Data Article

The dataset for validation of factors affecting pre-service teachers' use of ICT during teaching practices: Indonesian context

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A B S T R A C T

This dataset describes two main variables, technological pedagogical and content knowledge (TPACK) and Beliefs on ICT, which may affect pre-service teachers' (PSTs) use of ICT (UICT) during teaching practices. TPACK assumes that PSTs should actively combine some domains of knowledge to design good quality of ICT-integrated courses lessons. Beliefs on ICT in this study consist of a mix of behavioral, normative, and control beliefs on ICT integration in education. In addition, UICT is defined as ICT used by PSTs during teaching practices. Three approaches were applied for the purification of the dataset; development of instruments, survey, and exploratory factor analysis (EFA). The dataset consists of demographic information, TPACK, Beliefs on ICT, and UICT. The dataset is beneficial to teacher educators in designing effective programs that best nurture PSTs' UICT during teaching practices. Researchers sharing similar sample characteristics in developing countries may adapt this dataset for more rigorous statistical analyses.

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2352-3409/© 2019 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
1. Data

This dataset contains variables' dimension, definition, and adapted references of the instruments (Table 1) as well as versions of the instruments during the development process (Table 2). Further, the instruments were distributed as a survey to PSTs from three Indonesian universities. For normality test, Skewness and Kurtosis were calculated for 3 variables (TPACK, Beliefs on ICT, and UICT). The reliability was also examined by calculating the Cronbach’s alpha (Table 3). Finally, EFA was conducted by examining two variables' (TPACK and Beliefs on ICT) Kaiser-Meyer-Olkin (KMO), Bartlett’s Test of Sphericity, Eigenvalue, and cross loading (Tables 4–7). The raw and analyzed data were accessible at Mendeley Data, https://data.mendeley.com/datasets/s6brgxxktt/7. Fig. 1 exhibits the study model.

2. Experimental design, materials, and methods

TPACK is the framework assuming that PSTs should actively combine some domains of knowledge to design good quality of ICT-integrated courses lessons [2]. Beliefs on ICT in this study consist of a mix of behavioral, normative, and control beliefs on ICT integration in education [3]. In addition, UICT is defined as ICT used by PSTs during teaching practices [4]. Three approaches were applied for the purification of the dataset; development of the instruments, survey, and EFA.

2.1. Development of the instruments

For the development of the instruments, a 2-phase strategy introduced by Ref. [5] was applied. In the 1st phase, the processes of adaptation, construction, and translation were conducted. The adaptation, construction, and translation process include demographic information, TPACK, Beliefs on ICT, and UICT. Demographic information consists of questions about, age, major, university, and ICT-based
courses. Table 1 exhibits the variables’ dimension, definition, and adapted references in the adaptation and construction process. Besides, the instruments were translated using the back-translation method [6] English to Indonesian and Indonesia to English, involving 2 translation experts.

In the 2nd phase, face and content validity were done. Firstly, two panels of 5 users and 5 experts were involved in 2 discussion sessions to evaluate the instruments for their context and setting appropriateness. Further, the instruments were distributed to 10 experts of educational technology who agree to participate to examine the instruments’ relevance, clarity, and simplicity as part of the content validity index (CVI). The attributes of the instruments’ items were rated on a 4-point scale 1 = not relevant/not clear/not simple to 4 = very relevant/very clear/very simple [5]. The CVI was measured at the item level (I-CVI) for three variables (TPACK, Beliefs on ICT, and UICT). The I-CVI was measured by providing a score of 3 or 4 divided by the total number of experts [5]. With a total of ten experts, the I-CVI should not be less than 0.78 [11]. Additionally, a modified Kappa (k*) index was calculated to have an estimation to the I-CVI [11]. The k* is an index of agreement from the experts indicating that the item is relevant, clear, simple. To calculate k*, the probability of chance occurrence (Pc) was first calculated [11]. The standards recommended by Ref. [12] were adopted to interpret k* in which the values above 0.74, between 0.60 and 0.74, and between 0.40 and 0.59 are defined as excellent, good, and fair, respectively. The calculation and information of CVI, k*, and Pc can be accessed at the Mendeley website as informed earlier.

Table 1
Variables’ dimension, definition, and adapted references of the survey instruments.

| Variable     | Dimension             | Definition                                                                 | Adapted references of the survey instrument |
|--------------|------------------------|----------------------------------------------------------------------------|---------------------------------------------|
| TPACK        | Technological knowledge (TK) | Knowledge of emerging technologies for ICT integration during teaching practices | [2]                                         |
| Content knowledge (CK) | Knowledge of teaching such as teaching principles, students’ psychology of students, teaching strategies, and management of class during teaching practices | [7,8]                                      |
| Pedagogical knowledge (PK) | Subject matter knowledge e.g. scientific, social, and linguistics knowledge during teaching practices | [2]                                         |
| Pedagogical and content knowledge (PCK) | Knowledge of changing specific content into an understandable and accessible form for learners via an approach of pedagogy during teaching practices | [2]                                         |
| Technological content knowledge (TCK) | Knowledge of integrating emerging technologies for certain subject matter knowledge which excludes pedagogical aims during teaching practices | [2]                                         |
| Technological pedagogical knowledge (TPK) | Knowledge of integrating emerging technologies in pedagogy during teaching practices | [7,8]                                      |
| Technological pedagogical content knowledge (TPCK) | Knowledge of implementing technologies to improve students’ understanding and learning in certain subject matter knowledge during teaching practices | [2,8]                                      |
| Beliefs on ICT | Behavioral beliefs (BB) | Associated with attitudes for integrating ICT during teaching practices/Outcomes of using ICT | [9,10]                                      |
| Normative beliefs (NB) | Associated with subjective norms for integrating ICT during teaching practices/People who expect the use of ICT | [9,10]                                      |
| Control beliefs (CB) | Associated with perceived behavioral control/Internal and external enablers/constraints | [9,10]                                      |
| UICT         | UICT                   | UICT during teaching practices reflected on their integration evaluation it during actual placement | [4]                                         |
2.2. Survey

After the development process, the instruments were distributed as a form of a survey to PSTs from three Indonesian universities. A survey design was chosen because it elaborates trends of the data rather than inform rigorous explanations. The total population of the study was all Indonesian PSTs while the target population is PSTs in the three universities. The sample was determined through simple random sampling. The instruments were distributed to 300 PSTs in which 287 responses were measurable; 10 of them were not completed and 3 were not returned.

Data normality was assessed by calculating Skewness and Kurtosis. Skewness and kurtosis values need to be in the range of $-2$ to $+2$ [13]. All Skewness and Kurtosis values are within the recommended

| Table 2 | Versions of the instruments during the development process. |
|---------|-------------------------------------------------------------|
| Variable | Version 1 (Phase 1 (adaptation, construction, and translation)) | Version 2 (Phase 2 (face and content validity; discussion with 5 users and 5 experts)) | Version 3 (Phase 2 (face and content validity; CVI with 10 experts)) |
|         | Dimension | Number of items | Dimension | Number of items | Dimension | Number of items |
| TPACK   | TK        | 7               | TK        | 3               | TK        | 3               |
|         | CK        | 3               | CK        | 3               | CK        | 3               |
|         | PK        | 7               | PK        | 7               | PK        | 7               |
|         | PCK       | 3               | PCK       | 3               | PCK       | 3               |
|         | TCK       | 4               | TCK       | 3               | TCK       | 3               |
|         | TPK       | 4               | TPK       | 4               | TPK       | 4               |
|         | TPACK     | 10              | TPACK     | 5               | TPACK     | 5               |
| Beliefs on ICT | BB | 9 | BB | 8 | BB | 8 |
|         | NB        | 7               | NB        | 5               | NB        | 5               |
|         | CB        | 7               | CB        | 5               | CB        | 5               |
| UICT    | UICT      | 11              | UICT      | 12              | UICT      | 12              |
| Total   |           | 70              |           | 58              |           | 58              |

| Table 3 | Skewness, Kurtosis, and Cronbach’s alpha of TPACK, Beliefs on ICT, and UICT. |
|---------|--------------------------------------------------------------------------------|
| N       | Skewness | Kurtosis | Reliability |
|         | Statistic | Std. Error | Statistic | Std. Error | Statistic | Std. Error | a  |
| TK      | 287      | -.275     | .144     | 1.012     | .287     | .829     |
| CK      | 287      | -.382     | .144     | 1.217     | .287     | .849     |
| PK      | 287      | -.044     | .144     | 1.098     | .287     | .867     |
| PCK     | 287      | -.392     | .144     | 1.735     | .287     | .871     |
| TCK     | 287      | -.111     | .144     | 1.494     | .287     | .841     |
| TPK     | 287      | -.343     | .144     | .226      | .287     | .766     |
| TPACK   | 287      | -.175     | .144     | 1.056     | .287     | .845     |
| BB      | 287      | -.202     | .144     | .043      | .287     | .884     |
| NB      | 287      | -.144     | .144     | .563      | .287     | .843     |
| CB      | 287      | -.185     | .144     | 1.370     | .287     | .849     |
| UICT    | 287      | .082      | .144     | .267      | .287     | .895     |

| Table 4 | KMO and Bartlett’s test of TPACK. |
|---------|----------------------------------|
| KMO     | .901                             |
| Bartlett’s Test of Sphericity | Approx. Chi-Square | df | Sig. | p < .001 |
|         | 3898.011 | 325 | p < .001 |

2.2. Survey

After the development process, the instruments were distributed as a form of a survey to PSTs from three Indonesian universities. A survey design was chosen because it elaborates trends of the data rather than inform rigorous explanations. The total population of the study was all Indonesian PSTs while the target population is PSTs in the three universities. The sample was determined through simple random sampling. The instruments were distributed to 300 PSTs in which 287 responses were measurable; 10 of them were not completed and 3 were not returned.

Data normality was assessed by calculating Skewness and Kurtosis. Skewness and kurtosis values need to be in the range of $-2$ to $+2$ [13]. All Skewness and Kurtosis values are within the recommended
In addition, the reliability of data was conducted through Cronbach’s alpha (α > 0.700). Table 3 performs all value of Cronbach’s alpha and no values are less than 0.700.

2.3. Exploratory factor analysis (EFA)

EFA was conducted for TPACK and Beliefs on ICT as two main variables of factors that may affect UICT during teaching practices (Fig. 1). UICT was not included in this process since it was theoretically defined as one factor. A three-time rotation of factor analysis was run in SPSS 23 that included 28 items for TPACK and 18 items for Beliefs on ICT. Both TPACK and Beliefs on ICT data were analyzed through principal component analysis with Varimax rotation for four assessments; KMO, Bartlett’s Test of Sphericity, Eigenvalue, and cross loading. The value of KMO for TPACK is 0.901 with Bartlett’s Test of Sphericity value was significant (p < .001). In addition, the value of KMO for Beliefs on ICT is 0.915 and the value of Bartlett’s Test of Sphericity was also significant (p < .001). Therefore, no issues are indicated for KMO and Bartlett’s Test of Sphericity of TPACK and Beliefs on ICT (Tables 3 and 6). From the rotation, 7 factors were extracted and labeled according to the theories of TPACK. The eigenvalue of the seven factors ranged from 9.296 to 1.012 with a maximal percentage of the variance of 35.754% (Table 5). Through the process, TPK 1 and PK 4 were dropped because the cross loading values of the items were highly detected. For Beliefs on ICT, 3 factors were extracted and were labeled behavioral, normative,
Table 7
Eigenvalue and cross loading of Beliefs on ICT.

| Construct | Eigenvalue | Item | Component |
|-----------|------------|------|-----------|
| BB        | 7.577      | BB4  | .821      |
| BB        | 7.577      | BB5  | .747      |
| BB        | 7.577      | BB3  | .740      |
| BB        | 7.577      | BB2  | .682      |
| BB        | 7.577      | BB7  | .625      |
| BB        | 7.577      | BB6  | .617      |
| BB        | 7.577      | BB8  | .562      |
| CB        | 1.585      | CB4  | .830      |
| CB        | 1.585      | CB3  | .742      |
| CB        | 1.585      | CB5  | .693      |
| CB        | 1.585      | CB1  | .668      |
| CB        | 1.585      | CB2  | .639      |
| NB        | 1.203      | NB2  | .772      |
| NB        | 1.203      | NB1  | .709      |
| NB        | 1.203      | NB3  | .701      |
| NB        | 1.203      | NB4  | .694      |
| NB        | 1.203      | NB5  | .663      |

Fig. 1. Study model.
and control belief (Table 7). The eigenvalue of the three factors ranged from 7.577 to 1.203 with the maximal percentage of the variance of 44.569%. No items of Beliefs on ICT were dropped from this process.

3. Conclusion

Many frameworks have been established to measure factors affecting technology integration in education such as technology acceptance model, theory of planned behavior, unified theory of acceptance and use of technology, and TPACK. However, little research has informed UICT predicted by combined frameworks. Therefore, this study model is offered as a combination of two frameworks, TPACK and Beliefs on ICT, as factors that may affect UICT. The model is relevant to the current condition of Indonesia as a developing country where technology is massively used in education. The dataset informs an insight into factors affecting UICT during teaching practices for Indonesian contexts. It is expected to be beneficial to teacher educators in designing effective programs that best nurture PSTs’ UICT during teaching practices. It also benefits researchers sharing similar sample characteristics in developing countries to adapt this dataset.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.dib.2019.104875.

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