

# Teachers' Technological, Pedagogical and Content Knowledge (TPCK) and Practice Correlative Theory

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**Abstract:** Quality teaching is rooted from the teachers who have exemplary knowledge on the content, pedagogy and technology. To carry out this notion, this study was designed to determine the teacher's level of content knowledge, pedagogical knowledge and technological knowledge using the quantitative-qualitative research methods. The respondents of this research were all the senior high school teachers handling HUMSS (Humanities and Social Science) and they were classified into two groups: the non-education graduate teachers and education-graduate teachers. It was found out that there is no significant difference with respect to the level of content knowledge and technological knowledge between the two groups of respondents. However, when it comes to pedagogical knowledge, the education-graduate teachers outperformed the non-education graduate teachers. Teachers' practices were considered as dependent variable of this study and that retrieving the teaching performance rating of the teachers was done. It was noted that the level of teacher knowledge is positively correlated with their teaching performance. Along with these results, this study revealed that the teachers have struggle in the content knowledge as well as in applying the pedagogical knowledge. The same dilemma was found out in integrating technology into classroom instruction. Furthermore, SHS teachers have stressed that the challenges that they have encountered lead them to take the opportunity in attending enhancement seminars on content teaching and pedagogy as well as developing their technological skills. With all these result, teachers' TPCK and practice correlative theory has emerged. A diagram for this theory was created to serve as a framework in becoming competent and relevant teachers.

**Keywords:** Content knowledge, pedagogical knowledge, technological knowledge, teaching performance, quality teaching, Teachers' TPCK and Practice Correlative Theory.

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## 1. THE PROBLEM AND ITS SCOPE

### Rationale

It is the prime desire of any literacy advocate or learning institution to provide a quality education among the learners. To take this challenge, the World Education Forum in Dakar (2000) accentuated the improvement of the quality of education. It has been a recommendation of the said forum to improve all aspects of the quality of education to achieve recognized and measurable learning outcomes for all with emphasis on literacy, numeracy and essential life skills (Fredrikson, 2004). In line with this is a universal notion that achieving quality education is the key role of the teachers and that the teachers should be aware on the distinct knowledge and skills that they need to acquire so as to achieve a quality teaching.

In the Philippine setting, upholding the quality education among the learners is also the main thrust of the current educational system. It is believed that continuous monitoring on the aspect of increasing the quality of education is one of the vital tools to the country's progress, hence, the K to 12 program has been implemented to enhance our basic education system to keep abreast of the development of other country's educational system. Despite of the dilemmas that the government has faced, the implementation of this new curriculum came to its realization in lined with the agenda of President Aquino III of having quality education as a long term solution to poverty (SEAMEO, 2010).

With such necessary improvement, one of the problems faced by the Department of Education (DepEd) is the enormous need of teachers who will take the challenge in teaching the newly crafted curriculum for the senior high school students. The legislation has authorized the Department of Education and private high schools to hire teachers even those non-education graduates to teach the different core and specialized subjects (The Philippine Daily Inquirer, February 2013). This leads to the mass hiring of non-education teachers to teach the courses prescribed in the senior high school curriculum. A good number of them have not yet taken the Licensure Examination for Teachers (LET) but were given five years to acquire the necessary license.

With all these queries and along with the implementation of the K to 12, this study has transpired. It is the interest of this study to determine whether the education graduates and non-education graduates, have the sufficient knowledge and skills to address the demands of the newly implemented Senior High School curriculum. Consequently, it is quite interesting to take the challenge on how to become a competent teacher for the 21<sup>st</sup> century specifically in the senior high school in collaboration with the education-graduate teachers and non-education graduate teachers. With these two groups of teachers practicing their profession in the senior high school, there is a felt need to determine their level of knowledge with respect to technology, pedagogy and content. Upon knowing the level of these three domains of teacher knowledge, their teaching performance will also be considered.

However, this will only concentrate on the academic track, particularly those handling humanities and social sciences (HUMSS), since this track prepares students who plan to pursue college education. This further investigates if there is significant difference on the level of knowledge with respect to content, pedagogy and technology between the non-education graduate teachers and education-graduate teachers. Moreover, the outcome of this research will be the basis for generating a theory that will serve as a guiding principle in becoming a competent teacher who has all the courage to surpass the challenges brought by our recent educational system.

### **Theoretical Background of the Study**

The learning competencies embedded in the newly implemented Senior High School curriculum are strenuous and indeed challenging on the part of the subject teachers. It is befitting to evaluate the teachers as to the extent of their level of knowledge in terms of content, pedagogy and technology. This is to ensure that the teachers are ready to engage students into 21<sup>st</sup> century learning. With this presumption, the underpinnings of this study are the Technological Pedagogical Content Knowledge or TPACK model by Matthew Koehler and Punya Mishra (2006) and the Five-Stage Model of Adult Skill Acquisition by Stuart Dreyfus (2004).

The figure that follows (see figure 1) depicts the framework of this study. The TPACK model is intended to look into the level of the considered domains of teacher knowledge: the content knowledge, the pedagogical knowledge and technological knowledge. In addition, the Adult Skill Acquisition Model supports this study assuming that knowledge is irrelevant if it will not be transformed into a skill. These theories will be utilized as the level of the identified knowledge will be measured in which these teachers are grouped into education graduates and non-education graduates handling HUMSS. At the same time, their teaching performance will also be given emphasis. Challenges and opportunities that the teachers have encountered during their teaching in the Senior High School will be highlighted for these will give some relevant assumptions to emerge a certain theory.

TPACK model as being elucidated by Koehler and Mishra (2009) is a framework that helps teachers consider how their knowledge domains intersect in order to effectively teach and engage students with technology. It is an approach that looks at the combination of what teachers know, how they teach and the role of technology in order to have a better impact to students' learning. Furthermore, TPACK is a model which could identify where the strengths and weaknesses of the teachers lie in terms of their knowledge of content, pedagogy and technology and how these areas work together for innovative teaching and learning (Common Sense Education, 2016). Technically, TPACK model consists of three domains of teacher knowledge: the content, pedagogy and technology. The interplay between and among these domains of knowledge resulted to another three components of the model: the pedagogical content knowledge (PCK), technological content knowledge (TCK) and the technological pedagogical knowledge (TPK). The intersection of the three domains is considered the core of the said model, the technological pedagogical content knowledge (TPACK).

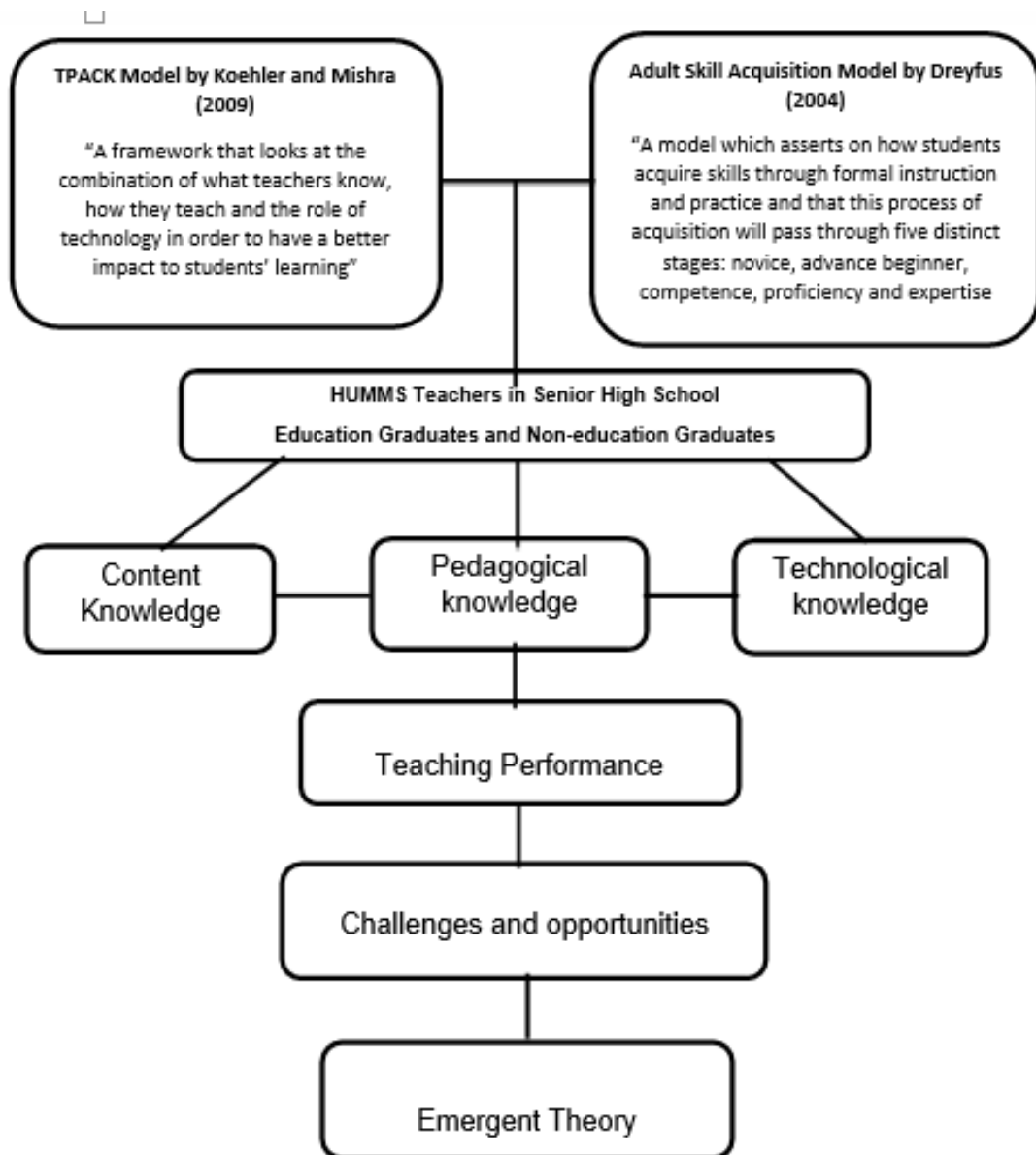


Figure 1. Theoretical and Conceptual Framework of the Study

Based on the explanation of Mishra and Koehler (2006), each of the domains of TPACK has given a comprehensive description. However, in the context of this study, the three main domains of teacher knowledge, the content knowledge, the pedagogical knowledge and the technological knowledge are the ones being considered.

The TPACK framework proves that teachers should have a profound understanding of each of the above-mentioned domains of knowledge so as to organize and integrate technology, pedagogy, and content into teaching in a way that students' learning is easy to achieve (Koehler et al, 2006).

As far as students' learning is concerned, any educational institution aims to ensure all students to become critical thinkers, active problem solvers, inquisitive readers, diligent researchers and prolific writers in which these qualities are indeed the demands of the real world. These should be the kind of students that every school should produce once the senior high school curriculum will be fully implemented. However, studies revealed that achievement of the students was related to teachers' knowledge of the subjects taught (Myrberg & Rosen, 2003) and that those teachers who have had pedagogical training produce higher student's achievement scores (Darling-Hammond, 1999). Aside from these facts, almost all observers of the educational process point to teacher quality as the most significant institutional determinant of

student achievement (Clotfelter et al., 2008). Hence, evaluating the teacher knowledge is an appropriate move to address the issue on teacher quality.

On the other hand, the *Five-Stage Model of Adult Skill Acquisition* is assumed that knowledge is just an information that could be acquired through sensory input like reading, watching, listening, touching, and the like (Boulet, 2015). Teachers are somehow expected to have the three domains of knowledge but it remains a question as to the extent of their knowledge. Applying knowledge to specific situations is an ability and it refers to the term, *skill*. Teachers are not only presumed to have the knowledge but having equipped with necessary skills in teaching is a great tool in attaining quality teaching. Skill acquisition is part of the teacher preparation and it is one of the key findings which assumed that teacher preparation helps candidates develop the knowledge and skill they need in the classroom (What Makes a Teacher Effective, 2015). Thus, the skill acquisition model which was proposed by the Dreyfus brothers, Stuart and Hubert, in 1980 is also an appropriate foundation of this study aside from the above-mentioned model.

The said model asserts on how students acquire skills through formal instruction and practice and that this process of acquisition will pass through five distinct stages: novice, advanced beginner, competence, proficiency and expertise (Dreyfus, 2004). The model is more concerned on the skill acquisition of the students but considering a maxim that goes: “once a teacher always a student”, this makes the said model applicable to teachers who need to attain the relevant skills along with the acquired knowledge on content, pedagogy and technology. In addition, pedagogical knowledge and technological knowledge when enacted will be transformed into pedagogical and technological skills respectively.

The main purpose of this study is to assess the level of knowledge of the teachers with the aforementioned knowledge, it is deemed apt to classify their extent of knowledge as to what stage of skill acquisition that each group belongs. It is believed that the knowledge gained by each teacher is insignificant if it will not be enacted and be transformed into a certain skill. In addition, it is indeed relevant to determine if the concerned teachers have reached the highest stage of skill acquisition, the expertise stage, where in we could say that teachers who can reach this stage are considered effective teachers. It is a fact that teachers who can teach effectively have greater impact on students’ achievement (Engberg, 2012).

Along with the investigation of the level of the teacher knowledge and assessing the stage of skill acquisition of the teachers will lead the researcher to look into their teaching performance since it says that one way to assess the effectiveness of the teacher is to know what he/she does in the classroom and how much progress his/her students make on the achievement test (Rhoden, 2016). Additionally, significant relationship will be investigated if it exists among the level of knowledge of the teacher in terms of content, pedagogy and technology and their teaching performance. With all the necessary findings of this study, emergent theory was proposed.

### Statement of the Problem

The focal purpose of this study was to determine the technological, pedagogical, content knowledge and practices of teachers who are education and non-education graduates teaching HUMSS in Senior High School curriculum, school year 2017 – 2018.

In particular, this study tried to find solutions on each of the following problems:

- 1) What is the level of knowledge of teachers who are education and non- education graduates in terms of content, pedagogy, and technology?
- 2) Is there a significant difference on the level of knowledge in terms of content, pedagogy and technology between the education and non-education graduates?
- 3) Is there a significant relationship among teachers’ teaching performance and knowledge based on the three domains?
- 4) What are the challenges and opportunities that have been encountered by the two groups?
- 5) What emerging theory could be proposed based on the findings of this study?

## 2. REVIEW OF LITERATURE AND STUDIES

This chapter encloses a review of literature and studies related to the purpose of this study. The literatures and related studies that are read and reviewed are classified into topics that will provide background of this study.

### *The Significance of Teacher Preparation and the Acquisition of Teacher's Knowledge and Skills*

Teaching is considered a rigorous profession. It is becoming more and more complex and the increasing demands are placed upon the teachers as it goes along with the ever changing world (Enu et al, 2015) and that the role of the teacher became an even more significant factor in education (GreatSchool Staff, 2016). Hence, teacher preparation has been given emphasis as it is being perceived by the APEC (Asian-Pacific Economic Cooperation) members. This group has seen professional preparation and development of quality teachers as a major aim for teacher education. In line with this, Darling-Hammond and Cobb (1995) posited that quality teachers can be delineated as having the combination of the following attributes: pedagogical knowledge, subject area content knowledge and the skills and attitudes necessary for effective teaching. Added to this, research indicates that the factors leading to teacher effectiveness are circumscribed with the knowledge of teaching and learning, subject matter knowledge, experience and the combined set of qualifications measured by teacher licensure (What Makes A Teacher Effective, 2015).

Developing an understanding of the subject matter areas is one of the mission and goals of the teacher education program as cited in the article written by Nguyen (2015). With this knowledge, creation of meaningful learning experiences will be the challenge of the teachers so as to let the students appreciate the lesson and that they will learn more on such subject matter. Moreover, teachers are to develop the pedagogical knowledge and skills which can be used to encourage students in evolving their critical thinking and problem-solving skills (Lunenbergh, 2006). It is apparent that teacher plays a critical factor in the achievement of quality education, thus teacher preparation is an essential element in the educational reform (Mangawil, 2011). Navarro (2011) supported this notion which she accentuated that the teacher education continuum comprises two levels: the basic level or the pre-service in which the development of fundamental skills and basic knowledge about the instructional process and subject specialization courses are highlighted, and the professional level or the in-service phase where the beginning teachers are expected to apply in the real classroom situations, the content and pedagogical knowledge that they gained in the previous phase.

These all manifest that teacher preparation is an important tool in the acquisition of the relevant knowledge and skills to achieve quality teaching. Thus, it is an edge that a teacher is a graduate from any teacher education program.

### *The Impact of Teacher Knowledge to Student's Achievement*

Improving student outcomes entails enhancing the quality of the teaching force (Crosling et al., 2009) for it has been proven through a good number of researches that the educational system has pointed out teacher quality as the most significant element of student achievement (Clotfelter et al., 2008). Researches disclosed that there is a positive connection between the teacher knowledge and student achievement in general (Tchoshanov, 2008) and in particular, there is a clear evidence that the teacher's attribute found to be more significantly correlated with student achievement is the teacher's academic skills (Metzler & Woessmann, 2010). This notion was supported by the study of Mangawil (2011) which argued that high levels of performance cannot be achieved by the students without access to skilled professional teachers and sufficient learning materials. Nevertheless, the changes in the curriculum have brought challenges and problems to the teachers who are considered the implementers of the new curriculum. It is evident in the study of Faltado and Faltado (2015), that the challenges faced by the teachers with the said curriculum were the difficulty in integrating the content and curriculum design within and across learning disciplines, attainment of idealistic competencies with the consideration n students' abilities, difficulty of the learners to understand and express their ideas in English, the complexity of spiral progression approach and lack of learning resources.

With the above-mentioned challenges, teachers need a variety of skills to be proficient in their careers like exemplary communication skills so that there will be no struggle in explaining the learning material and that the teachers could adapt a variety of ways to students who have diverse learning styles (Weiss, 2010). Aside from this, the teaching performance should be then effective and this can be attained by taking into account the teacher's mastery of the subject matter, his or her skills in choosing appropriate teaching methodology and technique and with favorable classroom management that will ensure a conducive learning environment (Bilbao & Corpuz, 2009). Along with this, the measures of pedagogical



knowledge including knowledge of learning, teaching method and curriculum have more often been found to influence teaching performance (Darling-Hammond, 2000). In addition, one of the teachers' qualities that contribute higher student achievement is the content knowledge of the teacher and that they are claimed to be effective teachers if they have solid background in the subject area they teach (Policy Studies Associates, 2005). This could be attested by a study that the academic major of the teachers may affect student achievement (Darling-Hammond, 1999).

In a nut shell, the umbrella of teacher quality does not only include the identified teacher knowledge but it also shows a positive relationship with the achievement of the students. But it is equally important to note that teacher certification is also a determinant of the students' achievement. It is then a proof that a teacher has acquired certain knowledge and skills pertaining to teaching.

### **3. RESEARCH METHODOLOGY**

This chapter includes the following: the research design, the research respondents, the research locale, the research instruments and the procedure of gathering the necessary data.

#### **Research Design**

In order to carry out the conceptual flow of this study, the researcher employed the mixed methods of research, the quantitative-qualitative methods. This study utilized the quantitative research method in the sense that the researcher collected and analyzed the data from an adequate number of respondents using a non-interactive instrument. On the other hand, this research made use of the qualitative approach for it gathered and interpreted non-numerical and narrative data. Furthermore, researcher-made interview guide questions were crafted in order to collect qualitative responses from the participants about their insights on the domains of teacher knowledge.

#### **Research Respondents**

The respondents of this research were the teachers handling the senior high school particularly teaching the subjects under HUMSS. The researcher utilized the purposive sampling since the sample was based and limited to the senior high school teachers handling the aforementioned strand. Out of the ten (10) schools which offer senior high school, there were only six (6) schools for which HUMSS is one of its strands under the academic track that they offer.

#### **Instrument Validation**

A pilot test was done to ensure the reliability of the instrument since it was a teacher-made test. Scores from the pilot test was then scrutinized through item analysis and the instrument generated a mean Cronbach alpha of 0.7028. Furthermore, the said tool was validated by an expert in test construction to make certain the validity of the test.

#### **Data Gathering Procedures**

A letter was handed to the Schools Division Superintendent in the research locale asking the approval of acquiring the list of DepEd and Non-DepEd SHS providers to complete the researcher's research design proposal. Prior to the distribution and administration of the test to the identified SHS providers, the instrument was then pilot tested and was subject for reliability and validity. When the pilot test was done, the researcher sent a letter to the Schools Division Superintendent to secure permission for the conduct of this study. When the permit was granted, transmittal letter was given to the respective school head of the SHS providers. List of the teachers was obtained from the principals with their consent. The researcher further asked the permission to retrieve the result of the teaching performance of the identified teachers. In case of the public teachers, the result of their performance as projected in their Individual Performance and Commitment Review Form or IPCR was used and for the teachers from private schools, their result from their respective evaluation tool for teaching performance was utilized.

When the collection of the data was done, tabular method was utilized in presenting the data and the presentations were based on the statement of the problems stipulated in this research. Furthermore, each presentation of the data was strengthened by a comprehensive analysis and the implications were reinforced with the related statements cited in the review of related literature. An inclusion of the vignettes from the interview were highlighted to strengthen the findings of this study and to validate their responses on the challenges and opportunities that they encountered in terms of content, pedagogy and technology.

#### 4. PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA

This chapter includes the data presentation with its corresponding interpretation and analysis which follows the following sequence: (1) the level of knowledge of the teachers in terms of content, pedagogy and technology; (2) the significant difference of the level of teacher knowledge between the two groups of respondents; (3) the relationship that exists between the level of teacher knowledge and their teaching performance. Furthermore, the challenges and opportunities that the teachers have encountered were also presented and were substantiated with the responses from the interview of some of the respondents. The formulation of the emergent theory is also enclosed in this chapter.

##### **The Level of Knowledge of the Teachers in terms of Content, Pedagogy and Technology**

It has been emphasized in the context of this study that the respondents are grouped into non-education graduate teachers (NEGT) and education-graduate teachers (EGT).

It can be observed that the two groups of respondents have different level of content knowledge. That is, the non-education graduate teachers are in the *beginning level* whereas the education-graduate teachers are in the *developing level*. Taking into account the values of its corresponding standard deviation, the scores of the education graduate teachers are less varied than the scores of the other group. This means that the scores of the education-graduate teachers are clustered closely around the mean since it has a low standard deviation.

If the level of content knowledge of the non-education graduates is in the *beginning level*, hence, they have this difficulty of understanding the varied contents of the subject areas that they have taught. Handling the subjects which are not their major subject or have not studied the subjects in their undergraduate program is one of the reasons why this group of teachers is struggling in their content knowledge.

Aside from this fact, there may be some prevailing factors that affect the level of their content knowledge. One of which was the construction of the research instrument. Since the content knowledge covers the courses under humanities and social sciences and considering that these two (2) learning disciplines are broad in terms of its scope, hence the respondents might find hard in answering this part of the test. The paper-pencil test that was conducted did not cover only one area of humanities and social sciences. In addition, the researcher did not classify the respondents as to what subjects they teach, either humanities or social sciences. As long as the teacher is handling HUMSS subjects, then he or she should answer the 40-item test under the content knowledge. There might be some instances that a teacher is handling social science and has no idea about the topics in humanities or it might be that a teacher is good in humanities but unfamiliar with the subjects under social science. Thus, this gives an ambiguous idea about the result of their level of content knowledge. But the generated result would somehow provide an assumption that the non-education graduate teachers are struggling in attaining mastery of the subject matters under humanities and social science courses.

On the other hand, the education-graduate teachers' views about the subjects that they have taught and considering their level of content knowledge is in the *developing level*, teachers in this level have possessed the minimum knowledge, skills and core understanding about the subjects they handled especially humanities and social sciences. They may find the subject matter a manageable one for the reason that most of them have taken English as their major subject and most of the topics in humanities are literature-based.

Using these findings on their level of content knowledge, it is quite alarming that our teachers in the senior high school particularly handling the subjects in HUMSS, are in combat with their knowledge and understanding about the content of the subject areas that they handled. It has been emphasized by Shepherd (2013) that a deep knowledge and understanding of subject matter is relevant so as to transform the imparted information into meaningful one. Attaining mastery of the subject matter is one of the attributes that a teacher should consider in order to achieve an effective teaching performance and this which was concluded by the study of Bilbao and Corpuz (2009). Furthermore, one of the teachers' qualities which were given emphasis in the article published by Policy Studies Associates (2005) that contribute higher student achievement is the content knowledge of the teacher and that they are claimed to be effective teachers if they have solid background in the subject area they teach.

If the content knowledge should be enhanced in a way that it could lead to effective teaching, it is fairly important to consider their pedagogical knowledge. The level of pedagogical knowledge of the non-education graduate teachers is classified as *developing* while the education-graduate teacher is in the level: *approaching proficiency*. The teachers in

the *developing level* have the minimum knowledge and skills but need much assistance and guidance from their colleagues. *Approaching proficiency* is the level where the teachers develop the fundamental knowledge and skills with little guidance and assistance from peers or from the experts. Aside from this, they also differ in the measure of standard deviation where in the scores of the non-education graduate teachers are more varied than the scores of the education-graduate teachers since the standard deviation of the non-education graduate teachers is greater than the education-graduate teacher's standard deviation. The standard deviation of the scores of the education-graduate teachers is small which can be interpreted that most of the scores are concentrated around the mean. In fact, a good number of the education-graduate teachers got the scores within the range 80 – 84.

With these findings, the four years that the education-graduate teachers have undergone helped them equipped with the necessary pedagogical skills. They were prepared to such activities wherein they can apply the pedagogical knowledge they learned and experienced during their pre-service training. It is one of the objectives of the teacher education that aside from imparting adequate knowledge of the subject matter, prospective teachers should develop the pedagogical skills needed for a quality teaching as what Khan (2016) has illuminated and that developing the pedagogical knowledge and skills are used to encourage students in evolving their critical thinking and problem-solving skills according to Lunenberg (2006). It is indeed an edge if you are an education graduate.

In addition, Goldhaber (2006) concluded that teachers who graduated from a school of education with approved training program outperformed those who do not undergo the teacher education program. On the contrary, the four-year degree that the non-education graduates have earned will somehow help them face the challenges brought by the new curriculum though they concluded that their learnings are insufficient.

Along with the content knowledge and pedagogical knowledge is the knowledge on how to use technology in the classroom instruction. Knowing the level of technological knowledge of the teachers in the senior high school is a good move to determine if they have the knowledge and skills to use appropriate technology in every class discussion. Referring to table 3, the two groups have the same level of technological knowledge and they are both in the *developing level*. They have almost the same standard deviation which can be inferred that the scores of both groups of teachers are varied since they both have relatively large standard deviation. In view of their level of technological knowledge, which is *developing*, it can be implied that the teachers have minimum knowledge and skills about technology and that this needs to be developed more by either asking assistance from peers or keep updating oneself on the new trends in technology.

Studies have shown that teachers are more knowledgeable in the pedagogical and content fields than in technology, which means that their level of technological knowledge is not sufficient to integrate ICTs into their teaching tasks (Roig-Vila et al., 2016). Developing ones technological knowledge is relevant hence the K to 12 programs gives the opportunity for the teachers to improve their technological skills. Although it creates much pressure on the teachers, since technology should be properly integrated into learning, teaching and assessment as what Depew (2015) emphasized in his study

With this, it can be predicted that teachers need time to know more and discover on how to use technology in an informative way. As supported by Wilner (2015) that teachers as facilitators, should have the knowledge in choosing appropriate technological tools that best support a certain curriculum. Thus, proper training about technology and its new trends will be given emphasis by any learning institution.

In a nutshell, the level of knowledge in terms of content, pedagogy and technology were already determined, hence, it is befitting to know the corresponding level of skills as they were introduced by the Dreyfus Brothers. Referring to Table 2 in the data gathering procedures, *beginning level* corresponds to *novice stage*, the level of content knowledge of both groups fall under the *novice stage*, which the person in this stage follows whatever rules has given to him/her without context and without looking into consideration the responsibility of following the rules. It could be inferred that teachers who were hired to teach the new curriculum followed only the protocol of the top management and merely accepting whatever teaching loads were assigned to them. They will teach the subjects which are unfamiliar to them without thinking the responsibility if they can impart the lesson in informative way. This may be a big challenge on the part of the non-education graduate teachers to extend more effort in achieving mastery of the subject matters.

The level of pedagogical knowledge of the non-education graduate teachers as well as the level of technological knowledge of both groups is classified as *developing level*. This level of knowledge could be equated to *advanced*



*beginner* wherein individuals start to develop an understanding of the relevant context and learn to recognize new aspects. It can be concluded that the teachers' knowledge on pedagogy and technology have been applied in their daily undertakings inside their respective classroom and they were able to understand how to apply such knowledge whenever necessary.

It is expected that the level of pedagogical knowledge of an education-graduate teacher is a bit higher than the non-education graduate. It is a fact that the teacher education program is designed to develop an adequate knowledge of the subject matter and to equip with the necessary pedagogical skills. Consequently, after assessing their knowledge in pedagogy it resulted to *advanced proficiency level* and which corresponds to *competence stage of skill acquisition*. According to Dreyfus (2004), individuals on this stage develop organizing principles to access particular rules that could be applied a specific task at hand. They seek rules and reasoning procedures to decide what plan or perspective to use even if they are not sure if the chosen rules are appropriate for a certain task. Being a risk-taker is one of the skills of a 21<sup>st</sup> century teacher that is, trying a new teaching strategy without thinking if it will work out but the experience of learning new insight is what the teacher wants to acquire

Hence, this is how the education graduates utilized and maximized their pedagogical knowledge and skills as they educate the students every day.

### **The Significant Difference of the Level of Teacher Knowledge between the Non-Education Graduate Teachers and Education-Graduate Teachers**

It is one of the researcher's objectives to determine if there is a significant difference between the non-education graduate and education-graduate teachers when it comes to content, pedagogy and technology. The data gathered revealed that there is no difference on the level of content knowledge between the teachers who are non-education graduates and education-graduates. It was cited in the previous discussion of findings that both have struggles in handling the subjects that they have taught although they find ways on how to understand deeply the content of the subjects being taught. Even if some teachers did not find hard in understanding the content or the subject matter because they have a background of the subjects assigned to him or her, they still take time to boost their content knowledge by being resourceful and innovative.

The result of the difference in the pedagogical knowledge between the two groups is marked *significant*. Data revealed that the two groups differ on the level of knowledge in terms of pedagogy. One main reason for this result is that the education graduates were exposed to different teaching methods, strategies and techniques. They have the ample opportunities to take on their practice teaching in both private and public schools. Thus, it can be looked forward that these group of teachers have a good set of pedagogical skills for they are graduates from teacher education program.

To complete the discourse on the difference of the level of teacher knowledge between the two groups is to know the significant difference of their level of technological knowledge. Their difference is not significant thus, the hypothesis that there is no significant difference on the level of technological knowledge between the non-education graduate and education-graduate teachers should not be rejected. This further means that the two groups have the same level of knowledge and skills in terms of technology. They are relatively skillful in choosing appropriate technological tool to be integrated in a specific subject matter.

Since teachers at present are dealing with millennials, Bundy (2004) mentioned that the use of technology in school context exist not just for the students but for the teachers as well. It is cited in the study of Luterbach (2013) that the traditional chalkboard had become obsolete and that multi-media instruction overruled in the present generation. Consequently, this entails that the teacher should have the knowledge in choosing appropriate technological tools that best support a certain curriculum and proper training should be conducted before introducing the new tools as suggested by Wilner (2005).

### **The Relationship between the Level of Teacher Knowledge and their Teaching Performance**

The strength of the relationship between the level of teacher knowledge and teachers' teaching performance is weak but considering that they are positively related, then one can conclude that the teaching performance of the teachers is being influenced by their level of knowledge in terms of content, pedagogy and technology. It is because a positive correlation signifies that when one variable increases or decreases, the other variable will also increase or decrease. In particular, each of the teacher knowledge is positively related to the teaching performance of the teachers. It can be inferred that if a

teacher demonstrates mastery of the subject matter then it is expected that this teacher shows exemplary performance. But if a teacher has inadequate knowledge on the subject matter probably will result to teaching performance. Same thing will happen if the teacher is good enough in pedagogy, his or her teaching performance is commendable. However, when a teacher struggles in his or her pedagogical skills, this will lead to unsatisfactory teaching performance. Equally important to content and pedagogical knowledge is the level of technological knowledge. That is, if one is good enough in using technology in the classroom this will make the discussion more interactive and that well-satisfied teaching performance is evident. On the contrary, if a teacher has low level in technological knowledge and that he or she may resort to traditional teaching, then his or her teaching performance might be slightly satisfied.

Moreover, the weak correlation between the identified variables implies that there are factors affecting the teaching career of the teachers. For instance, if a teacher is handling subjects that require a good number of preparations, then there might be some cases that they resort to mediocrity in their delivery of the lesson thus affecting their teaching performance. Aside from this, perhaps most of the teachers have another responsibilities to carry on other than being a classroom teacher since teachers are considered as multi-taskers. Consequently, these could contribute to the weak relationship between the level of teacher knowledge and their performance.

The aforementioned implications were manifested in one of the findings of the study of Darling-Hammond (2000) has been proven when she stressed that although the content knowledge or the subject-matter knowledge has often been found to be an important factor in teacher effectiveness, its relationship is curvilinear that is, it exerts a positive effect up to a threshold level and then diminish gradually. However, she added that the measures of pedagogical knowledge including knowledge of learning, teaching methods and curriculum have stronger effects to teaching performance compared to content knowledge. Thus, the pedagogical knowledge has bigger correlation coefficient than the content knowledge but both of them are positively correlated to teaching performance.

Teaching performance is the indicator of the teachers' practices, that is, this gives one an idea on how a teacher carry out his or her tasks daily in an informative and productive way. Knowledge on content and pedagogy will be maximized if technological knowledge will be taken into account. This is manifested in the study of Batiabwe and Bakkabulindi (2016) when they found out that the use of ICT in pedagogy has a positive impact on the teaching-learning process but the success of this integration depends on how the teacher put through his or her teaching skills. Hence, it can be assumed that having sufficient technological knowledge with pedagogical skill and sufficient content knowledge would lead to enhanced teaching performance.

### **Challenges and Opportunities encountered by the SHS Teachers**

When a certain system needs a reform and then on the process of implementation, challenges are inevitable. However, teachers in the senior high school especially handling humanities and social sciences, experienced a lot of challenges when it comes to understanding the content of the subjects they taught, how to deliver the content effectively and in utilizing and integrating technology into classroom instruction in an appropriate way. Challenges can be transformed into something positive that can lead an individual to personal and professional growth and this is known as opportunities. Most of the responses of the teachers were focused on the difficulty in understanding the different topics under humanities and social science. Topics that are broad and hard to comprehend was given emphasis and there were strange words that were used in the topics were not familiar to the teachers. This dilemma had been heightened when those "difficult subject" were handled by teachers who were not studying the subjects in the undergraduate. In short, teachers were obliged to teach humanities and social sciences even if these subjects are not their field of specialization. It might be some of the teachers thought that even if they have not encountered these subjects during their undergraduate study, these can be studied through readings and surfing the internet. Their deficiency in the content teaching has brought the teachers to go beyond what is in the textbook. Some teachers resorted to further readings and research related to the lesson.

Due to this undertakings that the teachers need to do research and further readings, it is their opportunity to widen their knowledge about the subjects taught. Aside from this, content of the subject areas learning activities are based on the curriculum guide provided for the teachers. They have also the struggle in following the said guide for some of the suggested activities did not go with the level of knowledge of the students. The learning resources and facilities recommended were usually not available in the campus. Thus, this gives the teachers to practice their being resourceful and innovative.

Moreover, this will be the chance for the teachers to participate any seminars and trainings pertaining to content teaching. Enrolling a post-graduate studies will be a good move for professional development. It is then emphasized in the study of Boudersa (2016) that professional development is a process which involves set of activities that is designed for enhancing the teachers' professional knowledge, teaching skills and attitudes to increase students' learning.

The challenges that they have encountered have pushed the teachers to exert much effort in acquiring adequate knowledge on the subjects that they have taught. This manifests that they have the desire to attain a satisfactory level on content knowledge and this could be possible if the opportunities that they have uttered will be met.

Employing different teaching approaches, methods and strategies including teaching styles and techniques were most of the challenges accentuated by most of the non-education graduate teachers. Teachers' struggle were centered on what appropriate teaching method and strategy suitable for every lesson and how to deliver the topics in such a way that the discussion is more interactive and productive. For them, they experienced these difficulties because they have not exposed much to different teaching methods and strategies. In this end, it is their opportunity to attend such seminars and trainings that encompasses the variety of teaching methods and strategies.

In addition, this is also their chance for the teachers to build rapport with their colleagues or their school head for they need assistance and guidance for this kind of challenge. The assistance that can be extended from master teachers or expert teachers is also of help in addressing the unfavorable behavior of the students. However, some teachers may not need an assistance from anyone whenever he or she is faced with the misbehavior of his or her students. They have to find ways to correct their class' misbehavior.

Furthermore, whenever a student committed an unfavorable doing, this is an opportunity for a teacher to practice his or her skills in curbing with misbehaved students by taking time for consultation and counseling. Student's misbehavior should be prevented and corrected properly for it was found out in the study of Sun and Shek (2012) that students' misbehaviors decelerate the flow of the class discussion and effectiveness of teaching will also be affected. They added that if a student is misbehaving in the class, this could interfere his or her learning and the rest of the class will also be distracted. It is then part of the pedagogical skills of the teachers to handle this kind of dilemma.

Sufficient knowledge on pedagogy is a great tool to surpass the challenges that the teachers have experienced. Exposing oneself to seminars and workshops regarding on the different teaching methods, strategies and techniques would enhance the teachers' practices inside the classroom. With the same ground, this could help the teachers establish some techniques on how to handle students' misbehavior.

It can be observed that most of the problems that the teachers have encountered when talking about technological knowledge were stressed on the scarcity of technological devices and absence of campus-wide internet connections. The teachers believe that having an internet connection within the campus would help them deliver the lessons in a more engaging way. It is a fact that nowadays, students have been using mobile devices such as tablets and smartphones. Making use of these gadgets and utilizing the internet connection productively, the integration of technology in the classroom will be more interactive and this will help students stay engaged throughout the class period. According to Mareco (2017), aside from the fact that the students' interest will be sustained if technology is properly integrated in the discussion, this could also be an effective way of connecting students with distinct learning styles.

However, some teachers have alleged that their knowledge about technology is insufficient. This is why they always resort to using the traditional teaching. Thus, this is their opportunity to upgrade themselves by attending seminars that would focus on the technical aspects of technology as well as awareness of the different computer software. Align with this endeavor, students should also be provided with ample number of computer units for the teachers to effectively transform the computer concepts into concrete hands-on activities. Therefore, once a teacher has enough knowledge in technology as well as the students and with the presence of a campus-wide internet connection, then quality teaching and profound learning will be realized.

In addition, with the challenges shared by the two groups of teachers call for the school administrators to look into the inadequacy of computer facilities and the absence of internet connections. If this will be properly addressed, then technological knowledge of the teachers will be improved since they will be more exposed in using technology in the classroom. Moreover, those teachers who are digital migrants will be encouraged to use technology as part of their classroom instruction.

## THE EMERGENT THEORY

### Theory Validation

Many definitions are accounted to the term: *theory*. Basing on the definitions stressed in the dictionary, a *theory* is a supposition or a system of ideas intended to explain something especially if one is based on general principles independent of the thing to be explained; or it is a set of principles on which the practice of an activity is based just like a *theory of education*. Taking into account these definitions and with the premise posited by King (2015) that a ‘theory may be a subject that needs updating because of new findings...’. With this notion, the emergent theory for this study is taken from the existing principles or concepts that needs to be updated. In addition to the existence of principles and concepts, the said theory is supported by the findings of this study. The development of a theory can be done through gathering informative and useful data. In the context of this research undertaking, the data were gathered through conducting a paper-pencil test, face-to-face interview and online interview. Taking a copious notes on ideas from the review of related literature would somehow supplement the formulation of the emergent theory.

With the qualitative data that have been gathered and the numerical data that have been generated through appropriate statistical tools lead to the validation of the emergent theory. Moreover, the findings on significant difference between two variables as well as the existence of significant relationship between the identified variables bring justification on the theory that will emerge from this study. To recall, it is the researcher’s objective to come up with a framework of a competent teacher depicting on his or her Technological, Pedagogical and Content Knowledge (TPCK) along with the teaching performance. This is a model for which the senior high school teachers may espouse and serve as a guide towards quality teaching. Upon conducting the paper-pencil test, the level of knowledge of the teachers in terms of the content, pedagogy and technology have been determined. Further investigation has been made if there is a difference on the level of the identified teacher knowledge between the non-education graduate teachers and the education-graduate teachers as well as the existence of significant relationship between the level of teacher knowledge and their teaching performance. It was found out that there exists significant difference on the pedagogical knowledge between the non-education graduate teachers and education-graduate teachers. Furthermore, the level of teacher knowledge of the two groups of respondents and their teaching performance are significantly related. Thus, from these results emerged a theory that is useful in the field of educational management since this will serve as a tool for the school heads to look into the necessary and appropriate professional enhancement for teachers in terms of their TPCK.

### Theory Generated: TEACHERS’ TPCK and PRACTICE CORRELATIVE THEORY

Education is considered as dynamic in nature and what makes it dynamic is that *change* or *reform* is always been in the priority list of the policy makers of our educational system. Since teachers are the important elements in the educational system, it is but appropriate to create a paradigm which could be useful in fulfilling our country’s dream to continually achieve quality education.

One of the indicators of having a quality education is producing a good number of highly competent graduates. Competent students are nurtured by knowledgeable and highly skilled teachers and these teachers are those who can produce an excellent teaching performance. A teacher may not be necessary a graduate of any four-year degree under the teacher education program but as long as an individual possesses the three domains of teacher knowledge or better known as TPCK, *technological, pedagogical and content knowledge*, then that individual has all the discretions to teach and has the potential to become a 21<sup>st</sup> century teacher. It has been proven statistically that TPCK of the teachers, whether that teacher is an education graduate or non-education graduate, showed significant relationship with one’s teaching performance.

**Teachers’ TPCK and Practice Correlative Theory** exemplifies that the teachers’ practices are influenced by the level of TPCK of the teachers and that its positive correlation will lead to becoming competent and relevant teachers. Its level of TPCK should be high enough so that exemplary teaching performance can be achieved. It is being stressed in this theory that a teacher should be proficient when it comes to content knowledge so that there is no room for subject matter difficulty. Well-grounded pedagogical knowledge would mean that a teacher has a strong foundation in pedagogy. In addition, it is not enough that a teacher knows how to use technological devices but he or she should be highly trained in terms of integrating technology in the class setting. The diagram in Figure 3 depicts the relationship between the TPCK of the teachers and their practices. It can be seen that at the core of the framework is the competent and relevant teachers

as the end result of the positive correlation between the TPCK and practices of the teachers. It is being circumscribed by the three (3) domains of teacher knowledge known as TPCK. It is called *Correlative Theory* since the TPCK have positive impact to the teachers' practices. The TPCK in this model are not simply the minimum level of content knowledge, pedagogical knowledge and technological knowledge. In order to realize this theory, a teacher should demonstrate proficiency in content knowledge possesses a well-grounded knowledge on pedagogy and should be well-versed in integrating technology into classroom instruction. If merging of the three (3) aforementioned knowledge is perfectly done, then outstanding teaching performance is attainable whether a teacher is an education graduate or non-education graduate. Outstanding teaching performance is evident for those teachers who are competent and relevant.

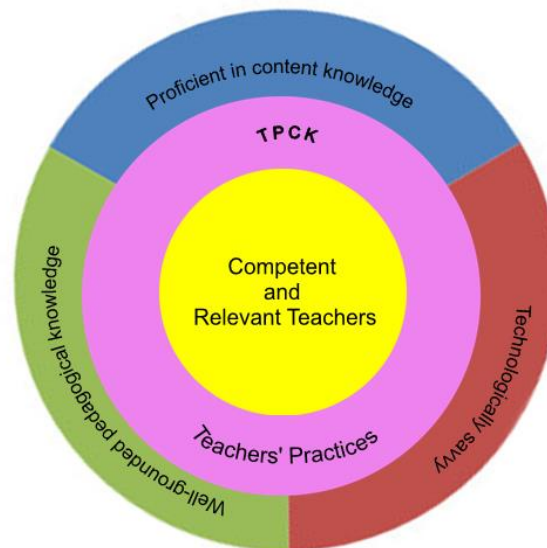


Figure 3. Teachers' TPCK and Practice Correlative Framework

## 5. CONCLUSION AND RECOMMENDATIONS

### Conclusion

The teachers' TPCK and practices are essential elements towards a successful services thus becoming them competent and relevant. Moreover, the challenges are learning opportunities for the teachers to improve practices called for in their teaching career.

### Recommendations

The following statements that follow are the recommendations of this study. These are based on the aforementioned findings:

- 1) Curriculum makers may consider to add the eighteen (18) units of professional subjects that the non-education graduates have to take so as to supplement their knowledge on pedagogy. Further, they may be recommended to take on the field study subjects if practice teaching is optional.
- 2) Adequate supply of updated books and other learning resources may be given much attention by the school administrators for these are essential tools in delivering quality instruction to the students.
- 3) The school heads may include in their school activity the "peer mentoring" especially for those who are beginners in the teaching force. Master teachers may find time for consultation of those colleagues who have the difficulty in handling the subjects as well as students' misbehaviors.
- 4) Technological devices may be made available at all cost as well as the availability of the internet connections for the easy access of those teachers who have the desire to apply their knowledge on integrating technology in the classroom instruction. School administrators may give equal attention on this matter for it is still part of achieving quality education.
- 5) Screening committee for hiring teacher applicants may consider practice teaching or equivalent seminars on pedagogy for those who are non-education graduates as part of the requirements in teaching senior high school.
- 6) A study may be conducted as a further validation of the Teachers' TPCK and Practice Correlative Theory.



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