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Evaluating EFL Teachers' Self-efficacy and Attitude Towards Web-based Professional Development Practices: A Rasch Analysis

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Abstract

Teacher professional development (henceforth TPD) activities play a vital role in improving the quality of education, particularly the quality of instructional activities in the classroom. Although there is plenty of research on the use of online-based technology for teacher professional development, little has been done to measure teachers' self-efficacy and attitude towards online-based professional development in the Indonesian school contexts. The current study is aimed to address this gap by measuring self-efficacy and attitudes towards online-based professional development among EFL teachers at three different school levels, such as primary, lower-secondary and upper secondary school levels. A total of 101 EFL teachers from three levels of education (i.e. primary, lower-secondary, and upper-secondary schools) completed Kao, Tsai, and Shih's (2014) self-efficacy and attitude questionnaire. Statistical analyses using the Rasch model were performed to evaluate the collected data. Findings of the current study have showed that most Indonesian EFL teachers possessed a high level of self-efficacy and attitude towards web-based professional development. Findings of the study also revealed teachers were very positive about the usefulness and the ease of use of web-based technology for professional development, reflecting their acceptance towards web-based professional development. The findings emphasise that the high level of teachers' self-efficacy and positive attitude should be carefully considered in the design and application of web-based teacher training programs. Recommendations are offered based upon the findings.

Keywords: *self-efficacy, attitude, web-based professional development, EFL teachers*

1. Introduction

Teacher professional development (henceforth TPD) activities play a vital role in improving the quality of education, particularly the quality of instructional activities in the classroom. TPD activities enable teachers to obtain knowledge and encourage teacher learning (Qi, 2012). Teachers' efforts to obtain the required knowledge, instructional competence as well as practices are believed to help teachers themselves to address particular needs of their students (Yurtseven & Altun, 2017) and, in general, educational needs (Bredeson, 2000). Moreover, teachers' knowledge and experiences enable teachers to creating dynamic changes in educational activities at schools (Hermans et al., 2017). Research also suggests that by attending TPD activities, teachers are enabled to improve their quality of teaching and thus enhance students' learning attainment at schools. Yoon, Duncan, Lee, Scarloss, and Shapley's (2007) review, for example, ~~have~~ showed that TPD activities provide a moderate effect on students' learning attainment at schools in nine studies.

The advancement of information and communication technology (ICT), particularly web technology, has provided teachers with wide access to learning and professional development without having time and space limitations (Kao et al., 2014). Web technology also offers more alternatives for teachers to obtain knowledge, shape their understanding about teaching and to interact with colleagues. Online TPD with the use of web technology is believed to facilitate the development of teachers instructional skills, strategies and improve their technological competence (Chen et al., 2009). Teachers' online groups at Facebook, for example, may also reflect teachers' online communities for professional development enabling teachers to learn together, share their experiences and best practices, and to find alternative solutions for classroom challenges outside their schools (Duncan-Howell, 2010; Macià & García, 2016). A study by Yang and Liu (2004) investigated the benefits and effectiveness of web-based online workshops for creating teacher learning communities. The study revealed that teachers ~~were~~ benefited emotionally and intellectually from attending the workshop. The workshop was observed to provide positive learning effects on the teachers suggesting the value of the web-based professional program in nurturing teachers professional growth.

Research on web-based professional development practices among teachers abounds in literature. Particularly in English as a foreign language (EFL) teaching contexts, Liu and Kleinsasser (2014) investigated the use of web-based asynchronous discussion board as a professional learning tool for seventeen preservice EFL teachers and six in-service EFL teachers. The findings revealed that teachers had a positive perception towards collaborative interaction, reflective practice, and emotional support. Most preservice teachers were observed

to have little opportunity to apply teaching ideas they obtained. In contrast, in-service teachers maintained to delay the report of their classroom application until they achieved success from the application. Kocoglu (2008) explored Turkish EFL student teachers' perception of using an electronic portfolio (e-portfolio) for their TPD tool. The study found that e-portfolio enabled student teachers to stay informed with current technological innovation, maintained their collection of instructional materials, and create a collaboration opportunity with other peers. Although, student teachers were shown to be reluctant to use e-portfolio to develop their reflective thinking ability. A study by Hermans et al. (2017) experimented TPD activities with the use of computer-assisted pronunciation teaching tool (CAPTT) in a dedicated website using Liferay Portal EE (http://www.liferay.com). Seventeen teachers from five schools in the Netherlands participated in the study. They found that teachers needed more time to adapt and use technology to address their classroom needs. Teachers were also shown to be motivated in using a web-based application. Teachers also were observed to develop a willingness to improve the quality of their teaching.

Although teachers' online professional development is practised worldwide (e.g. Bayrakcı, 2009; Khan, 2017; Quigley, 2011; Waheed et al., 2011), face-to-face (F2F) teacher training programs and other conventional TPD activities are still common in many TPD practices across Indonesian schools. Limited budget for TPD and availability of technological infrastructure are still major constraints for Indonesian teachers to participate in online TPD (Sari, 2012). Besides, a study by Widodo and Riandi (2013) has evidenced that many Indonesian teachers prefer to participate in a F2F training program as it provides them with an opportunity to interact with other teachers from different schools directly. Teachers also felt that attending F2F training program allowed them to obtain real training experiences. Our personal experience in providing teachers with hybrid TPD program (combining both F2F and online sessions) in late 2019 also support this claim. Teachers were reported to participate in F2F training sessions, but none attended the online sessions. Such a teachers' preference to F2F professional development, unfortunately, has made them unable to address emerging challenges in the knowledge communities (Sari, 2012). Sari (2012) argues that the conventional method of TPD requires target schools to send a little number of teacher representatives to participate in training programs provided by the government, universities, teacher associations and other communities constraining teachers to develop and exchange knowledge with others.

Literature has identified several factors that constrain teachers from carrying out online professional development, two of which are concerned with teachers' online self-efficacy and their attitude towards online professional development. The term teacher self-efficacy in the

current study is used to reflect teachers' personal belief and expectations in his/her capability to accomplish particular tasks (Bandura et al., 1996). Ghanizadeh and Moafian (2011) perceive that teachers' self-efficacy is fundamentally their future-oriented justification of their competence on particular domains rather than their actual level of particular ability. Kao and Tsai (2009) believe that teachers' success in web-based related activities is particularly associated with their level of internet self-efficacy. Teachers who were frequent to incorporate the web in instructional activities were reported to have a higher level of self-efficacy (Lee & Tsai, 2010). Moreover, a study by Lin and Lu (2010) has shown that teachers' perceived self-efficacy has a strong correlation with their commitment and efforts to incorporate technology in classroom instruction. It is thus, as Kao et al. (2014) had argued, teachers with sufficient web self-efficacy would likely to enhance their willingness to participate or to engage in a web-based professional program. In addition to self-efficacy, teachers' attitude towards technology plays a critical role in determining their acceptance and use of technology for online professional development. A study by Chien, Kao, Yeh, & Lin (2012), for instance, examined the relationship between teachers' attitude and motivation towards online professional development**.** This study found that teachers' attitudes and motivation toward online professional development positively correlated with each other, and play*ed* an important role in using online professional development. Furthermore, findings from Teo's (2012) study shows that teachers' attitude in using computer show a positive attitude and affect their use of technology.

In the Indonesian context, the Indonesian Ministry of Education and Culture's (MoEC) has supported many public schools with computer laboratories and provided a number of ICT training for the teachers. More importantly, several pre-service and in-service teacher education programs have exercised hybrid learning activities for their students (see for example N. Solihati & Mulyono, 2018; Nani Solihati & Mulyono, 2017). In many schools located in big cities, teachers are believed to have sufficient computer skills and accordingly are expected to carry out teaching and learning activities with the assistance of computer technology. Teachers are also expected to participate in professional development activities that require computer skills. While some authors (e.g. Yuwono & Harbon, 2010) have argued that the foreign language teaching in many Indonesian schools have not yet been successful, there is a strong need for teachers' professional learning, particularly with the support from the advanced use of technology.

There is plenty of research on the use of online-based technology for teacher professional development (e.g. Almekhlafi & Almeqdadi, 2010; Kao, Wu, & Tsai, 2011);

however, little has been done to measure teachers' self-efficacy and attitude towards online-based professional development in Indonesian school contexts. The current study thus is aimed to address this gap by measuring self-efficacy and attitudes towards online-based professional development among EFL teachers at three different school levels, namely primary, lower-secondary and upper secondary school levels.. Particularly, the current study attempted to address the following research questions:

1) Do Indonesian EFL teachers possess sufficient self-efficacy and attitude for web-based professional development?

2) Does the Indonesian EFL teachers' self-efficacy and attitude differ across their gender, teaching level and teaching experiences?

2. Methods

2.1. Participants

To be eligible to participate in the current study, the participants must have been English as a foreign language (EFL) teacher at the primary school level, lower or upper secondary school levels. To collect the data, the researchers identified the potential teacher participants through social media (e.g., WhatsApp personal account and WhatsApp groups). Then, an invitation link to the Google Form was sent to the target participants. A total of 101 EFL teachers completed the questionnaire. They involved 32 (31.7%) primary school teachers, 33 (32.7%) lower secondary school teachers and 36 (35.6%) upper-secondary school teachers; and with 19 (18.8%) teachers were male and the remaining 82 (81.2%) were female.

2.2. Instrument

Kao et al.'s (2014) five-point Likert scale questionnaire was adopted to collect the data for the current study. The questionnaire involved 40 items and was classified into two scales: Web-based Professional Development Self-Efficacy (WPDSE) and Attitudes toward Web-Based Professional Development (AWPD). Table 1 below details each of the scale.

Table 1. Details of the subscales and the item numbers

Scale	Subscale	Operasionalised definition	Items
Web-based Professional Development	General self-efficacy	The general self-efficacy (GSE) scale measures teachers' perceived capability in using online-based tools to complete their web-based assignment	Item no Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8

Self-Efficacy (WPDSE)	Interaction self-efficacy	The interaction self-efficacy (ISE) scale assesses teachers' perceived ability to interact with instructors or other peers in web-based professional development activities	Item no Q9, Q10, Q11, Q12, Q13, Q14, Q15
	Applying self-efficacy	The applying self-efficacy (ASE) scale evaluates teachers' level of confidence in applying what they have studied into the future teaching practices	Item no Q16, Q17, Q18, Q19, Q20, Q21, Q22
Attitudes toward Web-Based Professional Development (AWPD)	Perceived usefulness	The perceived usefulness (PU) scale examines the extent to which teachers perceive the positive impact of web-based personal development	Item no Q23, Q24, Q25, Q26
	Perceived ease of use	The perceived ease of use (PEU) scale measures the extent to which teachers perceive that web-based professional development is easy to use	Item no Q27, Q28, Q29, Q30
	Affection	The affection (AF) scale assess the extent to which teachers favour the web-based professional development	Item no 31, 32, 33
	Anxiety	The anxiety (AN) scale measures the extent to which teachers were anxious when participating in web-based professional development activities	Item no 34, 35, 36,
	Behaviour	The behaviour (BV) scale assesses the extent to which teachers express positive behaviour and willingness to use web-based professional development	Item no 37, 38, 39, 40

In addition to the above items, three demographic questions were added, including gender, teaching level and teaching experience. Prior to the survey, all participants were asked to fill out a consent form.

Kao et al.'s (2014) questionnaire was originally written in English. The questionnaire was translated into the native Bahasa Indonesia by two bilingual researchers to allow the teachers to comprehend the information from each of the questionnaire items. The Indonesian translation then was sent to another researcher to validate the questionnaire. As suggested by Zulaiha and Mulyono (2020), each of the translated items was read and re-read to ensure its readability and to maintain the intended meaning of the original questionnaire.

2.3. *Analysis procedure*

Several statistical analyses were performed using Rasch modelling method, including Rasch model fit analysis for screening analysis, reliability assessment, person-item mapping and differences. The objective, type of statistical analysis and the threshold value for each analysis are summarised in the following table.

Table 2. Statistical analyses and the measurement criteria

Types of analysis	Objective	Statistical analysis	Measurement criteria and the threshold value
Data screening	To evaluate whether the observed model fit the requirement of the Rasch Model (Ningrum et al., 2019)	Infit and outfit statistics	The acceptable range for Infit and Outfit statistics value between 0.60 and 1.40, and for Z-standardised (Zstd) value ranges between -2 and +2 (Huang et al., 2020; Ling Lee et al., 2020; Mulyono et al., 2020)
Reliability assessment	To assess the potential person reproducibility in a new sample when they are exposed to the same item (Chang et al., 2014).	Person separation reliability test	The person separation index should be higher than 2, and the Cronbach's α is greater than 0.8
Item mapping and bias	To assess potential item difficulty across the participants, and to evaluate potential bias emerged in reference to the participants' characteristics	• Item and person maps • Differential item functioning (DIF)	DIF value greater than 5, and significant

Prior to the analysis, the data were tabulated using Excel, and with the use of WINSTEP application version 4.5.1, the raw scores for each participant were transformed into log odd units (logit).

As discussed earlier, the number of initial teacher participants that completed the questionnaire was 101 EFL teacher participants. The data from 101 participants were screened using Infit and Outfit statistics to fit the Rasch model. It was found that 42 data samples did not meet the threshold for the Mean Square (MNSQ) and Z-Standard (ZSTD) in Infit-Outfit statistics (see Table 1) and accordingly were removed (Linacre, 2010; Mulyono et al., 2020). The remaining 59 samples included 20 primary school (PS) teachers, 20 lower secondary (LS) teachers, and 19 upper secondary school (US) teachers. Many of the participants were female (N=44, 74.6%) and male (N=15, 25.4%). The total of 59 samples still met the recommended threshold for the sample size of minimum 50 participants (Linacre, 1994; Ling Lee et al., 2020; Mulyono et al., 2020).

3. Findings of Rasch analysis

3.1. Reliability of the instrument

The reliability of the questionnaire was assessed using a person separation reliability calculation (Mulyono et al., 2020; Van Zile-Tamsen, 2017). The assessment criteria for the person separation index should be greater than 2 with reliability higher than 0.8 (Linacre,

2018; Van Zile-Tamsen, 2017). The result of person separation reliability for the global scale and subscales of Kao et al. (2014) questionnaires is detailed Table 3 below.

Table 3. Instrument reliability

Scale	G	GSE	ISE	ASE	PU	PEU	AF	AN	BV
Person mean logits	0.41	5.01	2.13	5.09	4.50	3.26	4.97	-0.75	4.81
Person reliability	0.91	0.47	0.75	0.78	0.73	0.82	0.67	0.81	0.85
Person separation index	3.11	.95	1.75	1.87	1.66	2.16	1.42	1.99	2.42

Note: G=Global scale, GSE=general self-efficacy subscale, ISE=interaction self-efficacy subscale, ASE=Applying self-efficacy subscale, PU=perceived usefulness subscale, PEU=perceived ease of use subscale, AF=affection scale, AN=anxiety scale, BV=behaviour subscale.

As shown in Table 3, the global scale was observed to have an excellent reliability level (α = 0.91). The reliability of 'Perceived ease of use', 'Anxiety' and 'Behavior subscales were considered good (α_{PEU} = 0.82, α_{AN} = 0.80, and α_{BV} = 0.85) (Gliner et al., 2017). According to Gliner et al. (2017), a reliability measure with above 0.60 reliability coefficient was still acceptable for use in social research in the educational fields Accordingly, the 'Interaction self-efficacy', 'Applying self-efficacy', 'Perceived usefulness' and 'Affection' subscales were still sufficient for use (α_{ISE} = 0.75, α_{ASE} = 0.78, α_{PU} = 0.73, α_{AF} = 0.67); while the 'General self-efficacy' subscale (α_{GSE} = 0.47) was removed from the analysis. It is critical to highlight that the lower of GSE subscale was likely due to the small number of the samples (N=59) that participated in the current study.

3.2. EFL teachers' level of self-efficacy and attitudes

The descriptive analysis of the person statistics showed the person mean (M_p) was 3.08 logit value (LV), and the person standard deviation (SD_p) was 2.02 LV. In addition, the analysis of the item statistics revealed the item mean (M_i) was 0.00 LV and the item standard deviation (SD_i) was 1.33 LV. Item and person map (also known as Wright Maps) was developed to depict the spread of EFL teachers' perceptions and the distribution item difficulty levels in the questionnaire (see Figure 1). The left side of the map shows the distribution of the measured ability of the respondents from the most able at the top to least able at the bottom. The distribution also describes the EFL teachers' level of self-efficacy and attitude towards the web-based professional development, ranging from the very low level of self-efficacy and attitude (LV < -4.04) to the very high level (LV > 2.02).

In addition, the right side of the map depicts the distribution of the most difficult items at the top (Q3, LV=4.06; Q6, LV= 3.90) to the least difficult item at the bottom (Q1, LV=-

2.30). Interestingly, the subscale 'Anxiety' had three difficulty items (i.e. Q35, Q36, Q34) with two standard deviations above the mean item difficulty (M_i). The three items in the subscale 'GSE' (i.e. Q1, Q2, Q6) were observed to be the easiest items with standard deviations below the mean item difficulty level (M_i). The findings indicate that the questionnaire can be used to measure general self-efficacy (GSE) of EFL teachers in using online professional development, but is difficult to identify the anxiety (AN) of EFL teachers' attitude toward online professional development.

Figure 1
Item-person Wright maps (N=59)
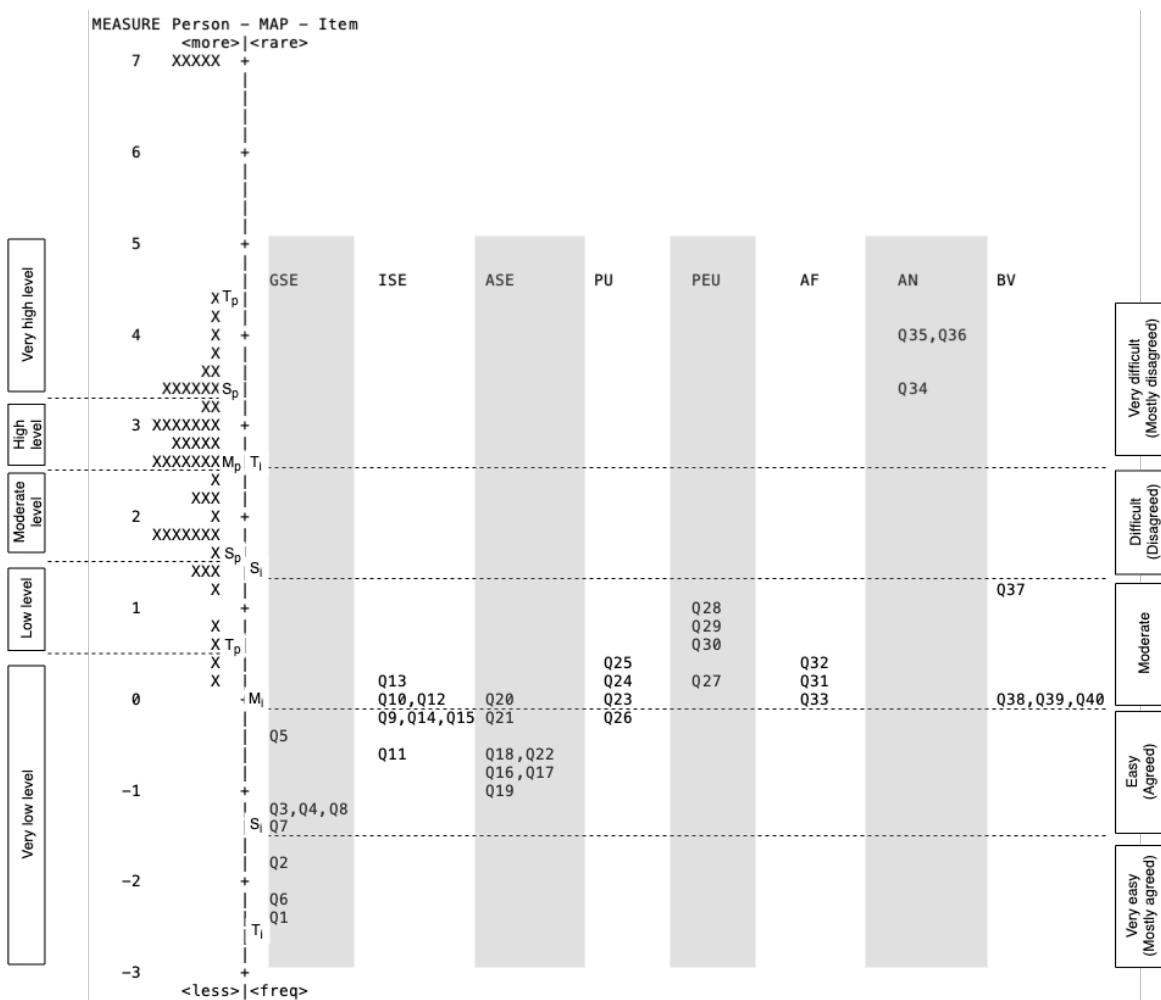
Note: X represents one person, M = mean, S = one standard-deviation, T = two standard deviation of mean

Based upon the person mean (M_p) as well as the person standard deviation (SD_p) shown in Figure 1 above, it was observed that many Indonesian EFL teachers possessed a high level of self-efficacy and attitude that promoted the practice of web-based professional

development. Specifically, teachers' level of self-efficacy remained moderate to a very high level and with positive affection and behaviour (i.e., moderate to high level). It is important to highlight from the findings that 53.7% of the teachers possessed a moderate to a high level of anxiety.

Table 4. EFL Teachers' self-efficacy and attitude level

Sub-scale	Very high level	High level	Moderate level	Low level	Very low level	Total
Interaction self-efficacy	26	10	15	8	0	59
Applying self-efficacy	26	15	11	6	1	59
Perceived usefulness	25	11	17	5	1	59
Perceived ease of use	21	21	10	5	2	59
Affection	23	9	22	3	2	59
Anxiety	7	11	11	12	13	54*
Behaviour	28	17	8	4	2	59

*five records were excluded by the system in the WINTSTEP report

3.3. Differences of self-efficacy and attitude across the EFL teachers' demographic variables

Table 5 classifies the EFL teachers' level of efficacy and attitude towards the web-based professional development in reference to their demographic variables, such as the teachers' gender, teaching level and teaching experience.

Table 5. EFL Teachers' self-efficacy and attitude level in reference to demographic variables

Demography	Very high level	High level	Moderate level	Low level	Very low level	Total
Gender						
Male	4	3	3	4	1	15
Female	13	18	10	2	1	44
Total	17	21	13	6	2	59
Teaching level						
Primary School	6	7	5	1	1	20
Lower Secondary School	6	8	5	1	0	20
Upper secondary school	5	6	3	4	1	19
Total	17	21	13	6	2	59
Teaching experience						
Less than 5 years	0	1	1	0	0	2
Between 5 and 10 years	7	9	8	4	1	29
Between 10 and 15 years	7	6	4	2	1	20
More than 15 years	3	5	0	0	0	8
Total	17	21	13	6	2	59

As shown in Table 5, female teachers have more self-efficacy and positive attitude than male, and teachers with more years of teaching experience were observed to possess a higher level of self-efficacy and attitude. The findings also showed that teachers teaching in primary schools and secondary schools had comparable levels.

In addition to the Wright map, the analysis of differential item functioning (DIF) using Rasch-Welch tests was performed to allow a deeper understanding related to the difference of teachers' self-efficacy and attitude across the demographic variables (Chan & Subramaniam, 2020). The threshold for the DIF value should be higher than 5 and is significant. The evaluation of DIF showed a significant difference on teachers' behaviour (i.e., Q37) between lower-secondary (LS) teachers and upper-secondary (US) school teachers (DIF contrast = 1.18, t = 2.40, $p < 0.05$). The LS teachers were shown to spend more time using web-based professional development than the US teachers.

4. Discussion

Findings of the current study have shown that most Indonesian EFL teachers possessed sufficient levels of self-efficacy and attitude towards web-based professional development. The statistical analyses using the Rasch model revealed that most of the teachers were able to interact with instructors or other colleagues in particular web-based professional activities. Teachers were also observed to have a high level of self-confidence in applying what they have learned to improve their future teaching performance. Furthermore, the findings of the study revealed teachers were very positive about the usefulness and the ease of use of web-based technology for professional development, reflecting their acceptance towards web-based professional development.

It is critical to highlight that teachers self-rated efficacy may not reflect the actual levels of their computer knowledge, competence and self-confidence for web-based professional development (Son et al., 2011). Although, the high level of EFL teachers' self-efficacy as revealed in the current study might be due to the Ministry of Education and Culture's (MoEC) regulation that have required teachers to participate in a web-based teacher training program in order to obtain a teaching qualification certificate. Another possible explanation for the high level of teachers' self-efficacy might be that teachers have been using social media for academic purposes. Teachers' frequent use of social media has been a strong indicator of their high self-efficacy towards web-based professional development. A study by Setiawan and Phillipson (2020) examining the relationships between social media use in an academic setting and self-efficacy have found that there is a high correlation between the frequency of social

media use and technological self-efficacy. Moreover, findings of the study suggest that teachers' use of social media for professional development is statistically correlated with their technological and pedagogical knowledge (TPK) and technological, pedagogical and content knowledge (TPACK).

Although EFL teachers' level of self-efficacy, attitude and their acceptance of web-based professional development remained high as revealed in the current study, teachers were observed to be anxious as well as uncomfortable in of using web-based technology for professional development. Such teachers' conditions reflect what is called as *technological anxiety* (see Loyd & Gressard, 1984). The fast advancement of technology may promote deep stress and uncomfortable situations for teachers (Sivakumaran & Lux, 2011). Some literature have suggested that deep stress and uncomfortable situations are two salient factors that contribute to their reluctance to carry out web-based professional development (see Sari, 2012; Widodo & Riandi, 2013). Preparing interesting and enjoyable online teacher training programs are required to reduce technological anxiety. Besides they could increase teachers' motivation as well as satisfaction towards web-based professional development.

The result of Rasch analyses also revealed that female teachers have more self-efficacy and positive attitude than males, and teachers with more years of teaching experience were observed to possess a higher level of self-efficacy and attitude. This may be because teachers with more years of teaching experience had obtained more technological training and have been benefited from the use of web-based professional development. The finding confirms an earlier study by Ghanizadeh and Moafian (2011) who found the significant correlation between teachers' self-efficacy, their teaching experience as well as their age. Although, it is important to note that teachers teaching in primary schools and secondary schools had comparable levels of self-efficacy. The level of web-based self-efficacy of teachers from the two school levels are observed to be above average.

5. Conclusion

The current study is aimed to examine the self-efficacy and attitudes towards online-based professional development among EFL teachers at three different school levels, such as primary, lower-secondary and upper secondary school levels. Teachers in the study are shown to possess a high level of interaction and application self-efficacy in addition to their positive attitude towards web-based professional development. The high level of teachers' self-efficacy and positive attitude should be carefully considered in the design and application of web-based teacher training programs. Whereas technological anxiety has been identified as an

issue, web-based professional development thus should also be designed to be enjoyable for teachers and with sufficient technological supports available. Such supports would enable teachers to address particular technical problems during their web-based professional development training.

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7. Conflicts of Interest:

The authors declare no conflict of interest.

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