, ethnic, or educational backgrounds (Heigham, 2018).	To make friends with students from other countries to establish social connections in the host country

Table 1: Transformed Challenges

Although there is no universal definition of ICC or communicative competence, ICC commonly refers to the use of a foreign language to properly communicate with others from different cultural backgrounds in ways that value the relationship between language and culture (Byram, 2012). ICC is also defined as "a complex of abilities need to perform effectively and appropriately when interacting with others who are linguistically and culturally different from oneself" (Fantini, 2006, p. 12). Research concerned with intercultural communication is critical of many globalization theories, but people involved in intercultural communication can hardly interact as well as they want (Matveev, 2002). In the 1970s, two Japanese scholars, Masao Kunihiro and Mitsuko Saito, recognized that effective

intercultural communication is more important than foreign language proficiency (Martin et al., 2012).

Thus far, no definite assessment tool has been established to measure ICC. According to Fantini (2012), there are approximately 100 kinds of tools to assess the ICC with numerous descriptive items. In the current study, Matveev's (2002) integrated ICC model was applied as a feasible assessment tool. This is an overview model combining the overseas performance model, intercultural adjustment model, and the ICC model, which dominate discussions in the intercultural communication literature (Matveev, 2002). Each model contains different identified critical factors in intercultural communication with varying situations or dimensions. The integrated ICC model examines an individual's ICC from four dimensions: interpersonal skills, team effectiveness, cultural uncertainty, and cultural empathy.

International Students' Success

Smith (2020) identified eight factors—divided into academic and non-academic types—that affect international students' success. The academic factors include language challenges, culture-related learning differences, exclusion from group discussions, academic support issues, and adjustment to a new education system, while the non-academic factors include social issues, cultural adjustment, and finances (Smith, 2020). In the current study, six factors were included as indicators of international students' success, as shown in Table 2.

Category	**Factor**
Academic	Language challenges
	Exclusion from group discussion
	Adjustment to culture-related learning differences
	Academic support issues
Non-academic	Cultural adjustment
	Social issues

Table 2: Factors Influencing the Success of International Students

Research Method and Participants

The chosen site was a national postgraduate university in Japan consisting of three schools. International students can obtain their degree by only taking EMI courses and writing the English thesis or dissertation, or by taking JMI courses and writing the Japanese thesis or dissertation. As of May 1, 2020, the total number of international students was 530, of whom 348 were Chinese, accounting for 65.7% of the total population. The data collection lasted from January 19 to 23, 2021. A total of 113 international graduate student respondents, who were studying at the above university from three different schools, were recruited. Data were gathered through an online survey hosted in Google Forms. The questionnaire data were collected by sending mass e-mails to students' on-campus email addresses. The total international student group response rate was 21.32% (the Chinese international student group's response rate was 21.55%). The composition of the participants is presented in Table 3.

Category	Item	Frequency	Percentage
Gender	Male	67	59.29%
	Female	46	40.71%
Grade	Master students	70	61.95%
	Doctoral students	43	38.05%
Age	Under 30 years old	91	80.53%
	30 years old and above	22	19.47%
Medium of instruction	English	73	64.60%
	Japanese	40	35.40%

Table 3: The Composition of Participants

Instrument

Thus far, no definite assessment tool has been established to measure ICC. According to Fantini (2012), there are approximately 100 kinds of tools to assess the ICC with numerous descriptive items. In the current study, Matveev's (2002) integrated ICC model was applied as a feasible assessment tool. This is an overview model combining the overseas performance, intercultural adjustment, and ICC models, which dominate discussions in the intercultural communication literature (Matveev, 2002). Each model contains different identified critical factors in intercultural communication with varying situations or dimensions. The integrated ICC model examines an individual's ICC from four dimensions: interpersonal skills, team effectiveness, cultural uncertainty, and cultural empathy.
Research Method and Participants

The questionnaire (see Appendix), which had Chinese and English versions, contained four sections. The first section included four demographic questions, and the second section included 11 items adapted from Matveev's (2002) Intercultural Communication Competence Questionnaire (ICCQ), which was used to measure participants' ICC. The third section included six questions adapted from previous research to measure international graduate students' levels of perceived challenges (Aizawa & Rose, 2019; Bradford, 2013; Heigham, 2018; Horie, 2017; Jon & Kim, 2011; Shimauchi, 2018; Tsuneyoshi, 2005). The fourth section included six questions adapted from Smith's (2020) work on international student success, which were used to measure students' levels of perceived success. All items in the 23-item combined questionnaire were answered using a 5-point Likert-type scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

Data Analysis

Data analysis was performed using IBM SPSS 26 to determine the results of each objective. The Cronbach's alpha values of the adapted questionnaires were initially measured to determine their reliability. The Cronbach's alpha values of the adapted ICCQ, the adapted perceived challenge questionnaire, and the perceived success questionnaire were 0.875, 0.800, and 0.805, respectively, all of which indicated good reliability.

The Relationship between International Students' ICC and Their Perceived Challenges

A bivariate correlation test was used to determine the correlation between the students' ICC and perceived challenge. Table 4 illustrates the bivariate correlation test results of the non-Chinese EMI learning group (N=38). As can be seen, a strong negative correlation was found between the interpersonal skill factor and the perceived communication challenge ($p<0.05$) and academic support challenge ($p<0.01$), while a statistically significant negative correlation was found between the cultural uncertainty factor and perceived communication challenge ($p<0.01$). Furthermore, strong negative correlations were found between the cultural uncertainty factor and the perceived academic support challenge ($p<0.05$) and the perceived social activity challenge ($p<0.05$). Thus, in the non-Chinese EMI student group, ICC factors negatively affected the students' perceived challenges.

	Language	Communication	Learning style	Learning effort	Academic support	Social activity
Interpersonal skill	-0.076	-0.341*	-0.259	-0.051	-0.434**	-0.221
Team effectiveness	0.137	0.012	-0.013	-0.156	-0.275	0.076
Cultural uncertainty	-0.287	-0.422**	-0.071	-0.115	-0.364*	-0.333*
Cultural empathy	-0.203	-0.301	0.216	0.159	-0.167	0.122

Table 4: Pearson Correlations between the Factors of ICC and Perceived Challenges in the Non-Chinese EMI Group (N=38)

Table 5 illustrates the bivariate correlation test results of the Chinese EMI learning group (N=35). Both four ICC factors were statistically positive for the perceived challenge of English language learning ($p<0.01$). Meanwhile, interpersonal skill and cultural empathy factors were statistically positive for the perceived challenge of learning style and social activity ($p<0.05$). Moreover, team effectiveness was statistically positive for the perceived challenge of communication and learning style ($p<0.01$). Thus, in the Chinese EMI student group, ICC factors positively affected their perceived challenges.

	Language	Communication	Learning style	Learning effort	Academic support	Social activity
Interpersonal skill	0.436**	0.277	0.425*	-0.007	0.119	0.310
Team effectiveness	0.556**	0.473**	0.506**	0.180	0.242	0.259
Cultural uncertainty	0.587**	0.273	0.296	0.113	0.145	0.312
Cultural empathy	0.486**	0.325	0.237	0.053	0.133	0.337*

Table 5. Pearson Correlations between the Factors of ICC and Perceived Challenges in the Chinese EMI Group (N=35)

Table 6 illustrates the bivariate correlation test results of the Chinese JMI learning group (N=40). In this group, ICC factors were barely statistically significant for the perceived challenges. Only cultural uncertainty was statistically significant for the perceived

communication challenge ($p<0.05$). Furthermore, cultural empathy was statistically significant for the perceived communication challenge ($p<0.01$). Thus, ICC had a less positive effect on the JMI student group's perceived challenges.

	Language	Communication	Learning style	Learning effort	Academic support	Social activity
Interpersonal skill	-0.146	0.091	0.125	-0.086	0.008	0.200
Team effectiveness	0.264	0.106	0.090	0.056	0.097	0.142
Cultural uncertainty	0.117	0.365*	0.062	0.098	-0.008	0.156
Cultural empathy	0.140	0.405**	-0.028	-0.164	-0.220	0.043

Table 6. Pearson Correlations between the Factors of ICC and Perceived Challenges in the Chinese JMI Group (N=40)

The Effects of ICC–Challenge Balance on Students' Perceived Challenges

Based on the collected data, the levels of ICC and perceived challenges of each international student were calculated. The mean score of 113 students' ICC was 3.78, while the perceived challenge was 3.92. The mean scores were respectively used as the horizontal and vertical coordinates to obtain the overall quadrant distribution of the students' ICC and perceived challenges. The quadrant distributions of 113 international students' ICC levels and the perceived challenge levels are shown in Figure 1.

As can be seen, the high-ICC and high-challenge (H-H) and low-ICC and high-challenge (L-H) quadrants had the most number of individuals (31 each). The Chinese EMI learning students had the majority in the H-H quadrant (15 individuals), while the Chinese JMI learning students had the majority in the L-H quadrant (15 individuals). At the same time, 18 of 24 non-Chinese EMI learning students were in the high-ICC and low-challenge (H-L) quadrant.

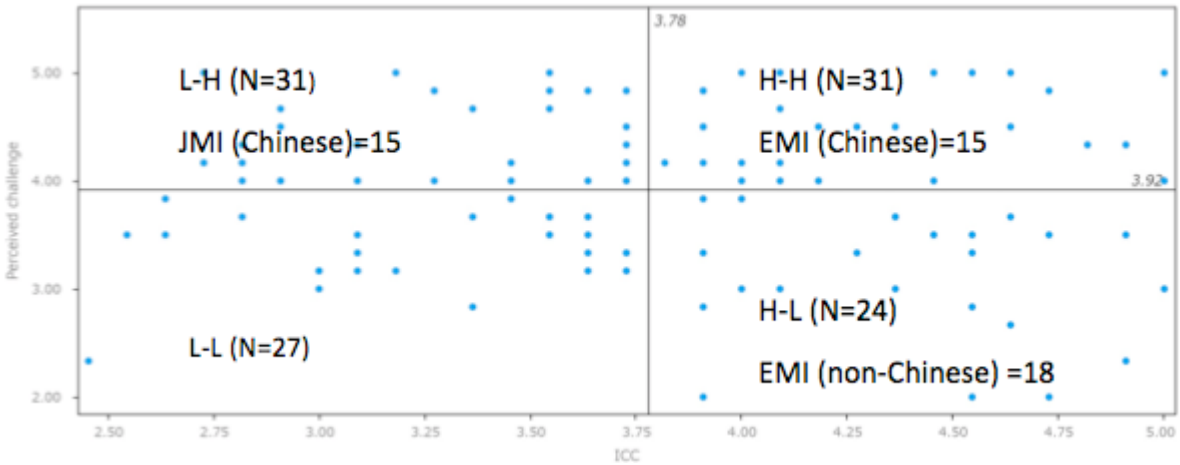

Figure 1: Quadrant Distributions of the Levels of ICC Level and Perceived Challenges among 113 International Students

After exporting the different ICC–challenge and the corresponding perceived success values of each individual (N=113) as the box plots (Figure 2), it can be seen that the degree of perceived success gradually decreased in the following order: H-H, H-L, L-H, L-L, H-H, H-L, and the L-L subgroups, which showed less fluctuation. Students in the L-H subgroup had a more severe perceived success range compared to the H-H, H-L, and the L-L subgroups. Furthermore, students in the L-H subgroup had a lower level of perceived success, while students in the L-L subgroup had a higher level of perceived success than those from the H-H, H-L, and the L-H subgroups.

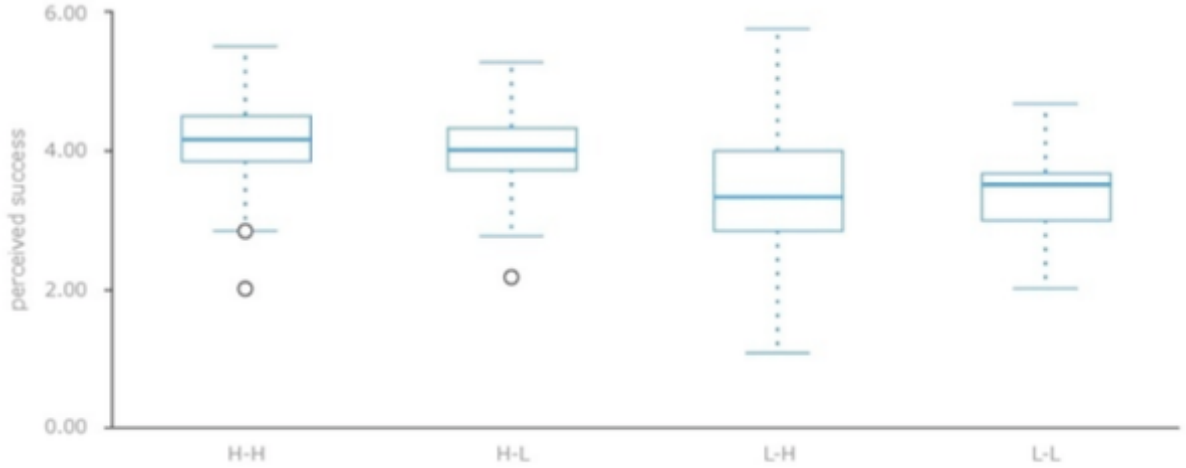

Figure 2: Different ICC–Challenge Balances in All the Student Groups' Perceived Levels of Success

Conclusion

This study investigated the relationship between international students' levels of ICC and perceived challenges and its effect on their perceived success in studying in Japan. Based on the questionnaire responses from 113 international students, the findings suggested that ICC factors negatively affected the perceived challenges in the non-Chinese EMI student group. Meanwhile, the ICC factors positively affected the perceived challenges of both the Chinese EMI and Chinese JMI student groups, although the effect was less in the latter group.

Furthermore, the findings suggest that most non-Chinese EMI students perceived themselves to be in the high-ICC and low-challenge balance, while most Chinese EMI students perceived themselves to be in the high-ICC and high-challenge balance. Although the JMI student group had excellent Japanese language proficiency compared to the EMI student group, most of the JMI students perceived themselves to be in the low-ICC and high-challenge balance categories.

Overall, international students' perceived success decreased in the following order: high-ICC and high-challenge, high-ICC and low-challenge, low-ICC and high-challenge, and low-ICC and low-challenge. The high-ICC and high-challenge categories led to the highest perceived success. Although international students studying in Japan are highly homogeneous in terms of geographical origins, their ICC factors and perceptions of challenges show great diversity.

Limitations and Further Study

While this study offers some implications for further research regarding international student groups' ICC levels, it still has some limitations.

First, the current study focused on the relationship between international students' ICC levels and their perceived challenges, thereby regarding ICC as an essential factor influencing students' on-campus lives. However, the effects of language proficiency should also be considered and compared.

Second, although 113 international students were involved in this study, over 60% came from China. Thus, their preferences for cognition may have led to biased analysis results. For this reason, the results cannot be generalized to other international student groups.

Finally, although this study investigated the effects of the balance between the level of skill–challenge balance on students' perceived success, success is self-reported in this study. However, given that individuals differ in their understanding of their success levels, this could lead to possibly biased results.

Appendix

Questionnaire of intercultural communication competence (ICC), perceived challenge, and success in students' learning experiences at JAIST

Gender: M/F Grade: M1 M2 D1 D2 D3 Postgraduate/researcher
Age: 20–24 25–29 30–34 35–39 40–above
School: Information Science Material Science Knowledge Science
Length of stay in Japan: Less than one year 12–24 months 25–48 months More than four years

Instructions: Please read the 23 listed items carefully and choose the closest one in each question based on your own learning experiences in your graduate program. Please answer all the questionnaire items on a 5-point Likert scale as follows: Strongly disagree-1 Disagree-2 Neutral-3 Agree-4 Strongly agree-5

1. 1.I can establish a good relationship with people from other countries.
2. I can listen actively to people from other countries (such as in a lab seminar or in the class group discussion).
3. I can deal with and manage cultural uncertainties well when I get along with other people who come from other countries. (Note: "Cultural uncertainty" refers to cultural ambiguities and sociocultural differences, such as different beliefs, customs, and values.)
4. I feel comfortable when discussing/studying/interacting together with people from different countries.
5. I can be flexible in interacting and working with people from different countries when it comes to getting together with them.
6. I can engage in meaningful dialogues with people from other countries in the same way as with people from my home country.
7. I can develop closer relationships with persons from other countries in school/lab/class like I make friends with my own country.
8. When I am assigned to a multicultural team, I can treat others equally without any relevance to the members' national origins.
9. I can learn as much about Japanese culture as possible.
10. I can be flexible with different communication/interaction styles when working with people from other countries.
11. I can be flexible when working with people from different cultures, as I am aware of differences in values and beliefs among cultures.
12. I need to work harder to improve my language proficiency to satisfy the degree/credit completion requirements.
13. I need to improve my communication skills to communicate effectively with other international students during group discussions/seminars.
14. I need to change my past learning style to adjust to the different learning environment/learning style in JAIST.
15. I need to pay extra effort to understand the learning materials exactly.
16. I need to actively look for extra academic support to overcome my academic disadvantages (such as language barriers, learning style differences, etc.) while studying at JAIST.
17. I need to actively expand my own social network, including making friends with other countries' people, to increase my social activities during my studies abroad at JAIST.

18. I have achieved significant improvement in both academic English writing and oral English communication.
19. I have effective and meaningful communication/interaction experiences with other international students.
20. I have adjusted myself to learning environments (such as teaching style, learning style, exam, academic tasks, etc.) at JAIST.
21. I received enough academic support from JAIST or outside JAIST to complete my study program.
22. I have adjusted myself to Japanese culture well.
23. During my graduate program in Japan, I built my social network and maintained enough social contact with family, friends, and the outside world.

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Distance Education in Hong Kong Preschools: Learning and Teaching During COVID-19 School Closures

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Abstract
The outbreak of the COVID-19 pandemic has led to widespread change in people's lives across the world. Indeed, such change is especially evident in the education sector, where this global phenomenon has arguably triggered some of history's most significant advancements. In this study, we explore how the Early Childhood Education (ECE) sector in Hong Kong has coped with schooling during this period. Furthermore, we investigate the extent to which players in Hong Kong's early childhood education scene had to adjust in light of dynamically changing local government guidelines and why that has led to long-term improvements. To derive meaningful conclusions from this study, we use a mixed-methods approach that relies on data collected from surveys, interviews, and case studies relevant to the topic at hand. This data is then analysed, and themes are formed through coding. We also explore teachers' feelings, technology adoption, and examples from practice to determine how schools have supported young children's education. The research demonstrates how early childhood education and care centres innovatively provide education during a crisis. Traces of success in making teaching and learning possible and meaningful are visible, even with children of a young age. Consequently, this research yields key lessons about ECE learning and teaching during crises.

Keywords: Early Childhood Education, Teaching and Learning, Distance-learning, Teaching Strategies

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Introduction and Literature Review

With the COVID-19 pandemic beginning to take hold on all aspects of life, its impact is being equally felt across the education sector. It is only now that we have started understanding the ramifications stemming from countrywide lockdowns, business closures and travel restrictions, all of which have made their mark on the delivery mechanisms of education around the world. With specific reference to Hong Kong, the local government here instructed the closure of schools in February 2020 (Bureau, E., 2020), with these schools adopting recommendations from the Education Bureau (EDB) to shift from face-to-face learning to delivering online education. Although working remotely has been widely established in a range of industries, distance learning has arguably been a new concept for the Early Childhood Education (ECE) sector. Distance learning refers to delivering the curriculum in a virtual manner, whereby educators and students are physically separated during instruction. In February 2021, the EDB gave kindergartens and schools in Hong Kong permission to resume face-to-face classes under the condition that school staff take regular Covid-19 tests. As a result, many kindergartens welcomed these regulations and continued on-site teaching practices (Moorhouse et al, 2020).

Kindergartens in Hong Kong

It is important to note that all kindergartens in Hong Kong are privately run and vary in their operations, curriculum and numerous other aspects. International kindergartens implement various worldwide curriculum frameworks including the British Early Years Foundation Stage (EYFS), International Baccalaureate Organisation (IBO) Primary Years Programme (PYP), Reggio Emilia and Montessori. In contrast, local kindergartens follow the Hong Kong local curriculum promoted by the EDB Hong Kong. Kindergartens are registered under the Education Ordinance and EDB inspectors make routine visits to all kindergartens to advise principals and teachers on curriculum delivery, instructional methods, and school administration.

Characteristics of Early Years Practice

Within the ECE sector, students should learn and acquire skills through play, and during the pandemic, educators have adapted and supported its development as effectively as possible, in order to enhance the students' development. There are numerous theorists associated with aspects of ECE, however, Dewey and Montessori can be regarded as pioneers in initiating the importance of child-centred learning (Mooney, 2013). Their child-centred philosophy influenced other theorists including Piaget, Vygotsky, Erikson and Freire, as they equally believed that “education should be child-centred; education must be both active and interactive, and education must involve the social world of the child and the community” (Mooney, 2013, p. 16).

In support of child-centred learning, the concept of play has been widely recognised as a vehicle that enhances a variety of skills, stimulating children’s exploration, creativity, imagination, social, emotional and physical development, as well as their level of independence (Pound, 2017). Vygotsky (1978) considered play to be of paramount importance, claiming that educators need to “adopt strategies that are not only student-centred” (Moore 2000:16). Developing the relationship between the educator and student through play is what determines the level of child development. Vygotsky referred to this as the zone of proximal development, “the distance between the actual development level as determined by independent problem

solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p.86).

In addition to the above, the environment plays a vital role in driving learning, so much so that it has been defined as the "third teacher" by Malaguzzi, with the first being the parent and the second the classroom teacher (Gandini, 1998). Consequently, creating flexible, interactive, play-based and collaborative environments that are responsive to the needs of young learners is crucial.

Recognising the importance of the above, ECE educators and families had to be mindful of their physical learning spaces (e.g. noise levels and general distractions), in order to enable young students to participate effectively during synchronous distance learning. Nevertheless, creating a rich environment and using hands-on resources was identified as a challenge. Indeed, Lau & Lee (2020) highlight how a lack of resources and equipment causes further distractions and difficulties for students.

Challenging the theory of child-centred learning, the COVID-19 pandemic and its ramifications led to a significant shift to a teacher-directed approach. Such developments possibly triggered a drastic reduction in children's autonomy and ownership of their own learning. Whilst arguably unfortunate, Dewey recognises advantages in teacher-initiated/ directed learning and claims that it provokes students' thinking because "the teachers' suggestion is not a mould for a cast-iron result but is a starting point to develop into a plan through contributions from the experience of all engaged in the learning process" (Dewey, 1938, p.72). In addition to this, Chiarotto (2011) contends that "teacher-directed instruction occurs in moderation, for the purpose of gently scaffolding students towards their learning goals, and in turn, to help students feel successful as learners" (Chiarotto, 2011, p.17).

Communication

As in many organisations, communication is indispensable to the integration of effective management functions. The channels of communication that are selected are instrumental in determining its effectiveness, and need to be aligned with modern requirements to drive a notion of personalisation, in order for school staff to maintain strong connections (Akinnubi et al., 2012). Moore (1990) outlines that communication structures and dialogue between educators and families are critical to the success of distance learning. Consequently, the closure of schools and educational settings highlights the need to collaborate and communicate effectively across the school community.

In fact, communication and collaboration with families strongly influences the success of distance learning. As per IBO (2018), "encouraging and nurturing positive relationships between home, family and school provides a strong basis for learning, behaviour, health and well-being" (IBO, 2018, p.10). Educators heavily rely on parental communication and participation. For example, the gathering of resources, setting up appropriate learning spaces, carrying out suggested learning at home and supporting students with the technology at hand can only be achieved in collaboration with parents. In addition to this, the IBO (2018) states that "technology has the power to bring the learning community close together and overcome boundaries" (IBO, 2018, p. 48). Similarly, Richardson et al (2020) refer to it as a mechanism for people to collaborate and connect locally and globally.

Technology Adoption

Quinn et al (2020) believe that technology can empower students to have ownership of their learning beyond the classroom and identify it as a means to accelerate motivation and engagement. Furthermore, it is the teacher's role to select the most suitable technological tools and ensure that students have the skills and capabilities needed to succeed in creating and obtaining new knowledge. Although the importance of technology in the modern world is widely recognised, research has shown that one of the main challenges during distance learning has been the adoption of such technology (Garrison, 2000). ECE educators' challenges with technology may stem from a discrepancy between the e-courses they were taught in their academic activities and the level of technology already in use and required to use in action (Kalogiannakis, 2010; Wetzel et al., 2004). Despite this discrepancy, educators must assume additional responsibilities that come with teaching online (Kalogiannakis, 2010), even when the prospect of utilising technology might seem demanding (Konca et al, 2016; Lindahl & Folkesson, 2012; Yurt & Cevher-Kalburan, 2011).

Research Questions

RQ1: What are the main challenges that ECE educators experienced whilst teaching during class suspensions?
RQ2: What are some successful teaching strategies ECE educators deployed and opportunities that arose during class suspensions?

Research Methodology

In this study, a mixed-methods approach is adopted. Both quantitative and qualitative data collection methods including case studies, survey questionnaires and semi-structured interviews are deployed. The case study approach is primarily used to gather richer practical experience from the field. The case study method was chosen to better understand a phenomenon or situation (Merriam, 1998). The selected cases can be people, students, or staff who are members of a school community (Creswell, 2011).

Case study data is used to describe a case in-depth in real-life comprehensively (Yin, 2012). Data collected through case studies has been triangulated with data collected from interviews and open-ended survey questions, in order to increase reliability and validity. Data was collected in stages, beginning with online surveys and then, conducting semi-structured interviews to get more in-depth information. The data was analysed according to standard protocols for assessing observation objects and indicators (Braun & Clarke, 2006).

Participants

63 Hong Kong-based teachers from local and international kindergartens participated in this study. Figure 1 indicates that 31 local (49.2%) and 32 international kindergarten teachers (32=50.8%) completed the survey questionnaire. The questionnaires were distributed online using Google Form.

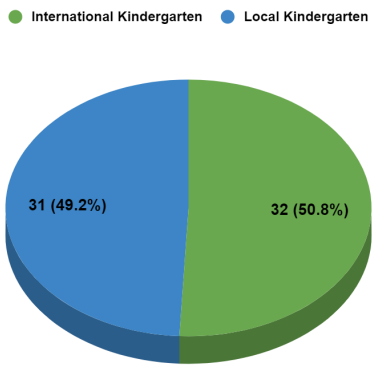

Figure 1: Participants' Teaching Institution

Figures 2, 3 and 4 highlight demographic characteristics such as gender, length of teaching experience, as well as teachers' level of education. Figure 2 implies that 93.7% of female and 6.3% of male respondents participated in the study.

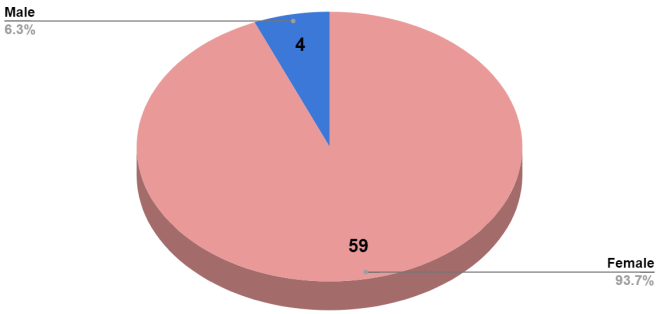

Figure 2: Gender Distribution

Figure 3 shows that the majority of teachers have 11-15 years of teaching experience, with over 65% of participants having taught for more than 11 years.

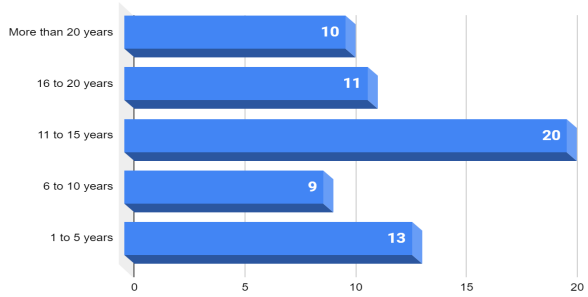

Figure 3: Length of Teaching Experience

Figure 4 indicates that the majority of participants in this study hold a postgraduate degree.

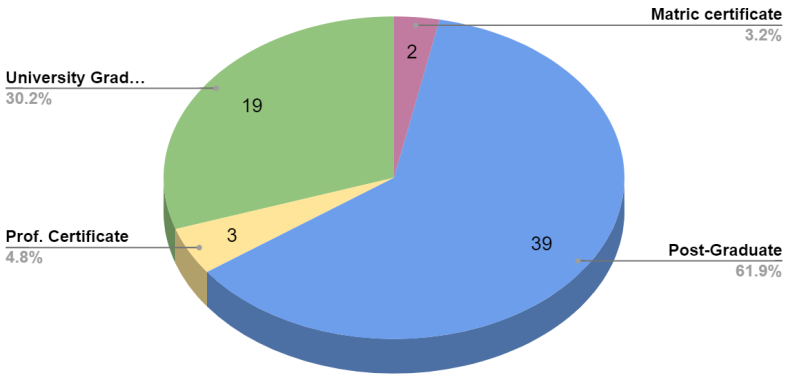

Figure 4: Teacher's Educational Level

Data Collection

Data was collected in two phases. The first phase included conducting a survey of classroom teachers in kindergartens across Hong Kong. The survey consisted of a total of 20 questions, with ten demographic and ten research-related short answers administered through Google Form. The questions were organised following the pertinent literature to the research's intent, which was to examine the classroom instructor's instructional, psychological, and social facets. The survey was conducted from 15th December 2020 through 23rd March 2021, with 63 respondents taking part. Following the collection of survey data, a transcript of each respondent's responses was developed, along with initial codes.

The second stage of data collection included interviewing 23 kindergarten teachers who responded to the survey using semi-structured, open-ended questions. The researchers created interview guides using the initial code extracted from the first stage results. The interviews were conducted to elicit more accurate results from January to March 2021, and interviews were conducted via the Zoom application online and lasted 30-45 minutes per respondent. Each participant was guaranteed confidentiality and given a pseudonym.

Data Analysis

Inductive and thematic analytics were used to define, assess, and create a theme shared by participants (Fereday & Muir-Cochrane, 2006). Each participant's responses, particularly in the first stage, were coded using keywords to avoid repetition. The NVivo 12 software was used to assist researchers with coding and categorisation. Nodes and Cases were used to organise data from surveys and interviews. Thematic maps demonstrate the arrangement of concepts at different levels, and possible connections between concepts were discussed. Following this, the research team addressed both codes and categorisations and the possibility of integrating codes to streamline these. This inductive technique enabled the identification of themes derived from participants' responses to the research questions (Fereday & Muir-Cochrane, 2006).

Findings

The survey findings comprise two parts based on our research questions. The following section discusses the challenges and opportunities educators have experienced and emphasises the teaching strategies educators have used to enhance their practice. Findings also compare and contrast practices from kindergartens following local and international curricula, prior use of technology integrated lesson delivery, and practice during the class suspension.

Tables 1 to 5 outline the five individual principles of effective distance learning and the main categories that were highlighted amongst survey and interview findings, and will be referred to throughout both of our research questions.

Table 1. Communication

Main Category	N, %	Representative Statements
Communication structures and strategies	74, 86%	"It is important to have structures in place that allow us to communicate with staff, students and families effectively. We spent a lot of time exploring different tools and refining our communication protocols".
Effective communication	73, 84%	"Regular contact with parents via email, including a weekly schedule which is sent out each Friday, giving parents time to prepare for the week ahead."
Dialogue between parents and educators	70, 81%	"We started calling parents more often than usual and try to make connections with families over the phone through emails, surveys".
Collaborating through communication	54, 63%	"Collaboration with staff and families is key to making distance learning successful. Technology and effective communication allow me to do just that".
Increased level of communication	46, 53%	"Parents were overwhelmed with the number of emails and links we were sending out at first. But we developed a system based on Google for education and try to keep it limited to weekly emails".

Table 2. Pedagogical Practices

Main Category	N, %	Representative Statements
Play	70, 81%	"Young children learn through play and digital play can't replace it. As an educator, I always try and put hands-on play to include in my online lessons too."
Authentic/ meaningful learning and teaching	64, 74%	"We can create meaningful learning opportunities for students even in distance education situations…This can easily be done by asking children to follow things at home for example I even had cooked with my students".
Student-centred vs teacher-directed approach	62, 72 %	"We started with sending direct teaching videos as asynchronous learning to the students, but soon realised from parent feedback that they lack interest … So we enhanced practice by having live story sessions and eventually smaller group interactive sessions".
Collaborative learning/ Level of interaction/ participation	57, 66%	"Our school has these Zoom sessions to enhance interaction. At first, it was challenging as we had whole class story sessions and sometimes it was not easy to open students' microphones as it was too noisy and difficult to listen to anything."

Table 3. Learning Spaces

Main Category	N, %	Representative Statements
Use and availability of resources	76, 88%	"We had very limited resources as we were not used to integrating technology in our curriculum or in school; So it was challenging to deliver this kind of teaching and learning".
Open-ended resources	64, 74%	"When we first started, we had only a few options such as producing videos but later we started thinking of sending resource bags home and can incorporate a lot of art & craft; cooking; and open-ended games such as taking turns, hunts etc."
Learning spaces and environment	56, 65%	"Setting up proper learning space at home is equally important for students. I noticed that my students behave differently while attending lessons from home."
Distractions	30, 41%	"Distractions has to keep minimum such as entire family working in the same room, or feeding student between lesson causes lots of disturbance".

Table 4. Partnerships		
Main Category	**N, %**	**Representative Statements**
Parental support	84, 97 %	"Parental support is a must to have successful online lessons for young learners. Parents are required to provide learning spaces conducive to online learning such as quiet space, support to access online resources, gathering resources if required to have in advance to participate in lessons, facilitating during zoom sessions".
Collaboration with parents	74, 86%	"We need to educate and collaborate with parents to fit them in their changing role as not only to support students but also to facilitate their learning, to be responsible to provide provocations as well as enhance motivation and student participation".
Collaboration amongst educators	64, 74%	"In this situation colleagues were the best collaborators, we all learned new skills and shared this with peers. Some were good at technological skills and some were very careful about ECE pedagogy and philosophy.
Partnerships with students	23, 27%	"It was necessary to let students develop independence and motivation for teaching and bringing student choice and voice to promote student-centred learning practices. Our school had a short and smart session with few students to talk to them and to just know their well being".
Partnerships with facilitators	20, 23%	"Helpers or grandparents were facilitating their learning at home. It was very difficult for these facilitators to help students to access learning at home as it might involve technical skills, passwords access and support to participate in activities…".

Table 5. Technology Adoption		
Main Category	**N, %**	**Representative Statements**
Challenges to adopting new technology	86, 100%	"At first it was very challenging to show our face and prepare video or conduct an online lesson on zoom but with this new normal we get used to amending videos, make the sessions more interactive for students".
Available tools	82, 95%	"We were using online portfolio, canvas and seesaw as regular tools to communicate with the parents prior to school suspension so it was easy to have few more tools like Padlet and Zoom to conduct online lesson".
Technical skills	79, 92%	"It was difficult for some teachers but eventually nowadays everybody has a smartphone and somewhat a little understanding of technical tools and their operations. So this helped to learn new tools like zoom, padlet".
Digital and pedagogical competence	64, 74%	"It was challenging to think about online lessons in kindergarten as I never delivered them before. So first we adopted new technology and gradually we moved to technology integrated hands-on learning".
Collaborative platforms	20, 23 %	"We used collaborative platforms such as Padlet where not only teachers but parents also were posting pictures, child voice or performances etc. as examples of learning at home. It was very helpful to develop collaborative learning opportunities in the school community".

Discussion

RQ1: *What are the main challenges that ECE educators experienced whilst teaching during class suspensions?*

When the announcement was made for schools to close, the majority of participants (n=74; 86%) recognised the need for clear and effective communication structures. However, participants were overwhelmed by the number of messages received amongst colleagues and parents, with one respondent stating that "the volume of emails was incredible". Communication channels were used in a disorganised manner and included a variety of platforms such as Whatsapp, email and Zoom. This led to high frustration levels and increased working hours until boundaries and clear expectations around communication were applied within organisations.

Likewise, participants (n=70; 81%) identified the implementation of Early Years pedagogy virtually as one of the main challenges during the pandemic. Due to the sudden closure of

schools and the lack of preparation that came with it, many educators changed their practice from student-centred learning in the classroom to a teacher-directed synchronous approach. This was due to factors such as the need to provide parents with structured timetables and the materials required in advance; therefore prohibiting educators to be flexible in the delivery of their daily practice and being responsive to students' interests and needs. However, this coincides with the fact that all students require some form of scaffolding in order to strengthen their learning, and 'teacher-directed instruction' (Chiarotto, 2011) is often used during face-to-face practice as well as virtual teaching and learning.

One participant stated that "with online learning, we can deliver some aspects of education but this can't replace play as a whole in early childhood education". Therefore, it was recognised that independent play, where students are able to follow their interest and develop new understandings through exploration, has been difficult to recreate during synchronous teaching.

With the decline of play-based experiences, collaboration has also been highlighted as an obstacle. Participants claimed that collaborative learning, where students have the opportunity to socially interact and engage with others, has been challenging during distance learning. Educators attempted to incorporate this into their daily practice and model the expectations during the likes of 'breakout rooms', where students have participated in some peer to peer and/ or student-educator learning. Data shows how one participant adjusted her practice by offering small group sessions, which consisted of 5 to 6 students, as well as whole class sessions. This relates to the notion that ECE educators should "involve the social world of the child and the community" (Mooney, 2013, p.16) as this enables young students to develop their social skills in an active and interactive manner.

Data shows that some educators offered a range of play opportunities through an asynchronous lens; for example, sensory forms of play. Although these opportunities were offered, the level of who accessed it and how students engaged with it varied largely, ranging from a child-initiated inquiry to an adult-directed approach. Examples include facilitators (i.e. parents, domestic helpers and other family members) taking the lead on behalf of the children and thus, not allowing them to explore freely. This coincides with the value of play, as not only does it enable students to develop their level of independence but it also stimulates their exploration, creativity, imagination, social, emotional and physical development (Pound, 2016).

Likewise, there are other participants who stated that delivering synchronous learning effectively was further challenged by a lack of the facilitators' understanding of play-based learning. Facilitators' limited experience and exposure to hands-on play and open-ended materials made it difficult to create rich learning spaces at their place of delivery. However, hands-on exposure and educators' modelling of good Early Years practice, supported facilitators in developing their conceptual understanding and value of play and the sessions that were being delivered.

The adoption of technologies designed to facilitate a virtual learning environment has been identified as a regular challenge faced by participants (n=86; 100%). Not only did ECE educators struggle to have access to devices, tools, internet connectivity and such, but the adoption of technologies was further complicated by an inherent limitation of technical skills, impacting children's motivation and learning. Although basic technology had already been incorporated into face-to-face instruction as a teaching tool in the past, the way technology now had to be applied was a new phenomenon to many and exposed educators' lack of experience more clearly.

One participant explained how their school relied on "free access and easily available tools" due to a limited budget. Despite such limitations, educators were still able to plan and deliver effective distance learning through easy-to-access platforms such as Zoom, Google Drive and others. Deploying and utilising technology represented a steep learning curve for educators and learners but once the tools were established, enhancing teaching and learning practices was more easily accomplished.

RQ2: *What are some successful teaching strategies ECE educators deployed and opportunities that arose during class suspensions?*

As highlighted in RQ1, the sudden shift to online education led to numerous challenges, forcing educators to rapidly rethink their practice and requiring them to adapt to new modes of delivering learning and teaching. Despite the severity of these challenges, RQ2 addresses significant advancements and innovation in the field of ECE. Data reveals that there is a repositioning in mindset from survival mode to thinking positively about how educators can deploy strategies, skills and competencies to enhance teaching and learning.

The establishment of clear communication structures has been crucial to effective distance learning. As claimed by one participant, "to communicate effectively, you have to establish routines, reinforce expectations and choose the most suitable tools". This is in line with Akinnubi et al (2012) who highlight the importance of selecting the most suitable channels of communication.

Data suggests a correlation between communication and collaboration. Through the use of the most effective communication platforms, educators developed the facilitators' knowledge and understanding of play, and equipped these with the skills to carry out synchronous sessions effectively. As a result, communication was strengthened through this collaborative approach, as facilitators and educators were able to work in partnership towards a common goal.

The need to offer support to parents and other facilitators was identified as one of the main factors to make distance learning successful. Educators offered regular one-to-one consultations, live workshops, pre-recorded tutorials and regular surveys, in order to gather data about the facilitators' satisfaction and suggestions in relation to distance learning. The level of support varied from setting to setting and was prioritised, particularly in international schools. One participant stated how the "school conducted online workshops for caretakers and parents to share the expectations" and emphasised how this led to a clearer vision of the facilitators' role during distance learning. Another participant claimed that "our school used regular check-ins and this is the time when every class teacher was available to answer questions from parents", leading to regular dialogue between parents and educators. This is aligned with the IBO's (2018) stance on the importance of developing strong partnerships with all stakeholders to impact learning positively (IBO, 2018).

Despite the challenges posed by the suspension of classes, educators found pockets of creativity to exploit. Strategies were based on the ability to deliver continued high-quality Early Years practice. In order to do so, educators planned experiences that were meaningful and relatable, empowering students to make choices, in order to increase engagement and motivation. As stated in the literature and referred to in RQ1, these included engagements that developed exploration, creativity, imagination, social, emotional and physical development, as well as their level of independence (Pound, 2017).

Many participants (n=70; 81%) designed and implemented hands-on experiences to enhance students' academic learning through play. These experiences ensured a balanced curriculum and allowed students to transfer skills and knowledge to different contexts. For example, one participant shared that students were given the opportunity to broaden their mathematical concept of measurement through baking and sensory play. Another participant developed the students' research skills and scientific knowledge through the planting and growing of seeds. To achieve such authentic learning experiences, resource packs created by educators were among the many mechanisms utilised to deliver continued learning opportunities for students. These resource packs were sent out on a regular basis and included items designed to meet the basic needs of distance learning, strengthening good Early Years practice in the process.

As a matter of fact, meaningful resources and authentic learning spaces have been highlighted as indicators for success. Bento & Dias (2017) as well as Muñoz (2009) suggest that educators be creative when using learning spaces. Indeed, participants showed a sense of such creativity by exposing students to the outdoors or facilitating online sessions from the beach, looking at patterns in nature. It was noted that varying spaces for asynchronous as well as synchronous teaching sparked interest and increased the level of enthusiasm. The use of open-ended resources and loose parts has also been highlighted as a means to stimulate imagination and creativity. Indeed, Daly & Beloglovski (2015) state that such resources not only stimulate children's curiosity but also "promote creativity and divergent thinking" (Daly & Beloglovski, 2015, p. 65).

Although technology adoption was identified as the main challenge, data suggests that it has also been the most effective tool to make distance learning effective and even possible. Without the use of technologies such as email, Google Drive and Zoom, educators would have not been able to make learning readily available. Findings indicate that parents who could not be reached via these channels still received printed working sheets and information.

Data suggests that technology has been the driver to help bring all the elements together and form a holistic platform. In this respect, one participant pointed out how technology enabled collaborative practices and stated that "learning platforms such as Padlet and e-portfolios play a key role in collaborating with students and families. These platforms enable us to get an insight into children's progress, interests and needs. They also allow me to give timely and regular feedback on learning". The IBO (2018) validates this notion, as it regards technology as the platform that connects the learning community (IBO, 2018). This implies that ICT-enabled learning allows students to connect to their curriculum, educators and peers, even when confined to their home environment. It can be argued that these linkages support children in retaining emotional well-being during times of crisis.

In response to these previously outlined challenges posed by a changing environment, educators, facilitators and those involved in the delivery of distance learning practices have shown increasing capabilities of being able to adjust to changes and to embrace emanating opportunities.

Conclusion

This study sets out to investigate how a small sample of ECE educators based in Hong Kong attempt to instruct children amidst the COVID-19 outbreak. In response to the first research question, the findings conclude that communication, collaboration, pedagogical practices, learning environments and technology adoption were deemed the most demanding issues with

regards to distance learning. Despite the seemingly overwhelming nature of these challenges, educators that participated in this study demonstrated that the deeper they go into resolving these, the more opportunity for effective teaching approaches they create.

In response to the second research question, the study observes various tactics applied as part of an iterative learning design process. These tactics are reflections of success stories that amplify the ability to deliver effective and high-quality Early Years practice. The strategies chosen by educators provide opportunities to deliver educational content and maintain a healthy level of contact with students, despite limited resources, a lack of training, and almost no prior experience in dealing with remote or distance education.

The research conclusively defines five key themes, namely Pedagogy, Environment, Partnerships, Technology and Communication. These need to be implemented by all educational organisations, in order for distance learning to be most effective. Table 6 outlines the theme, description and related pedagogical design dimension of ECE pedagogy.

Theme	Description	Related Pedagogical Design Dimension
Communication	Apply effective methods of communication	*Apply communication structures and strategies to:* ● Strengthen internal and external communication ● Strengthen collaboration ● Communicate clearly and coherently
Pedagogy	Apply different pedagogical methods to implement teaching and learning	*Vary pedagogical practices to:* ● Increase student engagement and participation ● Make teaching and learning student-centred ● Strengthen student choice and ownership
Environment	Set up environments to support the implementation of teaching and learning	*Create a learning environment to:* ● Promote interactive learning ● Make learning meaningful and fun ● Foster a sense of trust and safety
Partnerships	Strengthen partnerships to enhance good practice	*Form effective partnerships to:* ● Work towards common goals/ build shared understanding ● Strengthen capabilities of all stakeholders
Technology	Deliver teaching and learning through technology	*Leverage technology to:* ● Increase technological competence across all stakeholders ● Facilitate and amplify learning and teaching ● Connect and collaborate

Table 6: Emergent Themes & Their Relevance to the ECE Pedagogy

The key themes are accompanied by an iterative design process of designing, implementing, evaluating and modifying. Table 7 outlines the theme, description and related curriculum design dimension of each stage of the iterative design process.

Theme	Description	Related Curriculum Design Dimension (Specific to ECE)
Design	Design learning experiences and select appropriate resources	*Design and redefine learning in a crisis situation:* • Identify, gather and use available resources to teach remotely • Respond to the rapid change of practice, including planning and delivery • Incorporate '5 principles of effective distance learning' when designing learning
Implement	Implement planning through collaboration	*Implement instruction for meaningful teaching and learning:* • Pedagogy: Play into practice through a virtual lens • Curriculum coverage, including ongoing assessment • Routines and protocols
Evaluate	Reflect and evaluate teaching and learning practices	*Reflect and evaluate successes and areas of development to:* • Reflect on teaching practices - individual and collaborative • Gather data and feedback from multiple sources to inform next steps
Modify	Modify teaching and learning practices	*Modify and adapt the practice to:* • Build on successes and improve areas of development • Amplify teaching and learning

Table 7: Emergent Themes & Their Relationship to the Iterative Design Process

Based on the data and further findings from both research questions a theoretical framework referred to as the 5 Principles of Effective Distance Learning (Figure 5) emanated and was established. It is important to note that the 5 Principles of Effective Distance Learning derived from teaching strategies that progressive educators applied during the distance learning period. Nevertheless, the validity of this framework can and should be extended to face-to-face teaching and learning.

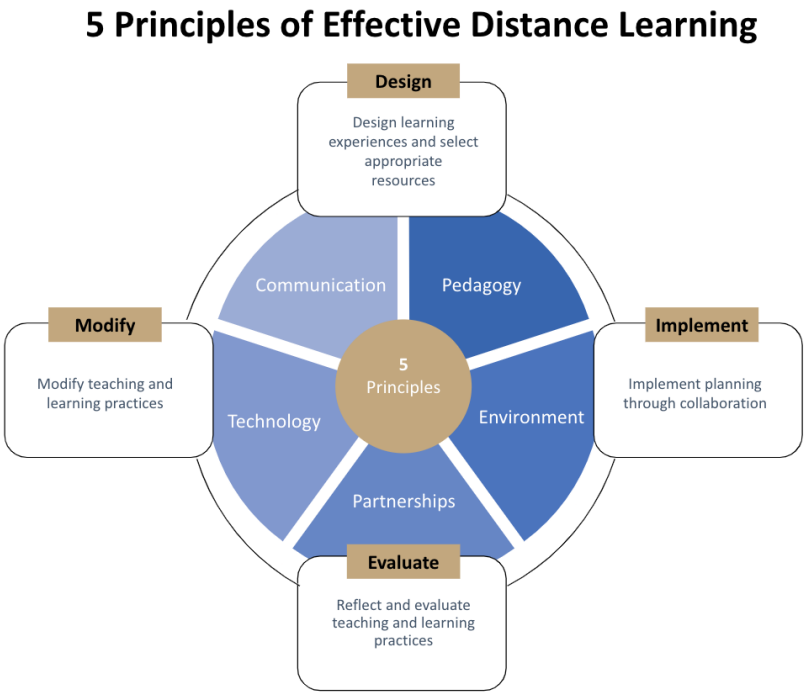

Figure 5: Five Principles of Effective Distance Learning

As this study utilises a small sample size to generalise findings, it is proposed that future research focuses on generating more detailed findings from educators across a multitude of disciplines, in addressing issues (such as those brought on by a pandemic) that appear to be beyond our current conceptions and experiences. Such in-depth research could give a practical perspective for assessing our educational trajectory in the future.

In addition to this, the study proposes that a focus on opportunity over external challenges should become a more critical focal point for educators. In other words, effectively dealing with unexpected change posed by external factors such as this pandemic, will ultimately lead to an accelerated progression in teaching practices.

In order to deliver a successful response to these external challenges, it is imperative to involve the whole school community in dealing with change. In that sense, the study points out that flexibility and open-mindedness towards new practices are key attributes to deploy if one is to successfully guide learning through unpredictable times. Furthermore, functional partnerships with families and other stakeholders are a critical component of such a response.

Finally, tools, strategies and systems deployed during times like these must serve as the building blocks for dealing with similar external uncertainties in the future. That is to say that this is unlikely to be the last pandemic or challenge educators have to face. In that respect, the longevity of new strategies has to be maintained.

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Maximising Student Engagement in Online and Blended Learning: A Survey of Learner Preferences

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Abstract
Blended learning is the integration of classroom face-to-face (F2F) learning with online learning experiences to engage students in a flexible learning framework. F2F lecturing is generally described as being more engaging. However, the incorporation of online resources gives students choice and flexibility in how they approach their studies and can offer an additional tool to further enhance and re-enforce content delivered F2F. Concepts of emotional and cognitive engagement and self-determination theory have attracted attention as a possible way to describe and influence student engagement in blended learning. A recent survey at the University of Glasgow Singapore (UGS) found that students perceive the incorporation of online resources favourably, with recommendations for 40-60% of teaching experiences to be video-based/online. It is important that the online content, format and delivery are designed to maximise student engagement. However, there is no consensus on the best format and balance between online work vs traditional F2F setting to achieve this outcome, and best practice guidelines are lacking. The objective of our study is to develop a series of pilot online resources across four engineering programmes and obtain student feedback through structured questionnaires, to identify what indicators and facilitators enhance engagement. In this paper, we present findings from the questionnaires on the learners' preferences and identify content and formats that are best received through online sources. In particular, our findings identify recorded video tutorials in combination with F2F lectures as a powerful tool to enhance student satisfaction and engagement.

Keywords: Student Engagement, Blended Learning

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Introduction

Blended Technologies in Learning

Higher education institutions are faced with the challenge to modify educational experiences in tandem with the rapid progress in information technologies, as well as the expectations of prospective students for higher quality blended learning experiences. In comparison with traditional face-to-face teaching, incorporation of blended learning has the potential to provide learning opportunities that allow students to engage more deeply with their subject matter and analyse and reflect at their own pace, and should not be limited to finding a new medium to deliver old content (Garrison & Kanuka, 2004). This move requires rethinking the teaching-learning relationship and will have profound yet uncertain implications on teaching practices and the way students engage with the university program.

Student engagement is the students' interaction with learning activities and has been identified as an indicator of student academic success and the institution's productivity (Coates, 2005b). Blended classes may make engagement more difficult for students, as they must navigate between instructional modalities, and need to be more proactive. It has been reported that several individual characteristics that make engagement in online settings difficult are: low self-efficacy, low resilience, low self-regulation. A blended learning approach may also diminish opportunities to interact, collaborate and receive feedback and social support (Manwaring et al., 2017). Given these concerns, it is essential to design the blended learning content to ensure that student engagement is considered from the beginning of its conception.

Student Engagement

Student engagement can be divided into three dimensions (Fredricks et al., 2004): (1) Behavioural engagement, it draws on the idea of participation; it includes involvement in academic and social or extracurricular activities. (2) Emotional engagement is related to positive and negative reactions to teachers, classmates, academics, and school and influence willingness to do the work. (3) Cognitive engagement is associated with willingness to exert the effort necessary to comprehend complex ideas and master difficult skills.

The three components of student engagement are interrelated within the individual and they are not an isolated processes (Fredricks et al., 2004). Park et al., (2012) argues that "students who do not feel emotionally engaged in their academic life often begin to disengage behaviourally and cognitively as well, and ultimately are at risk for poor academic outcomes". A growing body of evidence indicates that emotional engagement positively influences cognitive engagement, or otherwise put, emotional engagement precedes cognitive engagement (Fredricks et al., 2004; Manwaring et al., 2017). Therefore, an important aspect of developing online courses will be to incorporate aspects of emotional engagement to ensure that cognitive engagement is achieved.

Conditions for Emotional Engagement

Self-determination theory (SDT) by Deci & Ryan, (1985) offers a framework for understanding the conditions under which students are likely to become emotionally engaged in their work. The SDT framework has specified a set of three psychological needs that are relevant to intrinsic motivation (Deci & Ryan, 1994). These are:

- Autonomy: the need to feel ownership of one's behaviour (choice)
- Competence: the need to produce desired outcomes and to experience mastery (confidence & structure)
- Relatedness: the need to feel connected to others (social presence)

Several researchers proposed using the psychological needs specified in the SDT to identify key tenets of emotional engagement in learning (see Figure 1) (Manwaring et al., 2017; Park et al., 2012; Raes & Depaepe, 2020; Sun & Rueda, 2012). This approach is emerging as a promising methodology to study student engagement, and at present, there are limited studies that have measured these components of engagement with respect to specific components of the blended learning environments (e.g., videos, quizzes, lecture notes).

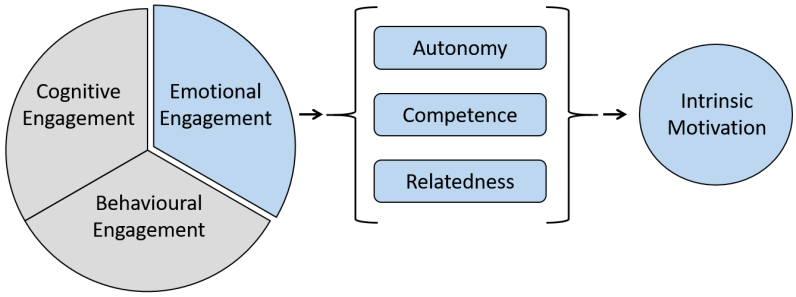

Figure 1: Dimensions of Student Engagement and Its Connection with the Self-Determination Theory Framework, Modified from (Raes & Depaepe, 2020).

Design and Review of Online Videos

Learning management systems (LMS) platforms have become central to the delivery of blended learning in tertiary institutions (Coates, 2005a). A typical approach to designing a course is to design and upload traditional course content (e.g., lecture notes as files) to an LMS platform and make it available online for students. However, uploading content to LMS on its own is not a truly blended learning approach (Graham et al., 2013). A blended learning course should be designed such that optimally integrates face-to-face and online modes of study to engage students in a flexible learning experience.

It is not clear which format and content of the online material and the ratio of online versus F2F learning is most effective for student engagement, and best practice guidelines on how to achieve this are lacking (Delialioğlu, 2012; Manwaring et al., 2017). A qualitative study conducted at UGS by Lim Li Hong et al., (Lim Li Hong et al., 2020), which found that students were in favour of video-supplemented learning and appreciated the resulting autonomy and self-dictated pace. The majority of the students have indicated that an acceptable level of videos versus F2F lecturing is about 40-60%.

Our study aims to examine the learners' preferences and identify content and formats that are best received through online sources in blended environments. We plan to develop a series of pilot online video resources across four engineering programmes and obtain student feedback through structured questionnaires, to identify what indicators (ways to measure) and facilitators (aspects of online material) enhance engagement. We present findings from some preliminary questionnaires on the learners' preferences and identify content and formats that are best received through online sources with a view to further research aimed at measuring the impact of the resources on student engagement.

Methodology

The objective of our study is to develop a series of online resources across four engineering programs to study components of student engagement. The online resources comprise (1) F2F & Online lectures and (2) F2F & Online tutorials. Figure 2 shows a sample of the pilot online lectures and online tutorials.

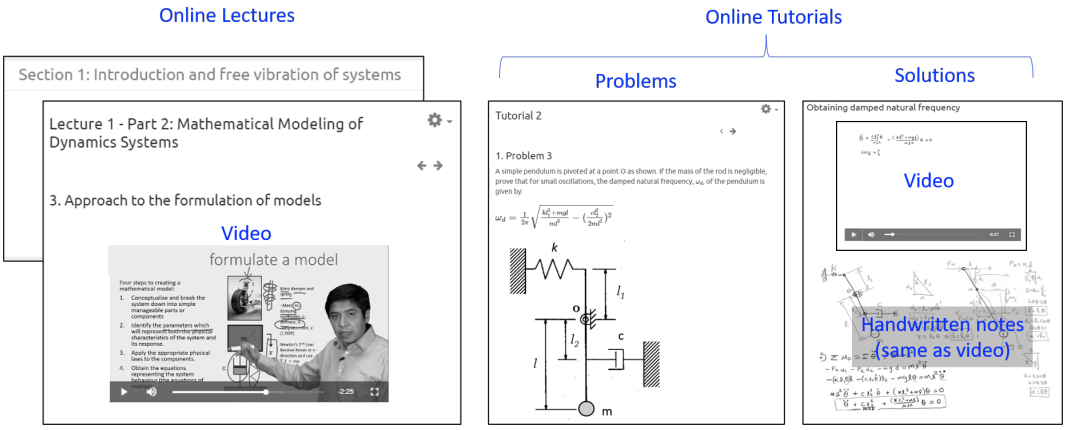

Figure 2: Sample of Online Resources

In this pilot run, we created video recordings of lectures nested within PowerPoint slides (Figure 2), PowerPoint slides with audio recordings, and step-by-step problem-based tutorials with audio recordings. These videos were created in addition to standard F2F teaching on these topics. Students were invited to view these resources and we administered questionnaires to identify, which aspects of online and F2F learning contributed to their learning. The goal of this pilot was to determine aspects of the course best suited for conversion to online videos that would be made available on the LMS platform. We also wanted to identify the quantity of online video content that would be manageable for a typical semester.

Questionnaire Survey:

Q1. Which type of teaching F2F format is more effective in your learning?
Q2. Which type of video does contribute more to your learning?
Q3. How many videos are sufficient for a 12-week course?
Q4. Which one of the following online material structure formats do you find more engaging?
Q5. Do you find the need for discussing material with someone?

The questionnaire survey was conducted using Google Forms and restricted to students from our programme. The survey itself was anonymous and students across four engineering programmes were invited to participate. All students were studying the second trimester of the first year in 2020. Eighty-eight students responded and the results are reported in the next section.

Student Engagement Model

To identify what indicators (ways to measure) and facilitators (aspects of online material) enhance engagement, we use a modified version of the model proposed in (Manwaring et al.,

2017). The model by Manwaring et al., (2017) has three categories of engagement facilitators:

1. Individual level (student) represents the type of personal qualities that students bring to instructional experiences. We relate this facilitator to the physiological need of "Competence". This facilitator measures individual confidence, which is related to the need to produce desired outcomes and to experience mastery.
2. Institutional design (instructor) represents the course design elements the instructor brings to the learning experience, e.g., the number of choice students had in the learning activity. This facilitator is related to the psychological need of "Autonomy", e.g., in our study is related to the choice provided how the online material is organised.
3. Student perception measures how the student is experiencing the learning activity. One of the characteristics of this category is related to the psychological need of "Relatedness". In our study, we relate this to the need to feel connected to others.

The modified model for this study is depicted in Figure 3. Table 1 shows the list of the questions we proposed that associated with the facilitators.

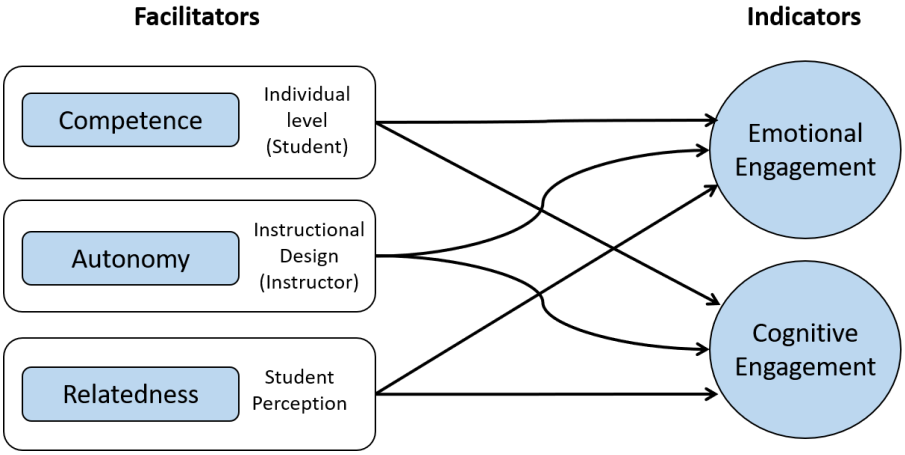

Figure 3: Modified Version of the Student Engagement Model by Manwaring Et Al., (2017).

Table 1: Facilitators and Questions of the Modified Student Engagement Model.

Facilitators	Question
Competence	Q1, "Which type of teaching F2F format is more effective in your learning?" Q2 Which type of video does contribute more to your learning?
Autonomy	Q3 How many videos are sufficient for a 12-week course? Q4 Which one of the following online material structure formats do you find more engaging?
Relatedness	Q5 Do you find the need for discussing material with someone?

Results

Figure 4 shows the responses to question Q1, "Which type of teaching F2F format is more effective in your learning?"

Overwhelming majority of students identified problem-based tutorials as the most effective format for face-to-face teaching. The second best option that they identified was didactic lectures.

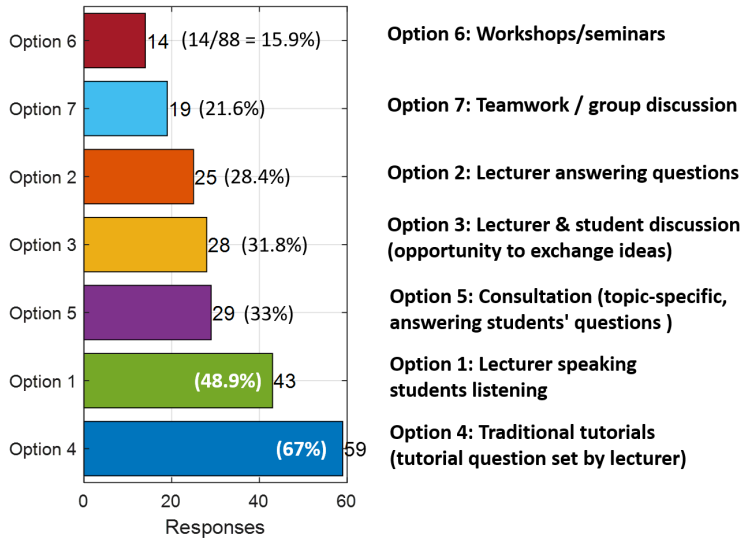

Figure 4: Q1 Which Type of Teaching F2F Format Is More Effective in Your Learning?

Figure 5 shows that 89.5% of the students find that recordings of problem-solving tutorials contributed to their learning. Video recordings of the solution were slightly preferred in comparison with audio recordings over power point. On the contrary, from a student's perspective, videos of lectures or videos of supplementary lectures have the least contribution to their learning.

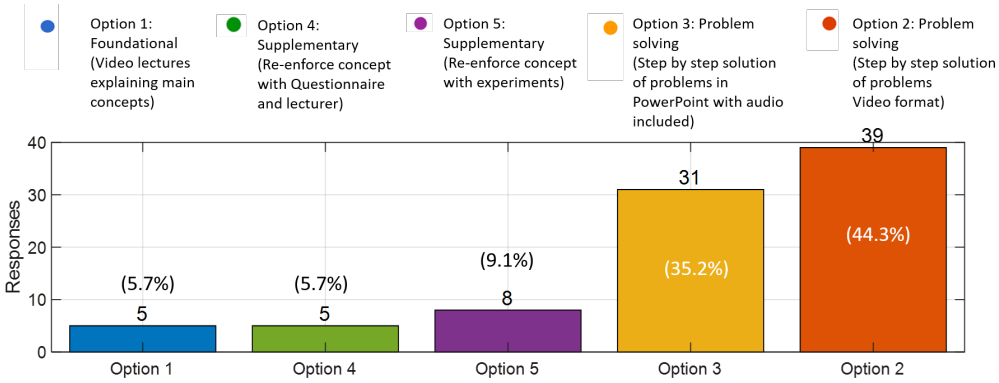

Figure 5: Q3 Which Type of Video Does Contribute More to Your Learning?

Figure 6 shows that 52.3% of the students consider that between 10 to 50 videos of tutorials or lectures are sufficient for a 12-week course.

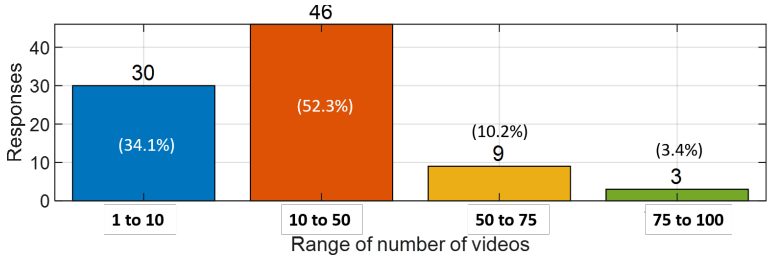

Figure 6: Q2 How Many Videos Are Sufficient for a 12-Week Course?

In Figure 7, from the student's perspective, it can be seen that 45.5% prefer that online material is organised in week-by-week sections.

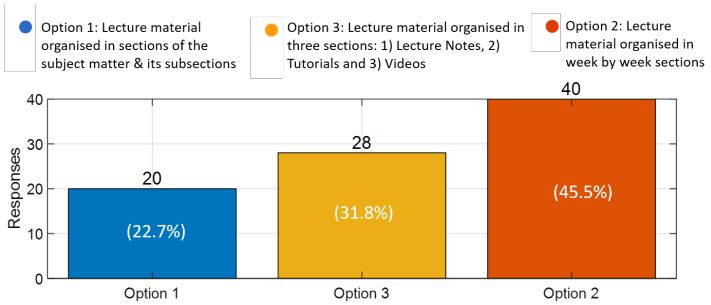

Figure 7: Q4 Which One of the Following Online Material Structure Formats Do You Find More Engaging?

In Figure 8, students responded that 65.9% of them needed to discuss the material with their classmates, and almost 30% needed to discuss the material with the lecturer, highlighting the need for incorporating opportunities for dialogue with lecturers and colleagues.

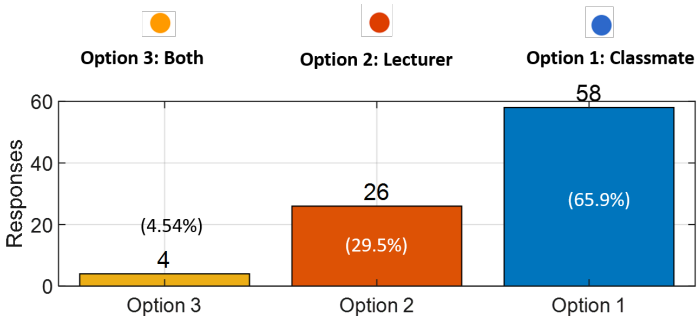

Figure 8: Q5 Do You Find the Need for Discussing Material with Someone?

Discussion

After examining the response to the questionnaire or the learners' preferences, we identify that the students perceive both F2F and recording of problem-solving as contributors to their learning. We interpret this as a facilitator to provide students with the opportunity to fulfil the need to produce desired outcomes and to experience mastery (Competence). Online lectures by comparison are least preferred by students as the platform for learning and hence would be least suited to conversion to online learning. Interestingly, students rated F2F didactic lectures more favourably (Figure 4). Students responded that online material organised in week-by-week section with 10 to 50 videos of tutorials or lectures. Finally, students expressed the need to discuss coursework both with lecturers and other classmates, which could serve both as the means to achieving competence, and the psychological need to be connected to others (relatedness). Online platforms have the potential to facilitate this interaction and suggest more effort be channelled towards the creation of resources that allow students and lecturers to communicate. The findings and their relationship to the modified student engagement model (Figure 3) are summarised in Table2 below.

Table 2: Summary of Results

Facilitator	Question	Response with majority
Competence	Q1, "Which type of teaching F2F format is more effective in your learning?" Q2 Which type of video does contribute more to your learning?	F2F Problem-based tutorials and Recordings of problem-solving tutorials contribute to their learning followed by didactic lecturing.
Autonomy	Q3 How many videos are sufficient for a 12-week course? Q4 Which one of the following online material structure formats do you find more engaging?	Between 10 to 50 videos of tutorials or lectures are sufficient for a 12-week course. Online material organised in Week-by-week sections.
Relatedness	Q5 Do you find the need for discussing material with someone?	The majority finds the need to discuss the material with classmates followed by the need to discuss it with the Lecturer.

These preliminary results identified some potential facilitators and will provide guidance for further research on identifying more facilitators or learners' preferences that are best received through online sources.

Limitations to this approach include the caveat the students' perception of the utility of each mode of teaching (e.g., lectures versus seminars) may not directly compare with the actual utility. For example, students who do not prefer to go to a workshop, or to a group discussion, they may still learn important skills and gain insight from the session that contributes to their cognitive engagement overall. This aspect of learning needs to be explored with serial questionnaires and performance indices in future work. The relatedness facilitator (social processed) identified in this work needs further investigation, as pointed out by Manwaring et al., (2017), it has potential to impact in both cognitive and emotional engagement. In this work, based on previous research mentioned in the introduction, we assume that the facilitators investigated here (Table 2) have an impact on student engagement. However, to find the correlations between facilitators and student engagement indicators, statistical validation needs to be conducted in future research.

Conclusion

The results presented here suggest that when designing blended courses, problem-based tutorials are preferred by students in comparison with didactic lectures. Our findings identify recorded video tutorials in combination with F2F lectures as a powerful tool to enhance student satisfaction and engagement.

Future work will address the limitations of the current approach. It is worth mentioning that this research is a pilot study and we have presented preliminary results only, the intent is to re-evaluate the approach to further identify more learners' preferences (facilitators) that impact student engagement in online and blended learning environments.

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