

# Technological Pedagogical Content Knowledge of College of Arts and Sciences Professors

Wilfred G. Alava Jr.

Natural Sciences Department College of Arts and Sciences  
Bukidnon State University, Fortich Street, Malaybalay City, Bukidnon 8700, PHILIPPINES  
E-mail: wilfred\_alava@yahoo.com

## *Abstract*

*The Technological, Pedagogical, Content Knowledge (TPACK) framework introduces the mixing of the 3 main domains (technological knowledge, pedagogical knowledge and Content knowledge). This study was designed to work out the amount of TPACK of the faculty of Arts and Sciences Professors of Bukidnon State University. This study could be a descriptive survey sort of analysis. There have been eighty Professors of the College of Arts and Sciences who participated the study. Associate tailored and changed form from Helmut Schmidt (2009) and Sahin (2011) was employed in gathering and grouping knowledge. Knowledge were subjected to applied math treatment. It had been noted that education data and Technological education data have the best mean score with a website level of professional. Generally, the TPACK domain of the CAS Professors is in Advanced level. This suggests that the TPACK domains were already integrated and enforced well by teaching content mistreatment applicable education strategies and technologies. They need associate intuitive understanding of the advanced interaction between the 3 basin parts of data (CK, PK, TK). Also, they're competent in to the data needed by professors for integration technology into their teaching in any content space. Moreover, there's no vital relationships between the demographic profile and also the TPACK of the CAS Professors. Hence, academics are expected to unceasingly develop their TPACK.*

**Keywords:** TPACK, Demographic Profile, CAS-Professors.

## **Introduction**

In learning, academics and students are 2 main actors in teaching and learning method. Teaching and learning as a method is thought of sure-fire if the scholars will provide expected outcomes. Teachers' efforts is shown from their disposition to search out ways that so as to transfer the data with success. For academics to achieve success in their career, they have to develop themselves in pedagogy, technology, and their content areas. By mistreatment data and communication technologies, academics will follow development in their areas, transfer the modern approaches and applications relating to teaching strategies into their instruction, and keep themselves up-to-date. Further, students of these days ar coined as “digital natives”. For these reasons, technology plays a vital role for teacher data improvement.

Lambert & Andres Martinez (2007); Margerum-Leys & Marx (2002) steered that teachers' use of academic technology needs comprehensive and multi-faceted data. The goal of a recent academic system is to lift people, World Health Organization seek for ways that to get data, apprehend wherever and the way to use it, and have vital thinking skills (Yilmaz, 2007). This goal is met with academics World Health Organization renew themselves with the ever-developing science and

technology. Hence, academics ought to have the required talents and responsibilities to integrate new technologies into their areas (Hicks, 2006). For example, fast diffusion of the net and distance education technologies need educators to debate some problems, like publication content on-line, and interaction between students and academic materials (Peruski & Mishra, 2004).

The Technological, education and conception data (TPACK) framework introduces the mixing of the 3 main domains (technological data, education data and abstract knowledge). The proponents wired that a teachers' PCK isn't any longer enough for effective learning within the twenty first century. The data on the employment and integration of technology within the conduct of room instruction is equally vital. The broad conception of TPACK is that the data relating to the interactions between Content data (CK), Pedagogy data (PK), and Technology Content (TK) in teaching through the employment of technology (Agyei & Voogt, 2012). Koehler and Mishra (2009) emphasised the importance of domains – education Content data (PCK), Technological Content data (TCK), Technological education data (TPK) and TPACK – as some way to examine the interaction among the 3 main domains (CK, PK, and TK). Previous studies steered that the TPACK framework planned an honest quality of teaching associated outlined an understanding of the interactions between the 3 domains; technology, pedagogy, and content (Koehler & Mishra, 2008; Mishra & Koehler, 2006).

Examining teachers' perceptions of their data in technology, pedagogy, content, and their intersections is a necessary ought to confirm the amount of their data in every domain. It's vital to notice that the TPACK framework is flexibly applied in any learning atmosphere. It doesn't demand specific directions regarding what specific content ought to be schooled, that education technique is helpful, and what tool of technology is employed in teaching (Mishra, Koehler, & Henriksen, 2010). The results of previous studies give a robust theoretical basis for representing instructors' TPACK (Lin, Tsai, Chai & Lee, 2012). There ar many studies that have examined the connection between the seven parts of TPACK to higher perceive instructors' TPACK data. Some studies found that each one seven parts were considerably associated with one another (Chai, Koh, Ho & Tsai, 2012; sculptor et al., 2012). These studies showed a robust correlational statistics between TPK, TCK, and TPACK in addition as a correlational statistics between TK with TPK, TCK, and TPACK. This emphasised that associate improvement of teachers' TPACK data can result in improvement in students' learning (Lin et al., 2012).

The integration of the technology domain within the TPACK framework, as several students tend to explore the TPACK parts and their interactions. Completely different analysis studies have steered a variation of relationships among the seven parts of the TPACK framework. In an exceedingly study done by Messina and Tabone (2012), the mean many CK, PK, and PCK were beyond the mean many the opposite parts of the TPACK framework that embrace the technology domain. Which means instructors were assured regarding their education and content data, however less assured once it came to technology (Archambault & Crippen, 2009). It will thus be over that it's vital that teacher coaching embrace the 3 domains, instead of entirely that specialize in their technology skills (Messina & Tabone, 2012).

However, there looks lack of effort in maintaining TPACK for teaching. This study was designed to work out the amount of TPACK of the faculty of Arts and Sciences Professors of Bukidnon State University.

## The framework of the Study

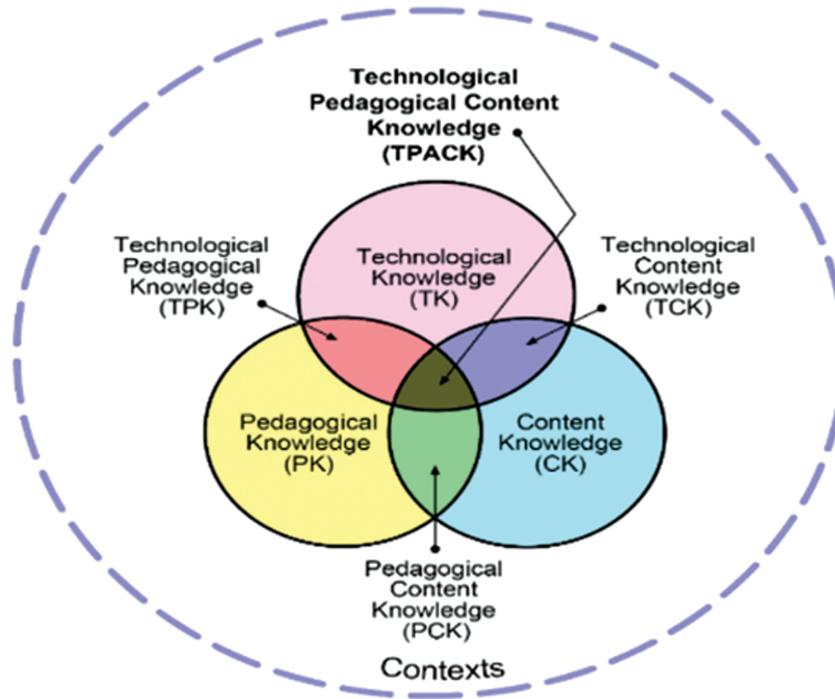


Figure 1. Koehler and Mishra (2009) TPACK Framework with its parts.

### Methodology

This study could be a descriptive survey sort of analysis within the exploration on the amount of TPACK among the faculty of Arts and Sciences professors in Bukidnon State University. The researchers used a form sort of instrument in gathering and grouping knowledge. The instrument used could be a form tailored and changed from Helmut Schmidt et al. (2009) and Sahin (2011). It's created of 2 components, the primary half contains ten queries on the demographic profile of the respondents and also the second half contains forty seven things for measure the faculty professors' self-assessment of the seven TPACK sub domains. It consists of fourteen TK things, 6 CK items, 7 PK items, four PCK things, four TCK things, nine TPK things, and three TPACK things. The solution for every item relies on five-level Likert Scale: five – Expert; four – Advanced ; three – Intermediate; a pair of – Novice and one basic Awareness. Results of validity check through Pearson Correlation showed that each one the things are valid. To check the questionnaire's reliability through Cronbach's tryout, 0.975 was obtained. There have been ninety Professors from sampling World Health Organization served as respondents of the study. Moreover, the data of this study were analysed descriptively with the employment of applied math tools; frequency and mark were employed in gaining respondents' demographic information, and ANOVA, t-test and Pearson-r correlation for the many relationships of TPACK to the demographic profile of the respondents.

### Results

Demographic profile of the faculty of Arts and Sciences' Professors of Bukidnon State University. As shown within the table a pair of below, the age. Teaching expertise and gender of the CAS instructors. The minimum age of the professors is twenty one and also the most is sixty one. Moreover, there's larger share of young professors. However, for the teaching expertise, it's a

minimum of one year and most of twenty one years on top of, likewise, larger share of professors having but 5 years teaching expertise. Yet, there are a lot of feminine than the male professors within the faculty.

Table 1. A pair of Profile of CAS Instructors

Age			Experience			Gender		
Range	Frequency	Percent	Range	Frequency	Percent		Frequency	Percent
21-30	32	40	1-5	29	36.25	Male	29	63.8
31-40	26	32.5	6-10	15	18.75	Female	51	36.2
41-50	18	22.5	11-15	17	21.25			
51-60	1	1.25	16-20	12	15			
61above	3	3.75	21 above	7	8.75			
	80	100		80	100		80	100

### TPACK Domain Level of CAS-Professors

Table three shows the results of the self-assessment of the CAS professors on their TPACK domains. Education data (PK) and Technological education data (TPK) have the best mean score with a website level of professional. The Technological education Content data (TPCK), Technological data (TK), education Content data (PCK), Technological Content data (TCK), and also the Content data (CK) have the domain level of Advanced.

Table 2. TPACK of the CAS Professors

Domain	Mean	sd	Level
TK	3.97	0.65	Advanced
CK	3.58	0.22	Advanced
PK	4.37	0.45	Expert
PCK	3.86	0.69	Advanced
TCK	3.75	0.75	Advanced
TPK	4.24	0.57	Expert
TPCK	4.08	0.56	Advanced
	3.98	0.55	Advanced

### Technological data

Technology these days could be a terribly essential tool in teaching. It's used for supporting teaching and learning method and has been a subject for quite a decade (Cunningham and Stewart, 2003). Hence, professors are expected to, at least, have basic technological data. They're expected to grasp some type of software and hardware, and be ready to operate some package like wordprocessor, program, browser, etc.

Based on knowledge obtained, Technological data (TK) of the CAS professors gained the Advanced level. This suggests that the professors were terribly competent and might support different teachers' improvement within the use of varied technologies, starting from low-tech technologies like pencil and paper to digital technologies like the net, digital video, interactive whiteboards, and package programs. Also, they were competent within the specific domain however would take pleasure in any coaching. They'll perform the actions related to this ability while not

help. Relating to the employment of specific technology, the professors is recognized as “a person to ask” once troublesome queries arise.

It implies that the professors have already had basic data regarding technology and have sensible ability in mistreatment them. It's expected that this ability is employed in their teaching since it's terribly helpful for his or her lesson preparation, networking and social process (Purcell et al., 2013). It's the mean of three.97 that infers that they're ready to solve their own technical issues addressing computers. As a digital tool, laptop is meant adjustable. It typically must be adjusted to our desires, like putting in new package, fixing errors, etc. therefore, by having this information, academics are expected to be ready to fix their own technical issues and to regulate the technology they need for his or her teaching desires.

The CAS professors have a positive response toward technology development. it's an honest thought, since technology evolves and perpetually changes (Mishra and Koehler, 2006). As professors are one among main actors of education, they need to possess the flexibility in learning and adapting the evolution of technology.

### **Content data**

In content data, the CAS professors have advanced level. They need “knowledge regarding actual subject material that's to be learned or taught” (Mishra & Koehler, 2006). It's in line with Shulman's statement spoken language that Content data deals with ideas, theories, ideas, framework, data of proof, and practices in addition as approaches to develop the data itself (Shulman, 1986). The Professors fathom the content they're getting to teach and the way the character of data is completely different for numerous content areas.

Supported knowledge obtained, Content data (CK), the mean score is three.58 that doesn't show a really sharp gap among them. In different words, the academics show sensible efforts so as to accumulate sensible data. During this case, professors consider with their data. It's vital for the professors since they need to master the data totally before teaching their students (Arnyana, 2007).

### **Pedagogic information**

On pedagogic information, the extent is professional. Pedagogic information is professors' information a few variety of applications, ways and ways to support students' learning (Koehler et. Al., 2014). It's in line with Yulianti's (2012) statement regarding pedagogic ability. She says that pedagogic ability is that the teachers' ability in managing the students' learning, together with the power to grasp their students well, planning and implementing lessons plans, evaluating learning outcomes, and developing students' potentials.

Data showed within the pedagogic information (PK) of the CAS professors were terribly competent and might support alternative professors' improvement. They were sure-handed within the ways and processes of teaching and includes information in schoolroom management, assessment, lesson arrange development, and student learning.

The mean score (4.37) in terms of knowing the way to organize and maintain schoolroom management indicates that they need confidence in schoolroom management. In teaching and learning method, schoolroom management is incredibly necessary since it's required to make a positive learning surroundings so as to attain effective teaching goals. However, the professors tend to possess many approaches. Even supposing they have an inclination to use an equivalent approach, they're still able to manage the schoolroom well as a result of pedagogic information isn't alone concerning mistreatment numerous approaches. It's concerning the mixture of ability of the way to arrange instruction, deliver the lesson, manage the scholars, and address individual variations (Chai et al., 2011).

### **Pedagogic Content information**

In the pedagogic Content information (PCK) indicates Advanced level. Pedagogic Content information (PCK) deals with the appropriateness of the approach used and therefore the subject educated. in step with Mishra and Koehler (2006), pedagogic Content information is information of mistreatment applicable approach for a selected subject. Shulman (1987) additionally highlights that pedagogic Content information is teachers' understanding of what's to be learned and the way it's to be educated.

Based on the information obtained within the mean (3.86), pedagogic Content information (PCK) domain, it implies that they need enforced their PCK well, particularly in creating their own lesson plans. In alternative words, they need superb confidence in making their own lesson plans by regarding on the suitable learning strategy and material characteristics. The Professors so got to acquire PCK since pedagogy and information can't be separated in teaching and learning method. It's not possible to show information while not having pedagogic information and the other way around (Savas, 2011). Pedagogic content information is totally different for numerous content areas, because it blends each content and pedagogy with the goal being to develop higher teaching practices within the content areas. Hence, PCK is incredibly necessary for each teacher in spite of the topic they teach.

### **Technological Content information**

On the Technological Content information (TCK), advanced level. It deals with the utilization of technology for instructional functions. In step with Koehler et al., (2014), TCK refers to inter-relationship between technology and content. This data needs academics to know the utilization of technology which may influence their means of understanding the idea of a selected content (Schmidt et. al., 2009).

Based on the mean score (3.75) obtained, Technological Content information (TCK) indicates that the professors area unit able to integrate their technological information and content information. In alternative words, they need already used technology to be told and develop their information for teaching and learning functions. They need incontestable competent within the information of however technology will produce new representations for specific content. It suggests that academics perceive that by employing a specific technology, they will amendment the means learners apply and perceive ideas in an exceedingly specific content space.

Also, it implies that they need an attempt in developing their information autonomously by mistreatment technology. By the presence of technology nowadays, information isn't any longer a restricted factor. It seems to be AN open supply which may be accessed by anyone, from anyplace and at any time. As a result, professors' perspective towards technology and their awareness of technology-based learning are a few things that ought to be maintained. Regarding to the utilization of technologies to develop learning activity and students' tasks, it'd imply that academics don't fairly often use technology-assisted activity and tasks. But, it's still sufficiently employed in their teaching and learning method.

### **Technological pedagogic information**

The Technological pedagogic information (TPK) of the professors is in professional Level. TPK is teachers' information of however numerous technology will be employed in teaching and learning method, and this usage will amend the way academics teach (Schmidt et. al., 2009). Harris et. al. (2009) adds that TPK is teachers' information of the way to use technology for pedagogic functions. They were terribly competent and might support alternative instructors' improvement on

the information of however numerous technologies will be employed in teaching, and to understanding that mistreatment technology could amendment the means academics teach.

Based on the mean (4.24) obtained, it indicates that academics have already got the power to mix their technological information for his or her pedagogic functions. TPK is concerning however academics use technology to facilitate their pedagogic approach (Chai et. al., 2011). During this case, academics area unit able to opt for and modify the technology required for specific method. Also, Professors area unit already attentive to numerous technologies offered for instructional wants. As they're demanded to be inventive and versatile in planning teaching and learning activity, they're expected to possess ability to settle on applicable technology for applicable approach.

### Technological pedagogic Content information

The Technological pedagogic Content information (TPACK) is in Advanced Level. It's the combination of 3 information domains (technology, pedagogy, and content). In alternative words, TPACK is information of facilitating students' learning to specific content through pedagogy and technology (Chai et al., 2011). In step with Thompson, Bull, and Willis (1998), academics ought to be equipped with over technology information and teacher should use technology to be able to integrate technology effectively within the authentic teaching context.

Based on the mean score (4.08) obtained, Technological pedagogic and Content information (TPACK) domain shows that they're competent within the information needed by professors for group action technology into their teaching in any content space. They need AN intuitive understanding of the complicated interaction between the 3 basin elements of data (CK, PK, TK) by teaching content mistreatment applicable pedagogic ways and technologies. Also, it implies that they need already enforced the TPACK well. It's principally shown within the initial statement speech communication concerning ability to fitly mix skill, technologies, and teaching approaches. During this case, academics area unit expected to keep up cooperation among them to support one another in developing TPACK.

Additionally, the quality deviations of every department were nearer to alternative departments. It's the quality deviations of below zero.68. This implies that the distribution is homogenised. There's no variation within the TPACK of the CAS professors.

Relationships of TPACK to age, teaching expertise, and gender skilled teacher is one in all the necessities in making an honest education system, they play a central role in crucial student action (Rivkin, Hanushek, and Kain, 2005). Table 4, 5, & half-dozen showed the relationships between the demographic profile (age, experience, gender) and therefore the TPACK of the CAS-Professors. The p-values were larger than zero. Hence, no vital relationships. This implies that TPACK is practiced across age, years of expertise and gender of the professors. The results of this study contradict to the study of Mahdum (2015) that age, teaching expertise and gender have vital impact toward TPACK.

Table 4. Relationship of TPACK and therefore the Age of the CAS Professors

Dependent	Independent	f-value	p-value	Interpretation
TPACK	Age	1.273	0.223	Not vital

Table 5. Relationship of TPACK and therefore the Gender of the CAS Professors

Dependent	Independent	f-value	p-value	Interpretation
TPACK	Gender	-0.935	0.975	Not vital

Table 6. Relationships of TPACK and therefore the Teaching expertise of the CAS Professors

Dependent	Independent	f-value	p-value	Interpretation
TPACK	Teaching Experience	-0.099	0.382	Not vital

Moreover, in TPACK framework, the Professors aren't solely needed to develop their pedagogic and content information, however additionally their technological information. They're expected to be able to deliver a topic mistreatment applicable technology and approach so as to attain effective and economical learning. What is more, there's a desire for teacher to integrate their teaching and ICT so they will walk hand in hand with the event of students' and world wants. It's additionally expected that by mistreatment ICT, students will learn quicker and academics will teach higher. Eventually, learning objective will be earned relaxed.

### Conclusions & Suggestions

Overall, TPACK of CAS Professors in BukSU is in Advanced level. It implies that they need been able to integrate ICT, content and applicable approach in their subjects being educated. Mean score of technology-related domains is less than non- technology domains. Yet, it's still in Advanced level. It'd indicate that academics haven't been extremely conversant in technology information. Therefore, it's expected that professors incessantly develop their TPACK, particularly in technology-related domains so as to attain higher teaching and learning.

Professors play a important role in developing education. Thus, they're demanded to master the desired information for thriving teaching and learning method. The findings disclosed that professors appear to possess some downside in technology master. Therefore, it's counselled for directors and technology consultants to supply the requirements in facilitating professors to amass such information. within the sort of ICT coaching, etc. through these, it's expected that the professors can have equal ICT information capability among them.

### Acknowledgment

Special thanks goes to any or all the CAS-Professors of Bukidnon State University who participated during this analysis for his or her cooperation and time on providing info for this analysis. Their valuable contributions area unit much appreciated.

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