Technological Pedagogical and Content Knowledge (TPACK) of Prospective Early Childhood Islamic Education Teachers

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The early childhood teacher candidates have been challenged by the requirement of the content technological, pedagogical and content knowledge (TPACK) in teaching. The teacher candidates are able to manage the contents beyond skilfully using technology to support effective and beneficial learning process. The purpose of this study was to describe the candidates TPACK ability in arranging regular learning process based on "the curriculum 2013." A descriptive qualitative method has been employed in which the subjects were the students of the Early Childhood Education Program who have achieved the Micro Teaching Class at the sixth semester 2018/2019 academic year. The TPACK competences was analysed by using Content Representation (CoRe) and Pedagogical and Professional-experience Repertoire (Paper) .Both CoRe and Paper analysis reveal that the teachers are able to develop 3 to 5 of 11 indicators of the 6 Child Development Aspects. 80% of the teacher showed good ability in choosing the learning strategies. Then, 45% of the teachers found difficulties in creating the effective time. 60% of the teacher can perform a good and right concept in the teaching process, while 40% on them has limitation on knowledge and insight. However, 55% of the teachers could not create an active interaction between the students. This research concluded that the teacher candidates in applying must be focused on material contents and technology usage to attempt to improve teacher professionalism.

Key words: *TPACK, Early Childhood Islamic Education Teacher, designing the Teaching Learning Plans.*

Introduction

The 5.0 era challenges the educational aspect, demanding the teacher professionalism, enriching knowledge and information technology as the teaching basic in the digital age. Today, students have more access and ability in using digital technology facilities (Putra, 2019).

The requirement in covering the early childhood education material contents (PCK) is not the only demand. Implementing the 2013 curriculum suggests the using of instructional technology as one of the major requirements besides integrating the skill in using the technology into Teaching Leaning process. The Information and Technology Computer Based availability and other supports affect the integration process. On the other side, the internal factor, teacher competencies, attitude, and trust are also crucial to developing and designing the learning experience that is facilitated by classroom based technology (Sani, 2015).

The related researchers found that the process of the technology integration deals with a complicated obstacles, multi dimension, and failures to practice (Chen et al., 2017; Khine, M.S., Ali, N. & Afari, 2017; Voogt, J., & McKenney, 2017). In light, (Mishra, 2019) proposes the knowledge contents of Technology Pedagogical material contents (TPACK) as the theoretical framework as the basis in explaining the complexities of the teachers role and competencies in integrating the aspects with the technology. The integration creates a term called as ICT- TPACK or the use of ICT in the classroom, a transformation of technology that uses both hardware and software. The technology is used as a classroom alternative that can support teaching and learning activities (Habibi et al., 2019).

The extracts of Instruction use (TPACK) are knowledge contents, Pedagogic, and technology, before CK, PK and TK. The frame is also viewed from the interaction between CK, TPK and among the three components TPACK, which were integrated in different contexts, by considering the variants, and the materials/content scale and the technology integration quality (Swallow & Olofson, 2017).

The Biology teacher ability in using TPACK at the Pakan Baru State High School is in good level. In detail, the PCK, PK and CK ability is categorised in good level.   However, the ability in using technology is in sufficient criteria, for TPK, TCK, and TK. (Lestari, 2015), states that researches related with TPACK are still new and the numbers are still limited in Indonesia and are very simply recorded.   (Papanikolaou et al., 2017) finds that the TPACK integration can increase the students' self-confident and competencies related with the learning contents, besides the pedagogy and the teacher ability in designing the instruction.

Then, (Ariani, 2015) did an analysis on the teacher competencies, identifying to what extent the teachers can present the Geometry Math materials which was based on the TPACK.

After doing the observations on the Micro Teaching Class at Islamic early Childhood education (PIAUD) Batusangkar, it was found that the in depth problem did not appear, there was a misconception between the theories and the teaching practice, the pre service teacher still faces some difficulties to find and relate the content and the intended use of technology. Another problem is related to the level in understanding the curriculum, which was still low in the case of designing the Islamic early childhood education based on the curriculum 2013. It can be identified from the teacher candidates ability in preparing the lesson, formulating the indicators, and choosing the material contents, that was less in line with the Basic Competency (KD), besides the problem in choosing the instructional method, using the media, or a less variety of learning resources choices means the use of information technology in the learning process has not been maximized. This indicates that both the pedagogic and the professionalism aspects must be continuously improved and developed.

The prior description of the TPACK Profile early childhood teachers candidates in terms of pedagogical abilities, mastery of content (material) and technology is seen as very important before doing real teaching or directly involved in the real classroom.

Methods

This research used descriptive qualitative to analyse and describe the TPACK ability of the teacher candidates in creating the RPPH of the 2013 curriculum. The subjects of this study were the sixth semester students or teacher candidate of Islamic Childhood education (PIAUD) who took the Micro Teaching class in the 2018 / 2019 academic year, consisting of 55 students, divided into 5 practice groups. TPACK ability was analysed by using the Content Representation (CoRe) and Pedagogical and Professional-experience Repertoire (PaP-eR) instruments (Loughran et al., 2008). The main components of TPACK are the knowledge on the learning content, pedagogy and technology. Analysis of TPACK consists of theme selection, sub-themes and basic competencies, time allocation management, class management, content / material mastery, teaching strategies, and selection / use of information technology-based / computer base teaching media in learning. The TPACK data was analysed by using percentages.

Results and Discussion

The teacher candidates' ability in applying TPACK are presented in the following table:

Table 1: The Analysis Result on Content Representation (CoRe) of the Knowledge Contents

Code	The Development Programs	Program Development	Learning Activities	Large amount of Material Ideas
CK-01	Moral Religion Values	The pillars of Islam, the pillars of faith, know the angels of God, know 25 prophets and apostles, know the Day of Judgme	Counting the Pillars of Faith and Islam, Sorting the Names of the Prophets and Apostles, tells about the events on the Day of Judgment	5
CK-02	Moral Religion Values	Closing the Aurat, Unclean, Istinja, Ablution, tayammum, Prayer inside and out of the mosque	Tellingthe story about the importance of covering up the aurat for a Muslim, the practice of ablution, and tayamum, do prayer before entering and leaving the mosque	5
CK-03	Moral Religion Values	Knowing Asmaul Husna, Knowing God's Creation, Knowing the Creed, Knowing the Sentences of Thayyibah, Knowing the Attributes of Allah SWT	Memorizing up the 99 Asmaul Husna, tell stories and play drama	5
CK-04	Moral Religion Values	Say greetings, Anak Saleh , Get to know to the mosque	Immediate practice on how to enter and exit houses and mosques, become pious children	3
CK-05	Moral Religion Values	Prayers compulsory, Number of rakaat obligatory prayers, Pillars of prayer, Which cancels prayer, Procedures for prayer	The practice of fard prayer, citing the order of prayer harmony	5
CK-06	The Religion Moral Value	Knowing Ka'aba, Hajj, Haram, Halal Food,	Introducing Geometry through cube-shaped miniature temples, telling stories about the prohibition of eating non-halal food, telling stories about the pilgrimage	4
CK-07	The Religion Moral Values	Knowing daily prayers, fond of giving alms, knowing heaven and hell, prophet Muhammad my idol, knowing the companions of the prophet	The Daily Prayer, Charity Practices, the Story of ssirah nabawiyah	5
CK-08	The Religion Moral Values	Child Prayers for Parents, Prayers for the Happiness of the Hereafter, Knowing Islamic holidays, Knowing short of the Qur'anic letters	The practice of prayer, tells of bear days in Islam such as Eid al-Fitr	5

CK-09	Moral Religion Values	knowing the prayer equipment, the Sacrifice Day, Knowing Hijaiyyah Letters, Smart Simple Arabic	Mengurutkan huruf hijaiyah, praktik bahasa arab sederhana Sorting the hijaiyah letter, practicing	4
CK-10	Moral Religion Values	knowing fasting obligatory, Things that can cancel fasting, Zakat fitrah	Knowing the amount of zakat Firtah for a Muslim, tells about the obligation of fasting for Muslims	3
CK-11	Moral Religion Values	Praised morals, despicable morals, Compassion for other creatures created by God	Tells the story of good and bad deeds, watching animated films love pets	3

The table shows that the teacher candidates of Islamic Early Childhood education in designing the Teaching Learning Plans (RPPH) expands themes and sub theme into the development aspects, religion and moral, which is based on intended Basic Competencies (KD). The idea expands the material development of the teacher candidates is from 3 to 5 materials idea. The TPACH analysis used CoRe instrument developed by (Loughran, 2019) where the teachers' ways of thinking figure in the materials are delivered in different level. The first stage of the analysis was formulating the content materials that related with the themes to teach. The teacher candidates can choose and formulate the idea related to the themes. The depth and breadth of the content and the right strategies applied must be available through this important concept. The curriculum becomes the basis in selecting the important concepts. The concepts that have been formulated as important concepts in determining the learning applicable strategy and advanced concepts can be adjusted to the curriculum requirements (Ramdhani et al., 2012).

The teacher candidate's competency in arranging the learning material/contents was analysed by focusing the basic competences, then to formulate them into the student's achievement indicators. This competency is learned in collage. It is the lecturers' duty to facilitate the teacher candidates in improving the pedagogy competence and professionalism through micro teaching activities and using relevant learning resources (Nilsson & Karlsson, 2019).

Teacher candidates are required to cover the material contents besides being able to integrate contents, knowledge and curriculum. This knowledge helps the teachers' candidate switch the situation with the analysis of the group and individual needs. The knowledge refers to *Pedagogical Content Knowledge* (PCK)(Baran et al., 2019). According to Evens et al., (2015) the essence of PCK competence is very important since this is the reflection of teacher professionalism. PCK is the basis of the thinking concept that explains teaching content and the way to teach (Sukeisih et al., 2017). The teacher competencies in PCK can be analysed by PaPer (Nilsson & Loughran).

Table 2: The Figure *Pedagogical and Professional experience Repertoire* (PaPeR) Teachers Candidates of PIAUD Analysis

Code	Time Management	Classroom Management	Concept Mastery	Strategy Choice	Media Use	Grading
PCK-01			√		√	
PCK-02		√				√
PCK-03			√	√	√	
PCK-04	√	√				
PCK-05		√				√
PCK-06	√			√	√	
PCK-07	√	√	√		√	
PCK-08		√			√	
PCK-09		√				
PCK-10		√			√	√
PCK-11	√	√	√			√
PCK-12		√			√	
PCK-13	√		√	√		
PCK-14		√			√	
PCK-15	√	√	√			
PCK-16		√				
PCK-17	√			√	√	
PCK-18	√	√	√			
PCK-19	√	√			√	
PCK-20		√			√	
Persentase (%)	45	75	40	20	55	20

Based on the above PaPer analysis, Teachers Candidates of PIAUD found some obstacles related with time effective management in teaching. They were 45% of them face this problem and 55% could run the time management as well. This may be due to the lack of experience in teaching practice. Another teaching problem faced by the teacher's candidate is related with the classroom management. This finding is in line with research conducted by Safrina (2019), which confirms that mostly teachers find difficulties in not having specific techniques in the attempt of managing the classroom. The Pedagogical experience and knowledge in teaching must be continuously improved to make teachers become more sensitive in order to create effective and efficient learning.

In terms of mastering, the concepts, among the entire sample, 60% have been categorised as good. 40% of them have been categorised with a less ability in mastering the materials/ contents and interpret the into 6 subs themes on children development aspects which are based on the basic competences before formulating them into the children development achievement indicators. This occurred because the teacher candidate ability to analyse are

still under practiced and unable to simultaneously construct their knowledge into teaching process.

In the case of choosing, 80% of the teachers' candidates have their own ability in teaching strategies while 20% on them have problems. To respond the basic competence, the teachers are able to choose the most appropriate and challenging strategy for making the students active in leaning. In its relation to the way of using the media, the teachers candidate are able to use various kinds of media such as power point, picture/card, video and film. The data also describes that 55% of them are able to create active and interactive media for the students. The PaPer instrument suggest that the teacher current condition on technology use must be taken into account since the instrument does not aims to identify the teachers teacher ability and knowledge in using technology. (Chai et al., 2013) states that the knowledge someone has is closely related with the knowledge of using software and hardware on information technology and communication (TIK) and other related devices, such as knowledge about *web (facebook, wiki, E-mail, blogs, dsb facebook, wiki, E-mail, blogs, etc)*which is used as the tools. (Chai,*et al*., 2013) states that technological knowledge and TPACK aspects integration create *Technological Pedagogical Knowledge* (TPK), *Technological Content Knowlegde* (TCK), and *Technological Pedagogical And Content Knowledge* (TPACK) *Technological Pedagogical Knowledge* (TPK), *Technological Content Knowlegde* (TCK), and *Technological Pedagogical And Content Knowledge* (TPACK). TPK is the knowledge of how to utilise the existence / specifications of various technologies in teaching, for example the use of the PowerPoinnt media as an interactive medium in developing the children cognitive abilities by utilizing a computer / laptop. TCK is a knowledge of how to use technology to create different content / material without considering how to teach, such as how to learn content related to children through online besides studying the SPSS statistical program for thesis writing purpose.

TPACK is a knowledge about using technology taught to the students and describes/presents the content/material toward a particular subject (Hidayat, 2019). That is why 55% does not represent the teacher who has problem in using and mastering TCK/TPK and TPACK. (Tondeur, J., Scherer, R., Siddiq, 2020), explain the ICT integration elements in curriculum are PK, CK and TK. It is not easy to provide learning labels called integrated ICT if one of the elements of the three basic dimensions is missing. TPACK integrated learning designed by teachers can improve student learning. Therefore, it is necessary to pay attention and study deeply in improving the understanding of the T component of the TPACK element to early childhood Education Teachers candidates.

In recent years the important role of technology has become a foothold for teachers in doing their duties which are more interactive and progressive. However, the use of technology does not give a positive effect for classroom learning quality and students' learning

achievement. Teachers must have a sufficient competencies in content knowledge/ materials, pedagogical skills/ teaching and knowledge and technology utilisation (Khine, M.S., Ali, N. & Afari, 2017).

In the assessment aspects of the Daily Assessment Implementation Plan (RPPH), in general, 80% of early childhood teachers candidate have been able to make a daily assessment instrument in annotated notes, child development checklist, and a portfolio of work properly and correctly based on 6 aspects of early childhood development: the development of moral, linguistic, cognitive, physical motor, social emotional and artistic religious values.

Table 3: The Teachers Problem Reflection Found at Teaching Process in This Research

Categories/ Aspects	The Summary of AUD Teacher Candidate Reflection
Teacher Personality Readiness	Less self confident hesitant and nervous when doing practice teaching, afraid of making mistakes in the RPPH that had been designed,
The Practice of Teaching and Learning	Class management has not been maximized, in the opening activities of instilling moral religious values through praying, small number of using *ayat pendek*, less variation on the core activities the main footing, do not have reflection session at closing session, difficulties in making the conditioning.
Teaching Time Management	Time run does not switch with the panning for every session.
Teaching Media	Taking too long time in using computer based media such as power point, and video animation, too long duration with less visual stimuli, simple media preparation, less representative real and current media.
Teaching Strategy	Less assurance about the choice of learning strategies / methods that have been chosen, less communicative in delivering learning material / content,

The journal reflection showed that there are some obstacles faced by the early childhood teacher candidates in teaching. This finding should be taken as an evaluation material and can provide feedback that they need guidance, training and provision of adequate early childhood materials, facilities through lectures undertaken as the requirement to improve their pedagogical competence. Content / material mastery must be optimised through the provision of adequate early childhood textbooks, early childhood material content in the library.

For the early childhood education teacher candidates, integrating technology into learning meaningfully is not easy, to determine the right technology, prospective early childhood demand the teachers cover the materials such as the characteristics of the material (Srisawasdi, 2012). In addition, teachers candidates must also think of teaching strategies chosen according to the technology used, or pedagogical knowledge (Sholihah et al., 2016). To conclude, to integrate technology into the learning process, especially in preparing a plan for implementing the 2013 curriculum children's daily learning, childhood education teacher candidates must have mastery and knowledge of early childhood material content, pedagogy, and technology. There must be an intersection interaction between the three components

knowledge, Technological Pedagogical and Content Knowledge mastery (TPACK) (Koehler et al., 2013).

Conclusion

The TPACK competence in designing the regular teaching practice of childhood education teacher candidates at IAIN Batusangkar still need some improvement and revamping the terms of integrating teaching competency and content/material mastery, teaching competency and the use of technology, the use of technology in material content and the integration on the three of them. The possible effort is by having lecture guidance in arranging the RPPH based on the curriculum 2013 and integrating the three TPACK aspects. To develop the TPACK ability the teacher candidates need a long process as the effort in realising qualified and professional teachers.

The department of Islamic Early childhood Education (PIAUD) may take the advantage of this research as the point of both the teaching and the curriculum evaluation. On the other side, this finding can give a positive effect as the input for teacher training program and Indonesian Teacher Training and professionalism institution. The information about teachers' competency on TPACK, good, superior or still need for guidance and attention. The purpose of this research is to analyse the Islamic Early childhood Education Teacher Candidates TPACK competency in designing the RPPH of Curriculum 2013.

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