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Research Article

# The Impact of Digital Literacy and Social Presence on Teachers' Acceptance of Online Professional Development

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**ABSTRACT**

The global COVID-19 pandemic has created the urgent need for online instruction throughout all levels, including teacher professional development. As we move beyond the survival phase of remote teacher professional development, it is critical to well understand teacher acceptance and continued use of online professional development. Digital literacy and social presence (SP) have been widely studied to understand online teaching and learning process. However, there is a dearth of studies that examine the impact of digital literacy and SP on the acceptance of online teacher professional development (OTPD). This study aimed to examine if digital literacy and SP affected secondary school teachers' acceptance and continued use of OTPD. A quantitative method was employed with two hundred and thirty-two Indonesian secondary school teachers completed a 48-item questionnaire based on an extended technology acceptance model and teacher digital literacy framework. Data were analyzed by structural equation modeling. The findings showed that digital literacy and SP significantly affected teachers' acceptance of OTPD. Therefore, this study suggests that the proposed model is valid to explain teachers' engagement in OTPD. The results have implications for educational leaders, designers, and facilitators who want to promote online professional development.

**Keywords:** OTPD, digital literacy, SP, acceptance of OTPD

## INTRODUCTION

The COVID-19 pandemic has exponentially increased remote learning or online education, including teacher professional development. Unquestionably, online teacher professional development (OTPD) will be an integral part of this new educational landscape around the globe. For instance, in Indonesia, the Ministry of Education and Culture offers a six-month OTPD course. This online course, providing general pedagogy, subject specific-pedagogy, and content area, is a 12-credit course required for in-service teachers to be awarded a teaching certificate (Mailizar et al., 2021a). Therefore, it is required to advance literature on how to design and deliver such online programs during the pandemic and beyond.

The success of digital technology use for programs of teacher professional development is dependent on their acceptance of digital technology (Mailizar et al., 2020, 2021b; Smith & Sivo, 2012). Therefore, understanding teachers' acceptance and continued use of OTPD is vital. Davis (1989) proposed technology acceptance model (TAM) to understand users' acceptance of technology. This model suggests that along with external factors, users' attitude (AT) and behavioral intention significantly affect their acceptance of

technology. Therefore, this model is widely employed to understand and describe users' acceptance of new technology.

TAM has been widely used to understand studies investigating online professional development with various external factors. For instance, by adding social presence (SP) and sociability, Smith and Sivo (2012) examined how the extended TAM could predict teachers' intention to continue engaging in OTPD. Furthermore, Mailizar et al. (2021b) extended TAM with TPACK as an external factor of the model. This study shows that TPACK is a strong external construct of TAM to predict teacher behavioral intention to participate in OTPD.

It is unquestionable that digital skills are needed to be competent in e-learning. As digital literacy integrates several skill sets (Virkus, 2003) is worth to be examined as an external factor of TAM. The relationship between digital literacy and TAM has been investigated in previous studies. For instance, Gie and Fenn (2019) examined the relationship between TAM and digital literacy among the first students in Malaysia's higher education institutions. They used PEU and PU as independent variables, while digital literacy was the dependent variable. This study revealed that there is a significant positive relationship between PEU and digital literacy.

Regarding online purchase intention, Nazzal et al. (2021) investigate the effect of digital literacy, PU, and PEU on intention of online purchase intention. This study suggests that digital literacy significantly affects PU, ease of use, and online purchase intention. However, there is a lack of studies that incorporate digital literacy as an external factor of TAM to examine teachers' acceptance of OTPD.

Researchers have investigated SP in an online learning environment (Lowenthal & Dunlap, 2020). It is a critical construct in an online learning environment (Gunawardena, 2017). Regarding the SP in OTPD, Smith and Sivo (2012) extended TAM with two external factors, namely SP, and sociability, to predict teachers' intentions to continue participating in OTPD. This study indicates that the extended proposed model was a good predictor of continuance intention to participate in online professional development. However, there is a lack of studies that examined the effect of SP on teachers' acceptance of OTPD in the Indonesian context, where OTPD is aimed at teacher certification.

The main aims of this study were:

(1) to develop a conceptual model to understand Indonesian secondary school teachers' acceptance of online professional development based on the TAM model and

(2) to propose new information and knowledge regarding the interplay between digital literacy, SP, and teachers' acceptance of online professional development.

Therefore, this study was carried out to respond this research question: to what extent do teachers' digital literacy and SP influence their behavioral intention to participate in online professional development?

## LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

### Online Teacher Professional Development

According to Elliott (2017), an OTPD is a type of professional development that teachers can participate in via the internet, offering both formal and informal learning opportunities. Feiman-Nemser (2001) states that formal learning opportunities are structured learning activities with a specific curriculum, such as mandated professional development. On the other hand, Informal learning opportunities are not limited to a specific learning environment or curriculum (Desimone, 2009). Informal online learning opportunities offer teachers opportunities to participate in shared learning environments and reflect on their practices.

Online professional development offers various advantages. First, it can reduce boundaries of geographic (Elliott, 2017) fits with teacher schedules (Dede, 2006). Second, OTPD promotes personalized learning (Yurkofsky et al., 2019). Third, OTPD provides various options for selecting learning tools (Elliott, 2017).

### Online Professional Development During the COVID-19 Pandemic

During the COVID-19 pandemic, teachers had limited access to professional development programs (Trikoilis & Papanastasiou, 2020). However, the COVID-19 pandemic has been changing the landscape of education, including the growth in OTPD opportunities. The scale of digital supported remote teacher

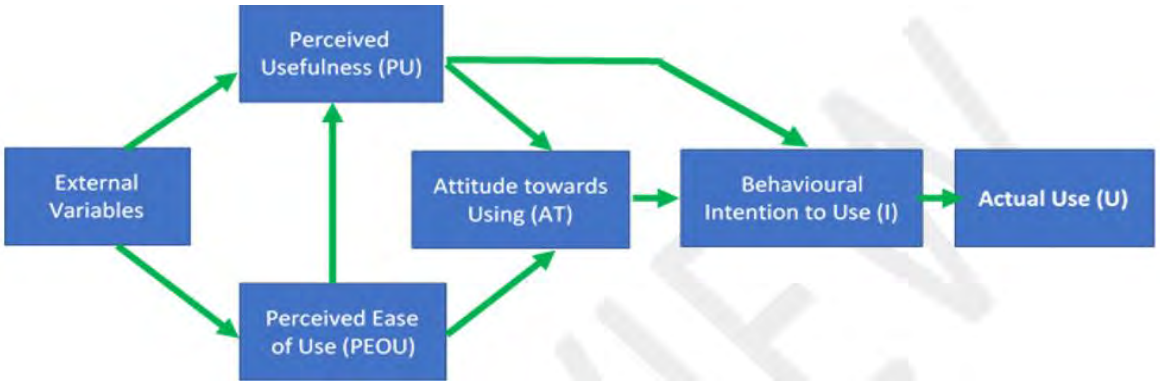


**Figure 1.** TAM model

education programs increased exponentially for those with access to an online environment. Given the rapid shift to online professional development as the result of the pandemic, therefore, it is critical to design and delivery a high quality online professional development program to enhance educational support for students (Reimers et al., 2020).

Given the pandemic spanning elementary to university and any future crises that may disrupt education, OTPD has benefits in the future (Bragg et al., 2021). In recent years, online professional development has gained increased intention (Karchmer-Klein & Pytash, 2019). Furthermore, OTPD emerged during the pandemic to address teacher needs. During this challenging time, teachers should be provided with opportunities to participate in professional development. In addition, online training can address teachers' lack of knowledge and skill in remote teaching (Toquero & Talidong, 2020).

In the Indonesian context, since 2017, the government has provided a six-months teacher professional development program for in-service teachers. Since 2018 this program was shifted to blended learning, where teachers do three months of online learning and the other three months in the university classroom. However, due to the COVID-19 pandemic, since 2020, this program goes full online where the ministry of education and culture enrolled teachers to higher education institutions in Indonesia that are eligible to offer the program. As this program is relatively new and involves a large number of teachers, therefore, it is necessary to investigate teachers' acceptance of online professional development in the context of Indonesia, where teachers were not familiar with full online professional development before the pandemic.

## Teacher Acceptance of Online Professional Development: TAM Perspective

According to Scherer et al. (2019), the TAM (Davis, 1989) is the most commonly used model for understanding and describing the acceptance of the technology integration in education. The model indicates that the acceptance of new technology is directly influenced by users' PEU and perceived usefulness (PU) of technology (**Figure 1**).

TAM has been used in several studies to understand teachers' acceptance of online professional development (Mailizar et al., 2020, 2021b; Smith & Sivo, 2012) as well as teachers' acceptance of online learning communities (Liu et al., 2010; Peñarroja et al., 2019).

Regarding the main variables of the classical TAM, namely perceived ease of use (PEU) and PU, previous studies (e.g., Mailizar et al., 2021b; Omar & Hashim, 2021; Smith & Sivo, 2012) revealed that those factors significantly teachers' intention to continue using an online platform for their professional development.

Furthermore, in terms of external factors of TAM, Smith and Sivo (2012) added SP and sociability to the model to predict teachers' intention to continue using e-learning for professional development. This study found that SP was a significant factor in the teachers' intention, while sociability did not significantly affect their intention. Mailizar et al. (2021b) include TPACK as an external factor of their extended TAM model. The study suggests that TPACK significantly affected teachers' acceptance of OTPD.

However, those studies did not add digital literacy as an external factor of TAM. The present study offers new insight into the literature by adding digital literacy and the SP in TAM to understand teachers' acceptance of OTPD.

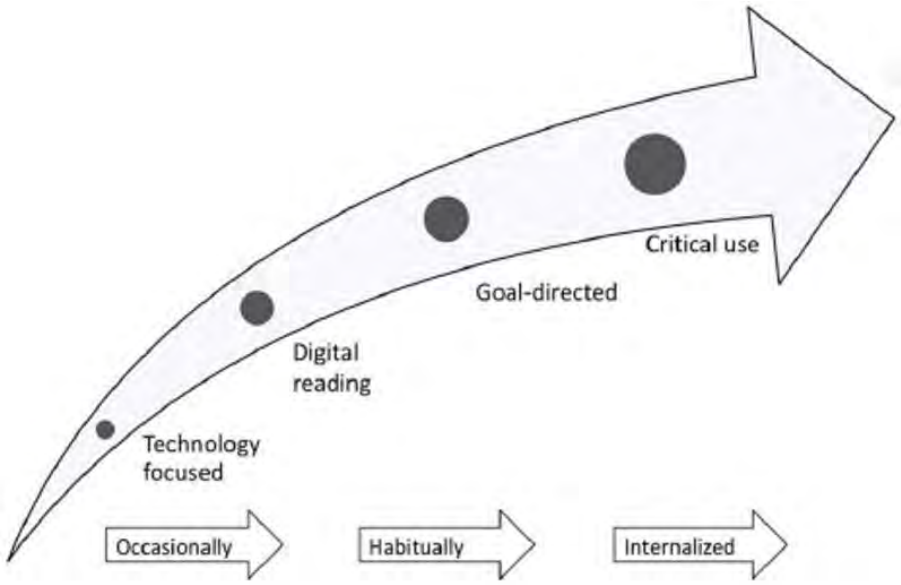


**Figure 2.** Framework for progression of digital literacy (List et al., 2020)

**Table 1.** Description of digital literacy constructs (List et al., 2020)

| Category | Definition | Example |
|---|---|---|
| Technology focused | An understanding of technology-driven notion of digital literacy that is centered on learning certain technical tools (e.g., computers, Internet use) | Having an understanding of technology and how it works such as using a computer program such as Google and Microsoft Word, and being able to use a smart phone correctly, etc. |
| Digital reading | An understanding of digital literacy that is centered on the translation of traditional print literacy to digital environments and everything that involves. | Defining digital literacy as readings and information being available online such as knowing how to use and navigate a computer, reading skills, and focus on screen. |
| Goal-directed | An understanding of digital literacy that is centered on the use of digital resources to complete specific activities | Figuring out ideas and concepts through a more digital use and reading what teacher need in order to complete that. |
| Critical use | An understanding of digital literacy as the reflective and evaluative process of utilizing technology and reading digitally to achieve task goals. | Defining digital literacy as the ability to have an understanding and the ability to be digitally savvy, whether that be knowing what technological resource to use and when or understanding the implications of the digital age. |

## Digital Literacy

Many scholars have addressed the term of digital literacy from different perspectives or discourses (Eshet-Alkalai & Chajut, 2009; Jones & Hafner, 2012). The program for international student assessment defines digital literacy as students' ability to

> "Evaluate information from multiple sources, assessing the credibility and utility of what is written using self-established criteria, as well as the ability to solve tasks that require the reader to locate information in an unfamiliar context, in the presence of ambiguity, and without prior knowledge" (OECD, 2015, p. 50).

Ng (2012) suggests that digital literacy emerges from the convergence of technical, cognitive, and socio-emotional abilities.

Furthermore, a number of frameworks have been proposed to define and understand digital literacy. The old definition of literacy, the ability to read and write to meet society's expectations, has become obsolete (McArthur et al., 2018). List et al. (2020) proposed a framework for pre-service teachers' digital literacy. Teachers' digital literacy is categorized into four categories (**Figure 2**).

Furthermore, detailed descriptions of each category are presented in **Table 1**. In this study, we used this framework of digital literacy.

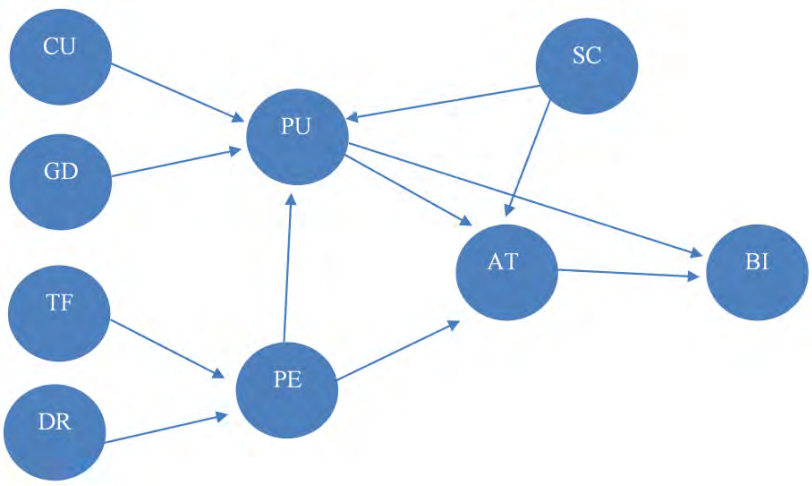


**Figure 3.** Initial structural model

### Social Presence

Short et al. (1976) define SP as the "degree of salience of the other person in the mediated interaction and the consequent salience of the interpersonal relationships" (p. 65). In terms of e-learning communities, Gunawardena and Zittle (1997) define the degree to which participants' online participation produces the sense that the other person is physically present is referred to as SP. In online learning environments, SP is essential as learners and instructors are physically separated. Furthermore, Previous studies showed that university students' SP significantly affects their persistence, satisfaction, learning (Garrison, 2011) and quality of cognitive presence (Lee, 2014). Regarding OTPD, Smith and Sivo (2012) revealed that SP was a significant factor in teachers' behavioral intention to participate in OTPD.

### Research Model and Hypotheses

This study proposed two external factors, namely digital literacy and SP. It is expected that their AT and PU jointly determine teachers' acceptance of new technology. Furthermore, based on the literature discussed above, we proposed the following initial structural model (**Figure 3**) and hypotheses.

1. **H1:** Critical use (CU) positively and significantly affects PU
2. **H2:** Goal-directed (GU) positively and significantly affects PU
3. **H3:** Technology focused (TF) positively and significantly affects PEU
4. **H4:** Digital reading (DR) positively and significantly affects PEU
5. **H5:** PEU positively and significantly affect PU
6. **H6:** PEU positively and significantly affects AT
7. **H7:** PU positively and significantly affects AT
8. **H8:** SP positively and significantly affects PU
9. **H9:** SP positively and significantly affects AT
10. **H10:** PU positively and significantly affects behavioral intention (BI)
11. **H11:** AT positively and significantly affects BI

## RESEARCH METHODOLOGY

### Research Design

This study uses a quantitative approach with a questionnaire survey (Fraenkel & Wallen, 2009). According to Shank and Brown (2013), a quantitative study aims at hypothesis testing, where clear steps and objectives can be followed. This study tested hypotheses to predict teacher continuance intention of participating in online professional development.

**Table 2.** Demographic profile of participants

| Demographic background | | Number of participants | Percentage |
|---|---|---|---|
| Gender | Male | 95 | 40.9 |
| | Female | 137 | 59.1 |
| School level | Lower secondary school | 112 | 48.3 |
| | Upper secondary school | 120 | 51.7 |
| Level of education | Undergraduate degree | 217 | 93.5 |
| | Postgraduate degree | 15 | 6.5 |
| Teaching experience | 0-5 years | 43 | 18.5 |
| | 6-10 years | 114 | 49.1 |
| | 11-15 years | 66 | 28.4 |
| | 16-20 years | 7 | 3.0 |
| | More than 20 years | 2 | 0.9 |
| Status of the training | Ongoing | 57 | 24.6 |
| | Passed | 125 | 53.9 |
| | Failed | 50 | 21.6 |

## Instrumentation

This study adopted a research instrument based on List et al. (2020) and Smith and Sivo (2012). A new instrument for the present studies was established regarding the adaptation process. In the first version of the questionnaire, 48 items were adapted for the questionnaire. Three experts then validated the indicators to ensure the instrument suited the study's purpose and context. After this validation process, we dropped three items due to unsuitable to the context of the study and 15 items were revised.

The remaining items were administered for a pilot study to 49 secondary school teachers to examine the validity and reliability further. We used SPSS to examine Cronbach's alpha. The results showed no construct below the threshold of .700, as suggested by (Hair et al., 2016). A varimax rotation was conducted to explore factors in the instrument by using exploratory factor analysis. According to Pallant (2020), sphericity Barlett test should be at $p<.500$, Kaiser-Meyer-Olkin with a value of >.800, and communalities of ≥.300. After this process, six items were deleted as the items did not satisfy the standardized measurement. Therefore, 39 items remained for the primary data collection. The questionnaire was translated using back translation, English and Indonesian language.

## Participant

During the COVID-19 epidemic, secondary school teachers engaged in an OTPD program offered by the Indonesian Ministry of Education and Culture. It is a six-month training program offering a wide range of school subjects and subject-specific pedagogy courses. In 2021, 232 teachers participated in the study. Respondents were chosen using a random sampling method. **Table 2** shows the demographic information of the participants.

## Data Collection

We obtained ethical approval for this investigation before data collection. We used an online survey since it was straightforward to administer and accessible from a variety of devices. (Fraenkel & Wallen, 2009). We reached the participants by WhatsApp and email. We used Google Form to run the online survey, sending participants an email with a link and keeping it available for three weeks.

## Data Analysis

We used SEM (structural equation modelling) with partial least squares SEM (PLS-SEM) to predict teachers' behavioral intention to participate in OTPD programs. SMART PLS 3.0 was used to analyze the model's reliability, validity, and internal consistency. The hypotheses were proven, and a structural model was established.

**Table 3.** Reflective indicator loadings and internal consistency reliability

| Item | Loading | α | CR | AVE |
|---|---|---|---|---|
| BI1 | 0.928 | 0.942 | 0.958 | 0.851 |
| BI2 | 0.927 | | | |
| BI3 | 0.909 | | | |
| BI4 | 0.926 | | | |
| AT1 | 0.921 | 0.943 | 0.959 | 0.855 |
| AT2 | 0.922 | | | |
| AT3 | 0.947 | | | |
| AT4 | 0.907 | | | |
| PU2 | 0.872 | 0.939 | 0.956 | 0.845 |
| PU3 | 0.937 | | | |
| PU4 | 0.934 | | | |
| PU5 | 0.932 | | | |
| PEU1 | 0.849 | 0.906 | 0.934 | 0.781 |
| PEU2 | 0.912 | | | |
| PEU3 | 0.875 | | | |
| PEU4 | 0.897 | | | |
| SC1 | 0.861 | 0.955 | 0.963 | 0.789 |
| SC2 | 0.918 | | | |
| SC3 | 0.886 | | | |
| SC4 | 0.912 | | | |
| SC5 | 0.928 | | | |
| SC6 | 0.861 | | | |
| SC7 | 0.848 | | | |
| CU1 | 0.818 | 0.902 | 0.927 | 0.718 |
| CU2 | 0.845 | | | |
| CU3 | 0.849 | | | |
| CU4 | 0.834 | | | |
| CU5 | 0.888 | | | |
| GD1 | 0.896 | 0.846 | 0.907 | 0.765 |
| GD2 | 0.900 | | | |
| GD3 | 0.825 | | | |
| TF1 | 0.838 | 0.882 | 0.919 | 0.739 |
| TF2 | 0.840 | | | |
| TF3 | 0.897 | | | |
| TF4 | 0.862 | | | |
| DR1 | 0.817 | 0.866 | 0.917 | 0.786 |
| DR2 | 0.916 | | | |
| DR3 | 0.923 | | | |

# RESULTS

## Measurement Models

In this study, we conducted three measurements to evaluate the measurement model: indicator loading and consistency reliability, convergent validity, and discriminant validity, as suggested by Hair et al. (2016).

### *Indicator loadings and internal consistency reliability*

In this study, the indicator loadings were calculated using PLS-SEM results. **Table 3** shows the loading value for all items. Almost all the items met the recommended loading values of >.700 (Hair et al., 2016). However, due to loadings of less than.700, one indicator from PU1 was dropped during the algorithm process in PLS-SEM (Hair et al., 2016). As a result, 38 items remained for the analysis's next step.

Internal consistency reliability refers to the examination findings for statistical consistency across indicators. Internal consistency reliability, according to Hair et al. (2016), should be examined through Cronbach's alpha (α) and composite reliability (CR). (Hair et al., 2016) propose that threshold of α should be >.700 and CR should be >.708. The details of both values are shown in **Table 3**. It shows that α and CR values for all constructs indicates good internal consistency ranging from .846 to .955 for α and .907 to .963 for the CR.

**Table 4.** Forner Larcker

| | AT | BI | CU | DR | GD | PEU | PU | SC | TF |
|---|---|---|---|---|---|---|---|---|---|
| AT | 0.924 | | | | | | | | |
| BI | 0.808 | 0.923 | | | | | | | |
| CU | 0.331 | 0.383 | 0.847 | | | | | | |
| DR | 0.321 | 0.376 | 0.629 | 0.887 | | | | | |
| GD | 0.305 | 0.398 | 0.596 | 0.635 | 0.874 | | | | |
| PEU | 0.687 | 0.617 | 0.511 | 0.498 | 0.474 | 0.884 | | | |
| PU | 0.648 | 0.622 | 0.411 | 0.388 | 0.463 | 0.608 | 0.919 | | |
| SC | 0.747 | 0.799 | 0.409 | 0.413 | 0.457 | 0.691 | 0.612 | 0.888 | |
| TF | 0.377 | 0.364 | 0.557 | 0.601 | 0.460 | 0.495 | 0.442 | 0.394 | 0.860 |

### *Convergent validity*

Convergent validity is one of the means to examine construct validity. Regarding convergent validity, we assess the AVE value. We use A PLS-SEM algorithm to calculate the AVE score and it should be ≥.500, which explains 50% of more of variance. **Table 3** shows that all AVE scores of all constructs are above .005, which mean it explain more than 50% of the variance.

### *Discriminant validity*

According to Hair et al. (2016), discriminant validity refers to how much a construct varies from other constructs. In this study, we evaluated discriminant validity using Forner Larcker, cross-loading, and Heterotrait-Monotrait ratio (HTMT). Based on the evaluation of Forner Larcker criterion (**Table 4**), the discriminant validity was established as the results show that the AVE values of all constructs are less than their shared variance.

Furthermore, we also examined discriminant validity by evaluating cross-loading criterion. **Table 5** reveals that all of the loading values for the indicators on the constructs were greater than the loading values for the other constructs. This implies that the construct indicators are interchangeable.

**Table 5.** Cross-loading

| | AT | BI | CU | DR | GD | PEU | PU | SP | TF |
|---|---|---|---|---|---|---|---|---|---|
| AT1 | 0.921 | 0.734 | 0.312 | 0.308 | 0.261 | 0.620 | 0.621 | 0.709 | 0.341 |
| AT2 | 0.922 | 0.764 | 0.305 | 0.290 | 0.293 | 0.661 | 0.628 | 0.690 | 0.349 |
| AT3 | 0.947 | 0.751 | 0.328 | 0.336 | 0.307 | 0.661 | 0.560 | 0.720 | 0.373 |
| AT4 | 0.907 | 0.736 | 0.277 | 0.253 | 0.265 | 0.595 | 0.588 | 0.643 | 0.330 |
| BI1 | 0.778 | 0.928 | 0.338 | 0.337 | 0.364 | 0.570 | 0.590 | 0.723 | 0.362 |
| BI2 | 0.771 | 0.927 | 0.367 | 0.349 | 0.386 | 0.571 | 0.570 | 0.731 | 0.347 |
| BI3 | 0.703 | 0.909 | 0.335 | 0.335 | 0.356 | 0.576 | 0.579 | 0.721 | 0.333 |
| BI4 | 0.725 | 0.926 | 0.375 | 0.367 | 0.361 | 0.563 | 0.557 | 0.776 | 0.299 |
| CU1 | 0.298 | 0.301 | 0.818 | 0.505 | 0.490 | 0.375 | 0.357 | 0.361 | 0.418 |
| CU2 | 0.250 | 0.286 | 0.845 | 0.539 | 0.505 | 0.399 | 0.374 | 0.337 | 0.482 |
| CU3 | 0.253 | 0.283 | 0.849 | 0.538 | 0.513 | 0.410 | 0.309 | 0.346 | 0.494 |
| CU4 | 0.298 | 0.363 | 0.834 | 0.482 | 0.492 | 0.459 | 0.322 | 0.330 | 0.439 |
| CU5 | 0.301 | 0.388 | 0.888 | 0.593 | 0.523 | 0.519 | 0.369 | 0.356 | 0.523 |
| DR1 | 0.246 | 0.255 | 0.479 | 0.817 | 0.461 | 0.322 | 0.247 | 0.281 | 0.520 |
| DR2 | 0.283 | 0.352 | 0.556 | 0.916 | 0.584 | 0.421 | 0.347 | 0.378 | 0.488 |
| DR3 | 0.315 | 0.372 | 0.617 | 0.923 | 0.620 | 0.539 | 0.407 | 0.414 | 0.586 |
| GD1 | 0.288 | 0.375 | 0.573 | 0.615 | 0.896 | 0.426 | 0.453 | 0.390 | 0.495 |
| GD2 | 0.271 | 0.348 | 0.517 | 0.569 | 0.900 | 0.449 | 0.399 | 0.410 | 0.364 |
| wGD3 | 0.236 | 0.316 | 0.462 | 0.469 | 0.825 | 0.364 | 0.353 | 0.405 | 0.331 |
| PEU1 | 0.511 | 0.476 | 0.446 | 0.462 | 0.432 | 0.849 | 0.504 | 0.529 | 0.438 |
| PEU2 | 0.631 | 0.568 | 0.474 | 0.456 | 0.404 | 0.912 | 0.523 | 0.585 | 0.461 |
| PEU3 | 0.657 | 0.566 | 0.436 | 0.409 | 0.446 | 0.875 | 0.594 | 0.699 | 0.424 |
| PEU4 | 0.618 | 0.567 | 0.449 | 0.438 | 0.394 | 0.897 | 0.524 | 0.621 | 0.430 |
| PU2 | 0.542 | 0.531 | 0.387 | 0.369 | 0.465 | 0.520 | 0.872 | 0.527 | 0.406 |
| PU3 | 0.560 | 0.552 | 0.358 | 0.337 | 0.403 | 0.538 | 0.937 | 0.552 | 0.362 |
| PU4 | 0.582 | 0.575 | 0.369 | 0.374 | 0.414 | 0.584 | 0.934 | 0.540 | 0.437 |
| PU5 | 0.686 | 0.622 | 0.396 | 0.349 | 0.423 | 0.590 | 0.932 | 0.623 | 0.417 |
| SC1 | 0.657 | 0.695 | 0.377 | 0.390 | 0.405 | 0.607 | 0.530 | 0.861 | 0.336 |

**Table 5 (Continued).** Cross-loading

| | AT | BI | CU | DR | GD | PEU | PU | SP | TF |
|---|---|---|---|---|---|---|---|---|---|
| SC2 | 0.682 | 0.757 | 0.406 | 0.374 | 0.422 | 0.607 | 0.562 | 0.918 | 0.344 |
| SC3 | 0.618 | 0.667 | 0.396 | 0.321 | 0.404 | 0.591 | 0.544 | 0.886 | 0.312 |
| SC4 | 0.644 | 0.703 | 0.361 | 0.353 | 0.416 | 0.596 | 0.535 | 0.912 | 0.355 |
| SC5 | 0.662 | 0.729 | 0.348 | 0.375 | 0.416 | 0.625 | 0.543 | 0.928 | 0.380 |
| SC6 | 0.776 | 0.750 | 0.338 | 0.387 | 0.350 | 0.651 | 0.572 | 0.861 | 0.365 |
| SC7 | 0.581 | 0.651 | 0.315 | 0.360 | 0.439 | 0.613 | 0.509 | 0.848 | 0.355 |
| TF1 | 0.364 | 0.313 | 0.502 | 0.540 | 0.381 | 0.476 | 0.446 | 0.328 | 0.838 |
| TF2 | 0.303 | 0.300 | 0.483 | 0.491 | 0.466 | 0.390 | 0.380 | 0.335 | 0.840 |
| TF3 | 0.299 | 0.295 | 0.468 | 0.536 | 0.402 | 0.434 | 0.366 | 0.324 | 0.897 |
| TF4 | 0.324 | 0.346 | 0.457 | 0.491 | 0.335 | 0.390 | 0.314 | 0.372 | 0.862 |

**Table 6.** Heterotrait-Monotrait ratio

| | AT | BI | CU | DR | GD | PEU | PU | SC | TF |
|---|---|---|---|---|---|---|---|---|---|
| AT | | | | | | | | | |
| BI | 0.856 | | | | | | | | |
| CU | 0.358 | 0.416 | | | | | | | |
| DR | 0.350 | 0.407 | 0.700 | | | | | | |
| GD | 0.339 | 0.443 | 0.677 | 0.723 | | | | | |
| PEU | 0.739 | 0.667 | 0.565 | 0.544 | 0.539 | | | | |
| PU | 0.685 | 0.660 | 0.444 | 0.417 | 0.517 | 0.657 | | | |
| SC | 0.783 | 0.841 | 0.440 | 0.442 | 0.513 | 0.739 | 0.643 | | |
| TF | 0.411 | 0.399 | 0.622 | 0.682 | 0.525 | 0.550 | 0.481 | 0.430 | |

**Table 7.** VIF values

| | AT | BI | CU | DR | GD | PEU | PU | SC | TF |
|---|---|---|---|---|---|---|---|---|---|
| AT | | 1.725 | | | | | | | |
| BI | | | | | | | | | |
| CU | | | | | | | 1.730 | | |
| DR | | | | | | 1.565 | | | |
| GD | | | | | | | 1.707 | | |
| PEU | 2.141 | | | | | | 2.193 | | |
| PU | 1.786 | 1.725 | | | | | | | |
| SC | 2.155 | | | | | | 1.999 | | |
| TF | | | | | | 1.565 | | | |

We also examined discriminant validity using HTMT. According to Hair et al. (2016), there is no problem with discriminant validity when HTMT values are lower than .900. **Table 6** shows that all HMTM value were lower than .900, indicating the scores significantly differed from 1 and discriminant validity was established.

## Structural Model Assessment

We conducted some steps to assess the structural model. Hair et al. (2016) proposed the following steps for the assessment process. First, we examined collinearity by reporting variance inflation factor (VIF) value. Furthermore, we examine the structural model relationship in the second step. In the third step, coefficient of determination ($R^2$). In the next step, we reported the effect size of $f^2$ for the relevance of the construct. The compute $R^2$ and $f^2$, we used a blindfolding procedure in PLS-SEM.

### *Collinearity issue*

We examined the collinearity issue by reporting VIF values. According to Hair et al. (2016), there will an collinearity issue if the VIF value is higher than 3.000. **Table 7** shows that all VIF value are below 3.000, therefore we concluded that there is no collinearity issue in this study.

### *Structural model relationship*

We employed bootstrapped sample with 5,000 sub-sampling to examine the path coefficient between endogenous and exogenous constructs. **Table 8** and **Figure 4** show that almost all hypotheses are supported; only CU that was not a significant predictor of PU (β=.037; t=.556; p>0.05) while the other constructs of digital

**Table 8.** Final results

| Hypotheses | β | Mean | Standard deviation | t-statistics | p-values | Significance |
|---|---|---|---|---|---|---|
| 1: CU->PU | .037 | .039 | .067 | .556 | >.005 | Not-supported |
| 2: GD->PU | .155 | .160 | .074 | 2.079 | <.005 | Supported |
| 3: TF->PEU | .306 | .310 | .066 | 4.675 | <.001 | Supported |
| 4: DR->PEU | .314 | .312 | .060 | 5.263 | <.001 | Supported |
| 5: PEU->PU | .292 | .286 | .076 | 3.852 | <.001 | Supported |
| 6: PEU->AT | .243 | .245 | .085 | 2.845 | <.005 | Supported |
| 7: PU->AT | .233 | .230 | .074 | 3.138 | <.005 | Supported |
| 8: SC->PU | .324 | .324 | .084 | 3.868 | <.001 | Supported |
| 9: SC->AT | .437 | .439 | .075 | 5.810 | <.001 | Supported |
| 10: PU->BI | .170 | .170 | .061 | 2.796 | <.005 | Supported |
| 11: AT->BI | .697 | .697 | .057 | 12.325 | <.001 | Supported |

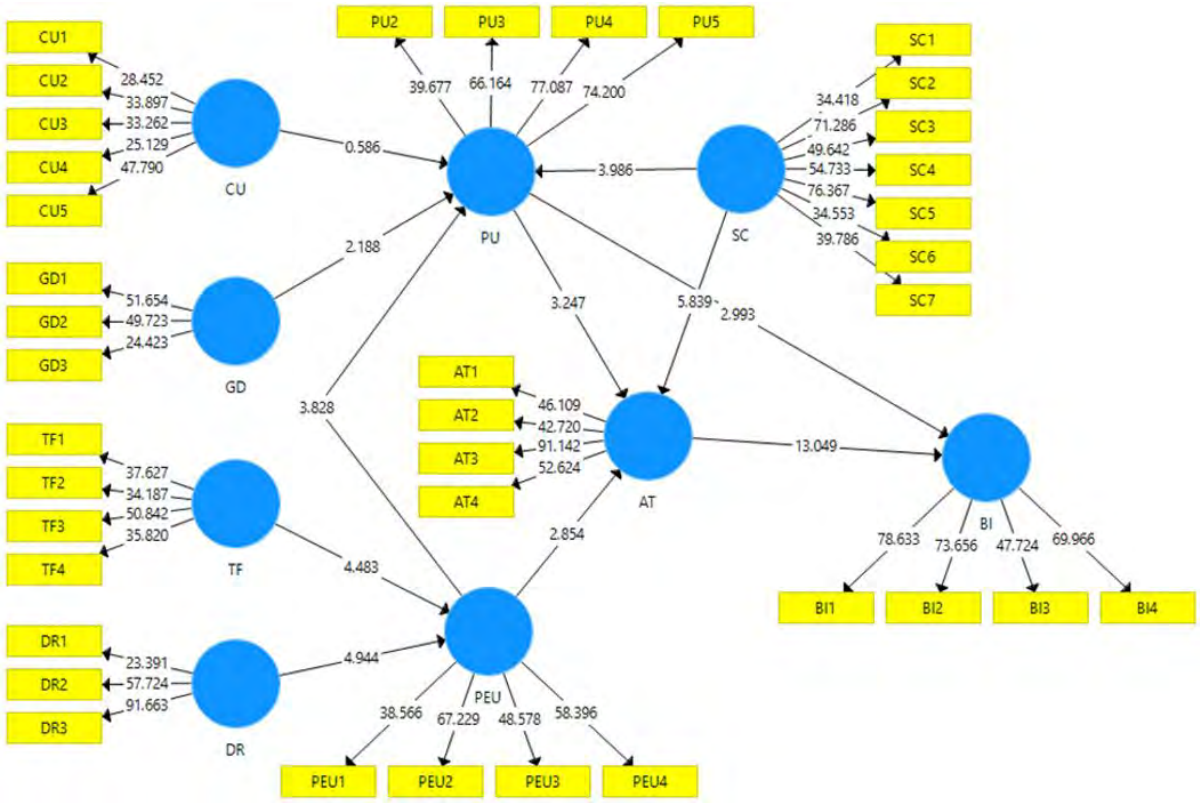


**Figure 4.** Final model

literacy significantly affected either PU or PEU. For instance, GD significantly affected PU (β=.155; t=2.079; p<0.05). Furthermore, TF (β=.306; t=4.675; p<0.01) and DR (β=.314; t=5.262; p<0.05) significantly affected PEU.

In term of behavioral intention to participate in OTPD, the strongest relationship was emerged in hypothesis 11 (β=.697; t=12.325; p<0.001), meaning that AT significantly affected behavior intention to participate in online professional development. Furthermore, the result also showed that PU significantly affected behavioral intention (β=.170; t=2.796; p<0.005).

As discussed previously, apart from digital literary this study also integrates SP as an external factor of teachers' acceptance of online professional development. The result shows that SP significantly affected PU (β=.324; t=4.675; p<0.001) and AT (β=.437; t=5.810; p<0.001).

## *Coefficient of determination*

According to Hair et al. (2016), coefficient of determination ($R^2$) can be used to assess the predictive accuracy of a model. The value of $R^2$ ranges from 0 to 1, a higher level of predictive accuracy is indicated by a higher value of $R^2$. Hair et al. (2016) suggest an $R^2$ value of 0.75 is regarded as strong. On the other hand, $R^2$ value of .50 is moderate, and .25 is weak.

**Table 9.** Coefficient of determination ($R^2$)

| | $R^2$ | Consideration |
|---|---|---|
| Attitude | .644 | Strong |
| Behavioral Intention | .669 | Strong |
| Perceived ease of use | .308 | Moderate |
| Perceived usefulness | .463 | Moderate |

**Table 10.** $f^2$ results

| | $f^2$ | Effect size |
|---|---|---|
| AT->BI | 0.853 | Large |
| CU->PU | 0.001 | No Effect |
| DR->PEU | 0.091 | Small |
| GD->PU | 0.026 | Small |
| PEU>AT | 0.077 | Small |
| PEU->PU | 0.072 | Small |
| PU->AT | 0.086 | Small |
| PU->BI | 0.051 | Small |
| SC->AT | 0.249 | Medium |
| SC-> PU | 0.098 | Small |
| TF>PEU | 0.087 | Small |

**Table 11.** Results of predictive relevance ($Q^2$)

| | $Q^2$ | Predictive relevance |
|---|---|---|
| Attitude | 0.542 | Large |
| Behavioral Intention | 0.561 | Large |
| Perceived ease of use | 0.236 | Medium |
| Perceived usefulness | 0.384 | Large |

**Table 9** shows the coefficient of determination ($R^2$) that indicates AT (.644, strong), behavioral intention (.669, strong), PEU (.308, moderate), and PU (.463, moderate). We can conclude that the model good predictive accuracy.

### *Effect size*

The $f^2$ value measures the influence of an external construct on an endogenous construct. The effect size is used to investigate the real impact of an exogenous construct on an endogenous construct. According to Hair et al. (2016), a value of .02 represents a small effect, a value of .15 represents a medium effect and a value of .35 represents a large effect. **Table 10** reveals that only CU does not have effects on an endogenous construct. In addition, one exogenous construct has a large effect size, and one has a medium effect size, namely AT>BI and SC>AT, respectively. The other have small effect sizes.

### *Predictive relevance*

To examine the predictive usefulness of the proposed model, we calculated Stone-Geisser's ($Q^2$). A model's predictive relevance is required to accurately predict data from indicators. (Hair et al., 2016). According to Hair et al. (2016), when a model's $Q^2$ value is greater than zero, it has satisfied the predictive relevance. We run the blindfolding method to acquire $Q^2$ values. **Table 11** presents the result of the predictive relevance. The result indicates that all endogenous constructs have acceptable values for predictive relevance of the model.

## DISCUSSION

This study examined whether digital literacy and SP affected secondary school teachers' acceptance of online professional developments. Regarding the aim of the study, we developed a questionnaire measuring digital literacy, SP, and acceptance of online professional development. We carried out several phases, namely face and content validity, reliability, and factor analysis, to assess the quality of the questionnaire. Also, to examine the proposed model, we assessed reflective indicator loadings of the model, internal consistency reliability, convergent validity, and discriminant validity. For the model's final evaluation, we used 39

indicators. This study suggests that digital literacy and SP significantly affected teachers' acceptance of online professional development. In terms of the findings, we highlight several critical aspects to discuss.

First, only one hypothesis was not supported. It suggests that the proposed model is appropriate for investigating teachers' adoption of online professional development. It indicates that, except for the construct of CU, all other constructs of critical literacy are valid external variables of TAM. This finding suggests that having sufficient critical literacy, particularly technology-focused, DR, and GU, is necessary for teachers to continue engaging in online professional development.

Regarding List et al. (2020), CU is the top level of critical literacy. Teachers see digital literacy as the reflective process of using technology to accomplish a task. This study suggests that understanding the reflective process of using technology did not significantly affect their PU of online professional development. On the other hand, at the level of technology-focused, teachers focused on mastering specific technology tools. Digital-focused is similar to the conception of digital propensity, emphasizing that digital literacy results from access to and use of technology (Thompson, 2013). Using TPACK framework (Mishra & Koehler, 2006), Mailizar et al. (2021b) have also revealed the significant effect of teacher technological knowledge on their acceptance of online professional development.

Another construct of digital literacy that plays a significant effect on teacher acceptance of online professional development is DR. DR is well-grounded in the literature as a component of digital literacy (List et al., 2020). It has been examined in comparing reading and strategy with digital text (Peterson & Alexander, 2020; Singer & Alexander, 2017). The present study adds insight to the literature on DR by revealing that DR significantly affected teachers' perceived ease of using online professional development platforms. The other construct of digital literacy is GU. Teachers with GU view digital literacy as a reflective process of resolving task goals through technology use on the internet (Mills, 2006). It is clear that the present study suggests GU is a substantial factor of digital literacy that plays an important role in teachers' PU of online professional development.

Second, this study suggests that SP significantly affected teachers PU and AT toward online professional development. This finding is in line with Smith and Sivo (2012) study, revealing that SP was a significant predictor of teachers' intention to engage in e-learning for future professional development. According to Smith and Sivo (2012), the relationship between PU and SC would become as teachers shared their knowledge gained from their professional development.

Third, AT and PU have been widely found to be significant factors for users' acceptance of new technology. In the context of OTPD, previous studies have revealed similar findings (Mailizar et al., 2021b; Smith & Sivo, 2012; Taat & Francis, 2020). Furthermore, the AT has also been widely believed to be a prominent factor in teachers' acceptance of new technology and has been proven in previous studies (Hussein, 2017; Letchumanan & Tarmizi, 2011; Sharma & Chandel, 2013). Therefore, the present study adds insight to a large body of literature on teachers' technology acceptance, particularly in online professional development.

This study is significant in terms of the validation of the extended TAM as an accurate model to predict teachers' acceptance and continued use of OTPD. Also, the present study fills a gap in the literature by revealing the significant direct and indirect effects of four constructs of digital literacy and SP on the acceptance and continued use of OTPD.

The implication of this new finding can be helpful for practitioners, instructional designers, and researchers in the development and implementation of OTPD. It is necessary to equip teachers with sufficient digital literacy to ensure they keep engaging in future professional development. Furthermore, in an OTPD program, this study suggests that a lack of SP would have a negative effect on teachers' PU and AT, which may discourage teachers from participating in OTPD. Therefore, the facilitator needs to encourage a sense of community in OTPD (Smith & Sivo, 2012). In addition, it is also necessary to facilitate social interaction and communities among teachers in the online system.

## CONCLUSION AND FUTURE RESEARCH

This study has examined the effect of digital literacy and SP on teachers' acceptance and continued use of OTPD. This study suggests that digital literacy and SP are valid and significant external factors. This finding

indicates that when teachers have sufficient digital literacy, and the training system facilitates online SP; they will most likely fully engage and participate in online professional development programs. The current study has a methodological limitation which is the questionnaire was delivered through virtual teacher groups. Therefore, we could not confirm that all prospective participants were aware and would like to participate in the study. It is essential to investigate the kinds of SP expected by the teachers in their online professional development for future work.

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