Comparing Pre-service Civic Education Teachers' TPACK Confidence Across Course Modes: Insights for Future Teacher Education Programs

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Abstract

Integrating technology into learning and instruction processes is inevitable in this modern world, so it is of pivotal importance that all teachers should master TPACK confidently. Unfortunately, the approaches toward teacher education programs in many countries, specifically in Indonesia, do not yet integrate TPACK in the curriculum. This study aimed at comparing pre-service civic education teachers' TPACK confidence across three course modes—Regular A, B, and C—of a pre-service teacher education program in Indonesia. Involving 90 pre-service civic education teachers, a self-report measure survey is used as the research method. The result revealed that Regular A and C pre-service civic education teachers report an almost equal level of TPACK confidence while the Regular B pre-service civic education teachers report a lower level of TPACK confidence. Academic and practical implications of these findings are discussed, and insights for future teacher education programs are provided.

Keywords: TPACK, pre-service civic education teachers, teacher education program

Introduction

Teaching is a complex activity requiring various knowledge, specific skills, and attitudes. Teaching activities involve aspects of personal quality and professional competency (Guzman & Nussbaum, 2009; Haider & Jalal, 2018; Meijer, Korthagen, & Vasalos, 2009; Srinivasan et al., 2011; Walsh et al., 2018), which will become a passion (Celik, 2017) as well as a profession (Sakuma, 2018) should it be conducted continuously and repeatedly. A classic theory stated

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that to be able to teach appropriately, teachers should have knowledge of content, pedagogy, and the intersection between the two: Pedagogical Content Knowledge or PCK (Shulman, 1986).

Nonetheless, since avant-garde science, technology, and arts developed in the 21st century, a new theory on teaching emerged. The theory is that today's teachers must have knowledge of technology and its intersections between content and pedagogical knowledge: Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006).

Integrating technology into learning and instruction processes is inevitable in this modern world. Learning in the 21st century actively uses technological instruments as tools, processes, and resources (Framework for 21st Century Learning). The learning process and environment should open an equal access to qualified tools, technologies, and learning resources. Finally, the learning outcome is directed to create students as good citizens in the digital era. Thus, in the context of 21st-century learning, it is of pivotal importance that all teachers should confidently master TPACK (Kereluik et al., 2013).

The approaches toward teacher education programs in many countries, and specifically in Indonesia, do not yet integrate TPACK in the curriculum. Since the 1970s, the approach toward teacher education in Indonesia has only emphasized knowledge of content and pedagogy as two different kinds of independent knowledge. By early 2010, inspired by the PCK framework (Shulman, 1986), it was understood that the approach should emphasize knowledge of content and pedagogy as well as their intersection (ALPTKI, 2016). However, applying the PCK framework is not relevant today, and approaching TPACK as a framework for teachers' knowledge looks more appropriate for future teacher education programs.

The TPACK Framework

The TPACK framework was introduced by Matthew J. Koehler and Punya Mishra in 2005 (Koehler & Mishra, 2005). It is not only a new kind of knowledge for teaching but also a framework for teachers' knowledge (Mishra & Koehler, 2008). The TPACK framework introduces relation and complexity to the basic knowledge of teaching: content, pedagogy, and technological knowledge. The framework could be used for analyzing and understanding teachers' knowledge levels in terms of integrating technology into learning and instruction processes (Cox & Graham, 2009; Koehler & Mishra, 2009; Koehler, Mishra, & Cain, 2013; Tadeu et al., 2019). Below is the figure of the TPACK framework.

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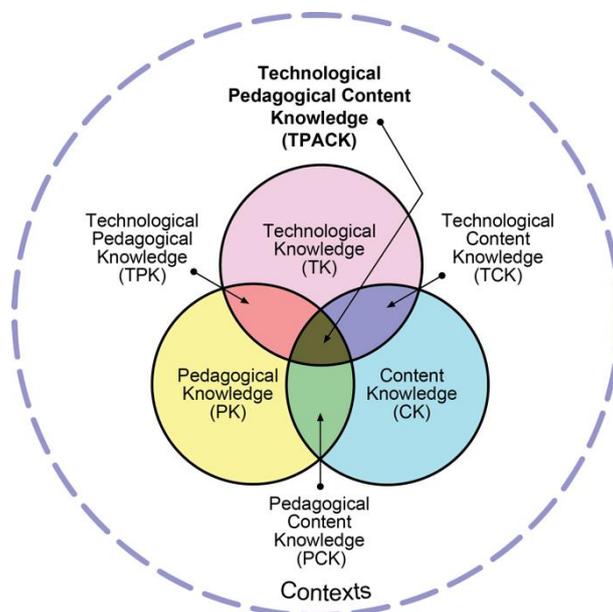
Figure 1: Technological Pedagogical Content Knowledge (TPACK) Framework (Koehler & Mishra, 2009)

As described in Figure 1, there are seven knowledge domains of the TPACK framework, including Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK). That knowledge is elaborated by Mishra and Koehler (2008) as follows:

1. TK is knowledge about standard technologies such as books, chalk, and blackboard, as well as more advanced technologies such as the Internet and digital video. This would involve the skills required to operate particular technologies. In the case of digital technologies, this would include knowledge of operating systems and computer hardware, as well as the ability to use standard software tools including web-browsers, email programs, and word-processors. It includes basic knowledge about installing and upgrading hardware and software, maintaining data archives, and staying up to date about ever-changing technologies.
2. PK is deep knowledge about the processes and practices or methods of learning and instruction and how it encompasses (among other things) overall educational purposes, values, and aims. This is a generic form of knowledge that is involved in all issues of student learning, classroom management, lesson plan development and implementation, and student evaluation. It includes knowledge about techniques or methods to be used in the classroom, the nature of the target audience, and strategies for evaluating student understanding.

3. CK is knowledge about the actual subject matter that is to be learned or taught. The content to be covered varies greatly by age level and subject matter. Clearly, teachers must know and understand the subjects they teach, including knowledge of central facts, concepts, theories, and procedures within a given field; knowledge of explanatory frameworks that organize and connect ideas; and knowledge of the rules of evidence and proof (Shulman, 1986). Teachers must also understand the nature of knowledge and inquiry in different fields.

4. PCK is the first intersection in the framework between pedagogy and content knowledge (Shulman, 1986). In considering the relationship between content and pedagogy, the key question is how disciplines differ from each other and whether disciplines can or should be taught through the same instructional strategies. If disciplines are the same, then mathematics can be taught using the same instructional strategies that we use to teach architecture or music. On the other hand, differences between the disciplines would argue for a need to teach them differently.

5. TCK is an understanding of the manner in which technology and content influence and constrain one another. Teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of technology. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology, or vice versa.

6. TPK is an understanding of how learning and instruction changes when particular technologies are used. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies. This requires getting a deeper understanding of the constraints and affordances of technologies and the disciplinary contexts within which they function.

7. TPACK is the intersection of all three bodies of knowledge. Understanding of this knowledge is above and beyond understanding technology, content, or pedagogy in isolation, but rather as an emergent form that understands how these forms of knowledge interact with each other. These include an understanding of how to represent concepts with technologies, pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help students learn; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones.

The Study Context

As shown in the TPACK framework, there is a context circle surrounding the main circle of the TPACK knowledge domains, meaning that considering context on the TPACK measurement is

important because different contexts lead to different results. Correspondingly, this study is conducted in the context of different course modes in the pre-service civic education teacher education program, faculty of teacher training and education, Universitas Pamulang. Comparing pre-service civic education teachers' TPACK confidence across the course modes is the main purpose of the study.

Table 1: Course Modes and Pre-service Teachers' Characteristics

Course modes		Days	Times	Hours	Characteristic
Regular (RA)	A	Monday-Friday	Morning	07:10-08:50 08:50-10:30 10:30-12:10	Mostly fresh graduates who do not work
Regular (RB)	B	Monday-Friday	Night	18:20-20:00 20:00-21.40	Mostly fresh graduates who work during the day
Regular (RC)	C	Only Saturday	Morning-Afternoon	07:40-11:00 11:40-15:00 15:00-18:20	Fresh graduates and adults who work on weekdays

Table 1 describes course modes and pre-service teachers' characteristics in the pre-service teacher education program. There are three course modes: Regular A (RA), Regular B (RB), and Regular C (RC). The course for both RA and RB is conducted on weekdays while RC is conducted only on Saturday. Each course has three different times scheduled for attending the class. RA pre-service teachers are mostly high school graduates who do not work, RB pre-service teachers are mostly high school graduates who work during the day, and RC pre-service teachers are a combination of fresh graduates and adults who work on weekdays.

Pre-service teachers' TPACK measurements have been conducted by researchers in a variety of fields including English (Baser, Kopcha, & Ozden, 2016; Kwangsawad, 2016; Öz, 2015), economics (Raman, 2014), sciences (Canbazoglu Bilici, Guzey, & Yamak, 2016; Jang & Tsai, 2012; Karta & Afacan, 2017; Maeng, Mulvey, Smetana, & Bell, 2013), mathematics (Cuhadar, 2018; Jang & Tsai, 2012; Xiang & Ning, 2014), and social sciences (Akman & Guven, 2015; Brigas, 2019). Likewise, there are some studies measuring pre-service teachers in general, neither focusing on specific subjects nor fields (Gairola, 2019; Greval et al., 2019; Jamieson-Proctor,

Finger, & Albion, 2010; Koh, Chai, & Tsai, 2010; Mouza & Karchmer-Klein, 2013; Tondeur et al., 2017).

The majority of studies measuring pre-service teachers' TPACK confidence were conducted in the field of sciences and mathematics, but there are few studies in the social sciences. This measurement of pre-service teachers' TPACK confidence in civic education can fill a research gap of TPACK measurement in social sciences and provide a report of pre-service teachers' TPACK confidence in Indonesia. Furthermore, it may be beneficial to evaluate the teacher education program.

Method

There are at least five methods to measure participants' TPACK, including self-report measure, open-ended questionnaire, performance assessment, interview, and observation (Abbit, 2011; Koehler, Shin, & Mishra, 2012, p. 21). This study is conducted by using a self-report measure survey involving 90 pre-service civic education teachers in a pre-service civic education teacher education program, faculty of teacher training and education, Universitas Pamulang, Indonesia, in April, 2019. The self-report measure is one of the most frequently used methods to measure participants' TPACK (Mouza, 2016, p. 173; Tsai, Koh, & Chai, 2016, p. 88). On the other hand, this is the most practical way to measure TPACK confidence with a large number of participants.

An online questionnaire in Google Form was developed for measuring pre-service civic education teachers' TPACK confidence, adapted from Schmidt et al. (2009), Sahin (2001), and Mahdum (2015). The Google Form link was shared to a WhatsApp group in order to be filled by the pre-service teachers. The questionnaire is a five-level Likert scale: 1) 1 = strongly disagree; 2) 2 = disagree; 3) 3 = neither agree nor disagree; 4) 4 = agree; and 5) 5 = strongly agree. The questionnaire contains 57 items of the seven TPACK knowledge domains consisting of 16 TK items, 8 PK items, 7 CK items, 7 PCK items, 7 TCK items, 7 TPK items, and 5 TPACK items. Using the Pearson Product Moment Correlation, all items have been validated with a valid result. Meanwhile, the reliability tested by Cronbach's Alpha test obtaining results of 0.884 (TK), 0.770 (PK), 0.703 (CK), 0.827 (PCK), 0.858 (TCK), 0.802 (TPK), and 0.804 (TPACK).

Regarding the study participants, they are pre-service civic education teachers in different course modes: Regular A (RA), Regular B (RB), and Regular C (RC). Furthermore, they are the final-year pre-service civic education teachers who participated in the three-month teaching internship program in secondary schools from January to March, 2019. The pre-service teachers voluntarily engaged in this study. Researchers declared in advance that their engagement in this study would not affect their internship grade. All collected data is used only for research purposes.

The sample of this study was taken by the disproportionate stratified sampling method. A descriptive statistic was employed to analyze the collected data. For analyzing as well as

describing data, rating scales and remarks are determined as follows; 1) 1.00 – 1.50 (very poor); 2) 1.51 – 2.50 (poor); 3) 2.51 – 3.50 (fair); 4) 3.51 – 4.50 (good); 5) 4.51 – 5.00 (very good).

Findings

After the Google Form link was shared to the WhatsApp group, 119 pre-service civic education teachers completely filled in the form. Of the 119 teachers, there were 38 RA pre-service teachers, 30 RB pre-service teachers, and 47 RB pre-service teachers. Applying the disproportionate stratified sampling method, 30 completed forms for each course mode were taken as data for further analysis. The general data of respondents is described below.

Table 2: Profile of Respondents

Gender:	Male	Female			
RA:	9 (30.00%)	21 (70.00%)			
RB:	11 (36.67%)	19 (63.33%)			
RC:	13 (43.33%)	17 (56.67%)			
Age range:	<22 yrs	22-24 yrs	25-27 yrs	28-30 yrs	>30 yrs
RA:	16 (53.33%)	13 (43.33%)	0 (0.00%)	0 (0.00%)	1 (3.33%)
RB:	4 (13.33%)	20 (66.67%)	2 (6.67%)	2 (6.67%)	2 (6.67%)
RC:	7 (23.33%)	11 (36.67%)	4 (13.33%)	3 (10.00%)	5 (16.67%)
Marital status:	Single	Married			
RA:	28 (93.33%)	2 (6.67%)			
RB:	24 (80.00%)	6 (20.00%)			
RC:	20 (66.67%)	10 (33.33%)			
IT course:	Never	Ever			
RA:	24 (80.00%)	6 (20.00%)			
RB:	22 (73.33%)	8 (26.67%)			
RC:	20 (66.67%)	10 (33.33%)			
Teaching experience:	Haven't	Have:			
		< 1 yr	1-2 yrs	3-4 yrs	5-6 yrs	> 6 yrs
RA:	26 (86.67%)	2 (6.67%)	2 (6.67%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
RB:	17 (56.67%)	4 (13.33%)	4 (13.33%)	2 (6.67%)	1 (3.33%)	2 (6.67%)
RC:	18 (60.00%)	4 (13.33%)	1 (3.33%)	4 (13.33%)	3 (10.00%)	0 (0.00%)

Table 2 describes the profile of pre-service civic education teachers involved in this study. The number of female pre-service teachers is higher in all course modes. The vast majority of RA pre-service teachers were younger than 22, and the majority of RB and RC pre-service teachers were ages 22-24. Interestingly, almost 40% of RC pre-service teachers were older than 24. The majority of RA and RB pre-service teachers are single, and one-third of RC pre-service teachers are married. Most pre-service teachers in all course modes have never taken an IT course. The majority of RA pre-service teachers have no teaching experience, while over 40% of RB pre-service teachers and 40% of RC pre-service teachers had experience in teaching practices.

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Technological Knowledge (TK)

TK is knowledge about technologies both in traditional and modern forms, requiring practical skills and knowledge to operate them in a variety of contexts. In this study, there are 16 statements in the issues of smart technology's practical usage ranging from computers to digital cameras. Moreover, it includes issues about understanding and keeping up with new technologies.

Table 3: TK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I know how to solve my own computer technical problems.	3.77	Good	3.57	Good	3.70	Good
2	I can learn technology easily.	3.77	Good	3.57	Good	3.90	Good
3	I keep up with important new technologies.	4.07	Good	3.80	Good	4.07	Good
4	I frequently play around with the technology.	3.87	Good	3.37	Fair	3.87	Good
5	I know about a lot of different computer technologies.	3.57	Good	3.17	Fair	3.57	Good
6	I know about basic computer hardware (ex. mother-board, RAM) and their functions.	3.63	Good	3.13	Fair	3.60	Good
7	I know about basic computer software (ex. Windows, Media Player) and their functions.	3.87	Good	3.43	Fair	3.90	Good
8	I know how to use a word processing program (ex. Microsoft Word).	4.27	Good	3.97	Good	4.23	Good
9	I know how to use a spreadsheet program (ex. Microsoft Excel).	4.03	Good	3.67	Good	3.93	Good
10	I know how to use a presentation program (ex. Microsoft PowerPoint).	4.27	Good	4.07	Good	4.23	Good
11	I know how to use a picture-editing program (ex. Adobe Photoshop).	3.53	Good	3.27	Fair	3.40	Fair
12	I know how to use an Internet communication tool (ex. Email).	4.37	Good	4.17	Good	4.37	Good
13	I know how to use an Internet social media application (ex. Facebook, Instagram).	4.57	Very Good	4.23	Good	4.50	Good
14	I can save data in a digital medium (ex. CD, DVD, Flash Disk).	4.30	Good	4.07	Good	4.47	Good
15	I can save and change data into file formats (ex. changing MS Word file to PDF format).	4.27	Good	3.77	Good	4.20	Good
16	I can use a printer, scanner, projector, and digital camera.	4.13	Good	3.83	Good	4.33	Good
	Total	4.02	Good	3.69	Good	4.02	Good
	Grand Total	3.91 = Good					

Table 3 reveals pre-service civic education teachers' TK scores. The mean TK scores of pre-service civic education teachers in all course modes are in the "good" category. RA pre-service teachers report that they are very good at using Internet social media applications. In addition, while RA pre-service teachers are good at using a picture-editing program, RB and RC pre-

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service teachers only have sufficient knowledge in the same issue. Moreover, RB pre-service teachers report having only sufficient knowledge of different computer technologies as well as knowledge about basic computer hardware and software while RA and RC pre-service teachers have better understanding.

Pedagogical Knowledge (PK)

PK is profound theoretical and practical knowledge regarding learning and instructional processes in the classroom specifically related to planning, processing, and evaluating learning and instruction. In this study, there are eight statements about issues of pedagogical theories and practices ranging from classroom lesson planning to student learning assessment. Further, it includes an issue about understanding common student misconceptions.

Table 4: PK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I know how to create a classroom lesson plan.	4.13	Good	4.07	Good	4.30	Good
2	I know about teaching general procedures in the classroom.	4.17	Good	3.80	Good	4.30	Good
3	I know how to organize and maintain classroom management.	4.17	Good	3.90	Good	4.27	Good
4	I can adapt my teaching style to different learners.	4.03	Good	3.87	Good	4.13	Good
5	I can adapt my teaching based upon what students currently understand or do not understand.	4.10	Good	3.87	Good	4.07	Good
6	I can use a wide range of teaching strategies in the classroom setting.	4.00	Good	3.83	Good	4.00	Good
7	I am familiar with common student understandings and misconceptions.	4.00	Good	3.83	Good	4.03	Good
8	I can assess student learning in multiple ways.	4.00	Good	3.83	Good	4.07	Good
	Total	4.08	Good	3.88	Good	4.15	Good
	Grand Total	4.03 = Good					

Table 4 reveals pre-service civic education teachers' PK scores. The mean PK scores of pre-service civic education teachers in all course modes are in the "good" category. RC pre-service teachers are relatively better at composing a lesson plan, general procedures of teaching, and organizing and maintaining classrooms, obtaining a score over 4.25. Interestingly, only in the knowledge of making a classroom lesson plan did RB pre-service teachers score over 4.00. Both RA and RC pre-service teachers, in contrast, scored over 4.00 in all issues.

Content Knowledge (CK)

CK is knowledge about the content that teachers teach, including knowledge of key concepts, explanatory frameworks, and rules in a particular field. In this study, there are seven

statements about issues of civic education content. This includes understanding civic education subjects, following recent issues, keeping up with resources, and using social ways of thinking.

Table 5: CK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I have sufficient knowledge about civic education.	3.97	Good	3.73	Good	4.13	Good
2	I have various ways and strategies for developing my understanding of civic education.	3.97	Good	3.87	Good	4.10	Good
3	I can use a social way of thinking.	4.13	Good	3.93	Good	4.23	Good
4	I follow recent developments and issues in civic education.	3.90	Good	3.80	Good	4.07	Good
5	I recognize leaders in civic education.	3.57	Good	3.47	Fair	3.57	Good
6	I keep up-to-date with resources (ex. books, journals) in civic education.	3.87	Good	3.50	Fair	3.87	Good
7	I join conferences and activities in civic education.	4.07	Good	3.87	Good	4.10	Good
Total		3.92	Good	3.74	Good	4.01	Good
Grand Total		3.89 = Good					

Table 5 reveals pre-service civic education teachers' CK scores. The mean CK scores of pre-service civic education teachers in all course modes are in the "good" category. However, RB pre-service teachers report having only sufficient knowledge in the issues of recognizing civic education leaders and staying current with the latest civic education resources. In the same issues, both RA and RC pre-service teachers have a relatively lower score, under 3.90, compared to the other issues. The RC pre-service teachers, surprisingly, have a better knowledge of using a social way of thinking than RA or RB pre-service teachers.

Pedagogical Content Knowledge (PCK)

PCK, as the first intersection in the framework, is knowledge of pedagogy for specific content, subjects, or fields. This matters because different content requires different instructional strategies. In this study, there are seven statements in the issues of subject-related pedagogic knowledge in civic education ranging from classroom lesson planning to student learning assessments. In addition, it includes issues on the capability of drawing connections among related subjects and other related courses.

Table 6: PCK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I can create my own lesson plan in civic education subjects.	4.27	Good	3.90	Good	4.23	Good
2	I can select appropriate and effective teaching strategies for civic education subjects.	4.13	Good	4.00	Good	4.23	Good
3	I can make difficult civic education lessons easier for students to understand.	3.97	Good	3.73	Good	3.93	Good

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No.	Statement	RA	Remark	RB	Remark	RC	Remark
4	I can draw connections among related subjects in civic education.	3.93	Good	3.67	Good	4.03	Good
5	I can draw connections between civic education and other related courses.	3.93	Good	3.63	Good	4.00	Good
6	I can use a variety of learning resources for teaching civic education subjects.	4.17	Good	4.00	Good	4.20	Good
7	I can develop evaluation tests on my own in civic education subjects.	4.20	Good	3.73	Good	4.03	Good
Total		4.09	Good	3.81	Good	4.10	Good
Grand Total		4.00 = Good					

Table 6 reveals pre-service civic education teachers' PCK scores. The mean PCK scores of pre-service civic education teachers in all course modes are in the "good" category. Compared to other issues, the pre-service teachers have a lower score on the issue of simplifying difficult civic education lessons and drawing connections between related subjects in civic education and other related courses. It is also noticeable that RB pre-service teachers have a lower score on the issue of creating a lesson plan and developing an evaluation test in civic education, scoring under 4.00. Both RA and RC pre-service teachers obtained a higher score of over 4.20 on the issue of composing civic education lesson plans.

Technological Content Knowledge (TCK)

TCK is knowledge about the manner in which technology and content influence and constrain one another in the learning and instructional context. In this study, there are seven statements about issues of using technology for creating civic education content. These include using computer technologies and the Internet to gain a better understanding of civic education subjects, as well as using communication technologies and social media to connect with peers and civic education leaders in Indonesia.

Table 7: TCK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I know about technologies that I can use for understanding civic education subjects.	3.93	Good	3.87	Good	4.13	Good
2	I can use specific computer applications for understanding civic education subjects easily.	4.23	Good	4.10	Good	4.30	Good
3	I can use computer technologies to develop civic education subjects (ex. writing papers and making presentation slides).	4.30	Good	4.17	Good	4.27	Good
4	I use the Internet as a learning resource for searching civic education materials.	4.37	Good	4.27	Good	4.37	Good
5	I use communication technologies (ex. WhatsApp, BBM, Line) for discussing civic education content with peers.	4.30	Good	4.23	Good	4.37	Good

No.	Statements	RA	Remark	RB	Remark	RC	Remark
6	I use social media (ex. Facebook, Instagram, Twitter, blog) for posting and expressing my understanding of civic education content.	3.90	Good	3.60	Good	3.70	Good
7	I use social media (ex. Facebook, Twitter, Linked-in) to connect with civic education leaders in Indonesia.	3.63	Good	3.20	Fair	3.43	Fair
Total		4.10	Good	3.92	Good	4.08	Good
Grand Total		4.03 = Good					

Table 7 reveals pre-service civic education teachers' TCK scores. The mean TCK scores of pre-service civic education teachers in all course modes are in the "good" category. Nevertheless, it is uncommon for pre-service teachers to use social media for getting in touch with civic education leaders in Indonesia; this issue received the lowest score in all course modes with a "fair" remark from RB and RC pre-service teachers. In contrast, they were by far more familiar with using the Internet to look for civic education materials, which scored almost 4.40 for RA and RC pre-service teachers and 4.30 for RB pre-service teachers. It can be seen that they are also familiar with specific computer applications to easily understand civic education subjects, computer technologies to develop civic education subjects, and communication technologies to discuss civic education content with their friends.

Technological Pedagogical Knowledge (TPK)

TPK is knowledge about the manner in which technology and pedagogy influence and constrain one another in the learning and instruction context. In this study, there are seven statements about using technology for learning and instruction in civic education. This includes issues of using technologies that could influence teaching strategies and enhance students' performance in the classroom.

Table 8: TPK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I can choose technologies that enhance the teaching strategies for a lesson.	4.03	Good	3.97	Good	4.03	Good
2	I am thinking more deeply about how technology could influence the teaching strategies I use in my classroom.	4.07	Good	3.83	Good	4.10	Good
3	I can choose technologies that enhance students' engagement for a lesson.	4.07	Good	3.97	Good	4.00	Good
4	I am thinking critically about how to use technology in my classroom.	3.90	Good	3.83	Good	3.93	Good
5	I can adapt the use of the technologies to different teaching activities.	4.07	Good	3.90	Good	4.00	Good
6	I can choose technologies that enhance students' performance in the classroom.	4.03	Good	3.90	Good	4.03	Good
7	I can help other teachers to use technologies for a lesson in the classroom.	3.97	Good	3.77	Good	3.87	Good
Total		4.02	Good	3.88	Good	4.00	Good
Grand Total		3.97 = Good					

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Table 8 reveals pre-service civic education teachers' TPK scores. The mean TPK scores of pre-service civic education teachers in all course modes are in the "good" category. For none of the issues did RB pre-service teachers obtain a 4.00 score. Similarly, RA and RC pre-service teachers also received a score under 4.00 on the issues of thinking critically about integrating technology in the classroom and helping other teachers to use technology for an instructional process in the classroom. On other issues, both RA and RC pre-service teachers have a higher score, particularly on the issues of thinking deeper about the possibility of technology influencing teaching strategies in the classroom, of 4.07 and 4.10, respectively.

Technological Pedagogical Content Knowledge (TPACK)

TPACK is the intersection of all three bodies of knowledge. This is knowledge about the manner in which technology, pedagogy, and content influence and constrain one another in the learning and instruction context. In this study, there are five statements on the issues of using appropriate technologies in suitable teaching strategies for delivering civic education content effectively in the classroom. It also includes issues of helping other teachers to use appropriate technologies for other content-related teaching strategies.

Table 9: TPACK Scores of Pre-service Civic Education Teachers

No.	Statements	RA	Remark	RB	Remark	RC	Remark
1	I can use appropriate technologies on suitable teaching strategies for delivering civic education content effectively in the classroom.	4.00	Good	3.83	Good	4.07	Good
2	I can choose appropriate technologies to develop students' understanding of civic education content that I teach by using a specific teaching approach in the classroom.	4.07	Good	3.80	Good	4.10	Good
3	I can choose appropriate technologies for assessing students' performance on civic education subjects that I teach by using a specific teaching approach in the classroom.	3.90	Good	3.90	Good	3.80	Good
4	I can conduct good teaching with combining the use of appropriate technologies and a suitable teaching approach on civic education subjects in the classroom.	3.93	Good	3.83	Good	3.97	Good
5	I can help other teachers to use appropriate technologies in other suitable content-related teaching strategies for a lesson in the classroom.	3.87	Good	3.70	Good	3.83	Good
Total		3.95	Good	3.81	Good	3.95	Good
Grand Total		3.91 = Good					

Table 9 reveals pre-service civic education teachers' TPACK scores. The mean TPACK scores of pre-service civic education teachers in all course modes are in the "good" category. Nonetheless, the majority of the issues obtained relatively low scores under 4.00. On top of that, the RB pre-service teachers scored below 4.00 on all of the issues. The issues that have

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scores 4.00 and over are for RA and RC pre-service teachers regarding the ability to use appropriate technologies on suitable teaching strategies for delivering civic education content effectively in the classroom and choose appropriate technologies to develop students' understanding of civic education content taught by using a specific teaching approach.

Composing the study findings in a simple message, this is a bar chart summarizing all mean scores of the seven TPACK knowledge domains from all course modes. The graph simplifies the findings for better understanding of the comparison of pre-service civic education teachers' TPACK confidence across the three course modes.
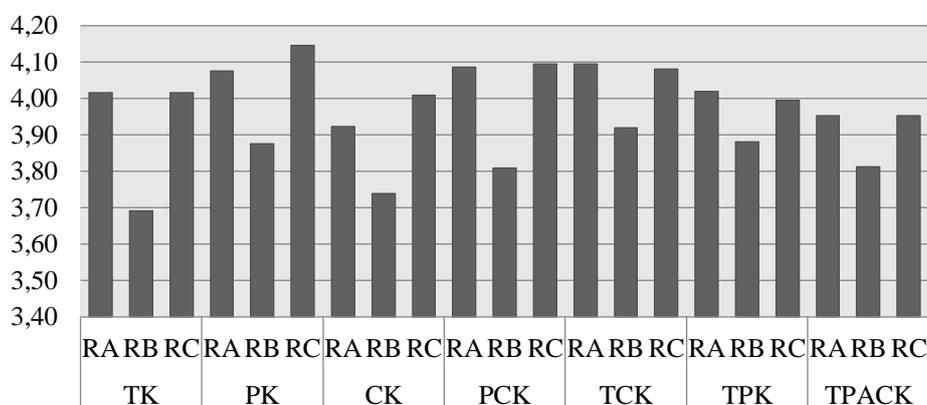
Figure 2: Pre-service Civic Education Teachers Mean Scores of TPACK Subdomains

Figure 2 shows TPACK subdomain mean scores of the pre-service civic education teachers. It is clear that the RB pre-service teachers' knowledge scores are lower than the knowledge scores of RA and RC pre-service teachers in all TPACK subdomains. In addition, the highest score is the PK of RC pre-service teachers reaching a score over 4.10, and the lowest one is the TK of RB pre-service teachers with a score under 3.70. The PK and CK scores of RC pre-service teachers are higher than those of RA pre-service teachers. On the other hand, there is no significant difference in the scores of RA and RC pre-service teachers at the mean scores of TK, PCK, TCK, TPK, and TPACK.

Discussion

All in all, the pre-service civic education teachers' confidence over the seven TPACK knowledge domains in all course modes is in the "good" category. It implies that the teachers have mastered TPACK confidently. However, among the course modes, the RB pre-service teachers showed lower confidence in mastering the seven TPACK knowledge domains. Further, there is almost an equal level of TPACK confidence for RA and RC pre-service teachers. This reveals that the pre-service civic education teacher education program conducted in RA and RC course modes is more powerful for developing the pre-service teachers' TPACK confidence.

Characteristics of course modes and pre-service teachers influence the TPACK confidence level. The lower TPACK confidence of RB pre-service teachers could be caused by the course being joined by mostly fresh graduates aged 20-24 who work during the day and study at night. The RA course mode looks more ideal than the two other modes because it is conducted in the morning and the participants do not work. Even though the RC pre-service teachers join the course on Saturdays, they are fresh graduates and adults aged 25 and over who work on weekdays while focusing their study on Saturday from morning to afternoon.

Teaching experience seems to have no significant effect on TPACK confidence. Over 80% of RA and 60% of RC pre-service teachers had not been engaged in teaching practices, but they reported mastering TPACK confidently. In contrast, over 40% of RB pre-service teachers have teaching experience, but the level of their TPACK confidence is lower. It supports the evidence that the RB course mode is unideal for the teacher education program. The pre-service teacher education program requires a well-developed system starting from recruitment to the continuous professional development process (Darling-Hammond, 2017) and standardized curriculum connecting theories and practices (Flores, 2016), so the implementation of the RB course mode should be reconsidered.

This study also discusses each issue in the seven TPACK knowledge domains. Even though their TPACK confidence is in the "good" category, there are some issues that obtained a relatively lower score and should be better developed in the teacher education program. Toward TK, pre-service teacher education programs should develop the teachers' competencies in using a picture-editing program, using different computer technologies, and understanding about basic computer hardware and software. There is no special concern on PK issues, but particularly in the RB course mode, pre-service teacher education programs should develop the teachers' competencies on all issues except making a classroom lesson plan. Regarding CK, pre-service teacher education programs should develop pre-service teachers' understanding of civic education leaders and develop their ability to stay current with the latest civic education resources.

Regarding PCK, pre-service teacher education programs should develop pre-service teachers' competencies in simplifying difficult civic education lessons as well as drawing connections among related subjects in civic education and other related courses. Also, particularly for RB pre-service teachers, their competencies should be developed on the issue of creating a lesson plan and developing an evaluation test in civic education. Regarding TCK, pre-service teacher education programs should develop pre-service teachers' competencies in using social media for getting in touch with civic education leaders. The ability to think critically about integrating technology and helping other teachers use technology in the classroom should be developed for the TPK. Finally, regarding TPACK, pre-service teacher education programs should develop pre-service teachers' competencies in helping other teachers use appropriate technologies for other suitable content-related teaching strategies in the classroom.

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This study provides a figure of pre-service teachers' TPACK confidence in Indonesia. It could be compared to pre-service teachers' TPACK confidence investigated in Australia and Israel (Redmond & Peled, 2015), Turkey (Kabakci, Yurdakul, & Coklar, 2014), New Zealand (Nordin, Davis, & Ariffin, 2013), and the U.S. (Schmidt et al., 2009). Below is the global figure of the TPACK confidence.

Table 10: The Global Figure of Pre-service Teachers' TPACK Confidence

TPACK domains mean	Australia (N=85)	Israel (N=99)	Turkey (N=3105)	New Zealand (N=107)	U.S. (N=87)	Indonesia (N=90)
TK	3.80	3.55	*	3.61	3.82	3.91
PK	3.99	4.06	*	4.11	4.05	4.03
CK	4.34	4.00	*	4.31	4.05	3.89
PCK	4.16	4.11	*	4.02	3.91	4.00
TCK	3.96	4.02	*	3.97	4.06	4.03
TPK	3.94	3.85	*	3.92	4.30	3.97
TPACK	4.02	4.00	3.84	4.00	4.13	3.91

Table 10 compares pre-service teachers' TPACK confidence on a global scale. Overall, the U.S. and Australia have higher scores than the other countries. The highest scores on TCK, TPK, and TPACK were recorded in the U.S. and the highest scores on CK and PCK belong to Australia. Surprisingly, New Zealand has the highest score on PK and Indonesia has the highest score on TK. There is no figure for TK, PK, CK, PCK, TCK, and TPK in Turkey, and the TPACK score of Turkey counted as the lowest among the other countries.

Conclusion

In short, the RA and RC pre-service civic education teachers report almost equal levels of TPACK confidence while the RB pre-service civic education teachers report lower levels of TPACK confidence. Further, the RB course mode looks inappropriate for developing pre-service teachers' TPACK. A pre-service teacher education program needs an ideal course time as well as good input so that future excellent teachers can be well prepared. Forthcoming pre-service teacher education programs should concern TPACK development, particularly on each issue of the knowledge domains that require further development, as discussed above.

The present study has limitations on the number of participants and the context of study. The study samples 90 pre-service teachers involved in a teacher education program conducted in a private higher education institution. Further research on the pre-service teachers' TPACK confidence measurement should explore another context with a larger sample. Measuring pre-service teachers' TPACK confidence in the pre-service teacher education program conducted in a public higher education institution is one example. It is also suggested that further research on TPACK measurement use the latest model and questionnaire, such as TPACK-21 (Valtonen et al., 2017), E-TPCK (Angeli & Christodoulou, 2019), and TPACK-SAMR (Tunjera & Chigona, 2020) models.

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