



An examination of Indonesian teachers' and students' perception and level of digital citizenship

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ABSTRACT

Despite the advanced development of technology has played a critical role in promoting a global community for people around the globe, it has been paid little attention in the literature that explores teachers' and students' readiness to become part of the digital citizenship particularly in the Indonesian education context. It is thus the objective of the present study to examine Indonesian teachers' and students' perception and their level of digital citizenship. Using a non-probability sampling technique, a total of 157 participants participated in the survey, including 39 teachers and 118 students. Many participants were from vocational-secondary schools (N = 58) and non-vocational secondary schools (N = 99). However, after a screening process, of 157 datasets, only 98 data were used for the quantitative data analysis using the Rasch modelling. Rasch modelling method was used for the quantitative data analysis. The findings of the current study revealed that teachers and students had a high-level level of digital citizenship. The teacher and student participants also had a positive view digital citizenship. However, although teachers and students perceived that the internet had helped them develop an understanding of political and social issues, they were reported to have fewer political activities online. They were reluctant to discuss political and social issues in the online community. Findings also showed that the participants' political activity was statistically different in reference to their age, although teachers and students were shown to have a similar level of digital citizenship. Recommendations were thus offered based on the findings.

1. Introduction

The advancement of technology has significantly impacted society, particularly how it enables people to interact and engage with others in the public domain. Some authors assert that the increase of teachers' and students' access to a number of online communities allows them to receive information about the current issues and thus encourages them to participate in the global discussion [1–4]. Choi [4] asserts that people's online activities over web-based applications influence the way they think, communicate, and participate in the digital community. By citing some literature, Kim and Choi [5] suggest that young individuals' participation in digital and web-based activities can positively nurture their cognitive and emotional skills and, accordingly, has encouraged their participation in both online and offline communities. Choi [4] argues that the advanced digital networking media and technology has offered a new perspective that allows people to view themselves, others, their community and the borderless world.

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The critical issue of teachers' and students' active engagement in the global discussion concerns whether or not they could be responsible for their action in the online community [1] in addition to rights, safety and security issues [6]. In his book, Ribble [6] has reminded us that many people exposed inappropriate behaviour, including misuse and abuse of technology application in a particular environment in our community. While individual interests, motives, and perspectives are diverse, a certain online community has developed rules about the types of citizen behaviour considered acceptable or unacceptable [6].

The term 'digital citizenship' is used to reflect on the ethical, safe, and responsible use of Internet technologies [7]. More specifically, the term is referred to a citizen behaviour when using a digital application to interact and engage in an online community [8]. According to Lucey and Lin [9], the role of technology is posited as a digital tool or application to assist every individual in obtaining particular social goals. In other words, individual who has a sufficient level of digital citizenship could use their specific knowledge and skills to act in appropriate manners while using technology in an online interaction or communication [10]. In the educational setting, the term 'digital citizenship' is perceived to reflect teachers' and students' responsible digital behaviour allowing them to use digital applications safely and effectively support their academic, social and emotional well-being [11]. The increase of digitalisation in educational sectors, particularly due to the spread of the Covid 19 pandemic [12], has impacted not only the rise of the awareness of digital citizenship but also the concept and practice of such type of citizenship see Ref. [13]. Lauricella et al. [7] suggest that digital citizenship has been perceived as one of the many essential skills that allows students to prepare themselves as 21st-century learners.

Although the role of citizenship has been the topic of debate in the global community [4,7,10,11,14], the discussion of digital citizenship in Indonesian secondary school settings is still reluctant. For instance, A current survey conducted by Prasetyo [15] was aimed to evaluate the level of digital citizenship readiness among Indonesian secondary schools by observing the contributing variables such as internet skills and attitudes and computer self-efficacy. Although the data presented in the study have suggested the students' level of the contributing variables, unfortunately, they did not indicate the level of students' readiness for digital citizenship. Other study by Gayatri et al. [16] was proposed to examine the potential risk of 400 Indonesian children and young adolescents aged between 10 and 19. The study was sufficient in providing information about the technology infrastructure and types of applications used by the participants and the motives of using such technology. However, the study fails to provide the expected findings regarding the risk of the participants' online activities and, most importantly, the extent to which digital citizenship may help the participants to address the risks. Another study by Triastuti [17] was conducted to discuss digital citizenship in Indonesia, but unfortunately, it did not reflect any essential findings to represent the secondary school teachers and students. Moreover, it is critical that the previous studies unlikely address the theoretical foundations that reflect the nature of the digital citizenship. The previous literature mainly describes the constructs of digital citizenship from the aspect of one' technological readiness and competence; and thus, a comprehensive view of digital citizenship is thus required to help understand how the Indonesian teachers and students perceive such a concept. In other words, the previous studies in the Indonesian setting do not seem to provide a clear picture of the level of digital citizenship among teachers and students. Thus, the objective of the present study was to examine the teachers' and students' perception and level of digital citizenship. The study was aimed to answer two research questions as below:

- 1) What are teachers' and students' perception and level of digital citizenship?
- 2) Do teachers' and students' perception and level of digital citizenship differ in reference to their demographic background?

1.1. Literature review

As discussed earlier in the introduction section, the current study views teachers' and students' digital citizenship as their responsible behaviour in using digital technology to communicate, interact and engage within online discussions. Teachers and students who have sufficient awareness about digital citizenship are believed to use their specific knowledge and skills about the digital environment as well as the internet and online communication [10]. Martin et al. [11] add that such knowledge and skills enable teachers and students to maintain their actions and behaviours inappropriate when using digital technology to safely and effectively achieve online communication goals. Martin et al. [11] affirm much safe and effective online communications could support teachers' academic, social and emotional well-being. The safety issue in defining digital citizenship is critical that many teachers and students have been the target of trolling and cyberbullying see Ref. [1]. Choi et al. [1] assume that teachers should be a model of digital citizenship practitioners. In this case, teachers should have sufficient skills and knowledge that make them capable and competent digital citizens.

The extant literature has explored several constructs that develop digital citizenship. For example, Kim and Choi [5] proposed four main categories that should be included in reflecting an individual's digital citizenship, such as self-identity, belief, protection and healthy digital use. Jones and Mitchel [18] suggest two main constructs to measure the digital citizenship of young people, including online respect and online civic engagement. Particularly, for the current study, we adopt the domains that develop digital citizenship as offered by Choi et al. [19]. In his seminal paper, Choi et al. [19] propose five domains to define an individual' digital citizenship, including internet political activism, technical skills, local/global awareness, critical perspective, and network agency.

The first domain of digital citizenship is known as internet political activism (IPA). The IPA domain refers to teachers' or students' online participation in particular political activity or events that allows express or speak up for their interests. Individuals that are active politically are shown to participate in public discussions and work with other people to organise or make changes within the society. The second domain concerns individual technical skills. In the context of the current study, the technical skills (TS) domain represents teachers' and students' ability to use technology media or other open-source applications to access information relevant to their interests. Such technical skills are reflected by teachers' and students' ability to use web applications to search and access

information needed on a daily basis.

Besides internet political activism and technical skills, digital citizenship is also developed by teachers and students being aware of local and global issues. In addition, the other critical perspective (CP) domain is concerned with teachers' and students' ability to understand different perspectives or to use other people's viewpoints on a particular issue to help develop their ideas. Furthermore, the domain indicates how teachers and students are able to evaluate certain issues, obtain more information from other society members and express their viewpoints while are engaged in both offline and online discussion. Finally, the network agency (NA) domain explores teachers' and students' ability to control, use, and disseminate information to other individuals in their society.

2. Methods

2.1. The setting of the study and the sample

The current study adopted the survey design to collect the data related to the teachers' and students' level and perception of digital citizenship. The current study was conducted in the context of secondary schools in Indonesia. Prior to the study, the study protocol that informed the participants related to the objective and procedure was approved by the local ethical committee of State Polytechnic of Media Kreatif, Jakarta, Indonesia Number: 9512/PL27.15/TU/2021. The participants were also informed that their participation was voluntary, and their identity was removed during the data collection, analysis and publication of the study findings. Participants gave their consents when completing the study questionnaire. The sample for the current study was selected using a non-probability sampling technique. Particularly, with the use of convenience sampling, a total of 39 teachers and 118 students from vocational and non-vocational schools in the Indonesian capital city of Jakarta participated completed the questionnaire. The choice to exercise the convenience sampling was made in reference to low-cost, efficient as it was easy for implementation and the access availability to the study participants. As suggested by Cohen et al. [20], convenience sampling enabled the researchers to invite the nearest individuals to serve as study participants. To this end, the current study did not aim to represent any group in the whole population nor to generalise the study findings to the wider population [20, see p. 218]. The student participants were aged between 14 and 18, and the teachers were aged 22 to 60. The demography of the participants was detailed in the following Table 1.

3. Data collecting instrument

The quantitative data for the current study was collected using a survey. A survey questionnaire was adapted from the earlier study by Choi et al. [19] and distributed to the target participants. Choi et al.'s self-report Digital Citizenship Scale (DCS) questionnaire comprised twenty-six items and was developed using a five-point Likert scale ranging from strongly agree (scored by 5), agree (scored by 4), neutral (scored by 3), disagree (scored by 2) and strongly disagree (scored by 1). The twenty-six items were classified into five domains: internet political activism, technical skills, local/global awareness, critical perspective, and network agency (see Table 2). As suggested earlier, the internet political activism (IPA) domain refers to teachers' or students' online participation in particular political activity or events that allows express or speak up for their interests.

In the questionnaire, the IPA aspects comprised nine items and were labelled with Q1 to Q9. The technical skills (TS) domain represents teachers' and students' ability to use technology media or other open-source applications to access their interests. The skills are indicated by their use of web applications on a daily basis. Four items in the technical skill domain included Q10 to Q13. The local/global awareness (LGA) domain concerns teachers' and students' consumption of information about particular local and global issues. The LGA included two items, i.e. Q14 and Q15. Finally, the critical perspective (CP) domain is shown as teachers' and students' ability to understand different perspectives or to use other people's viewpoints on particular issues to help develop their ideas. The CP domain was reflected in Q16 to Q22. Finally, the questionnaire includes the network agency (NA) domain that explores teachers' and students' ability to control, use, and disseminate information to other individuals in their society. The NA domain is comprised of four items labelled with Q23 to Q26.

The adoption of Choi et al.'s [19] self-report Digital Citizenship Scale (DCS) questionnaire was done in reference to the current participation of Indonesian citizens in political debates on social media [21–23]. It is generally observed that Indonesia is an exquisitely diverse and complex country, comprising hundreds of distinct cultures and languages. Religion, language and ethnicity have a long history of having formative effects on the Indonesian political culture, where many religions and local values are routinely

Table 1
Participant demography.

	Vocational schools		Non-vocational schools	
	Public (labelled K)	Private (labelled P)	Public (labelled N)	Private (labelled M)
Participant (N)				
Teachers (T)	3	17	14	5
Age				
<25	0	1	1	0
26 - 30	0	2	0	1
31 - 40	1	3	6	1
40<	2	11	7	3
Students (S)	3	35	74	6
Total (T + S)	6	52	88	11

Table 2
Sample of the questionnaire items Choi et al.'s [19] study.

Domain	Item
Internet political activism (IPA)	I attend political meetings or public forums on local, town, or school affairs via online methods
Technical skills (TS)	I am able to use digital technologies (e.g., mobile/smart phones, Tablet PCs, Laptops, PCs) to achieve the goals I pursue
Local/Global awareness (LGA)	I am more aware of global issues through using the Internet.
Critical perspective (CP)	I think online participation is an effective way to make a change to something I believe to be unfair or unjust
Network agency (NA)	Where possible, I comment on other people's writings in news websites, blogs, or SNSs I visit

For the detail, see Choi et al.'s [19].

integrated into political dialogues and have an impact on decision-making both at the local and national level. The high level of diversity present in many contexts motivates people from diverse religious, ethnic, and cultural backgrounds to participate in political debates, helping to highlight and champion the interests of their respective communities, as well as providing an opportunity to express and explore the concept of identity. The proliferation of social media networks in Indonesia has enabled people to easily engage in political discourse by providing commentary on topics presented by their peers on these platforms [24]. Their involvement in commenting, opining and critically evaluating certain issues published on news portals, social media posts, or viral events has indicated their awareness of global issues and reflected their eagerness to make changes when they perceive something to be unfair, or prevent the emergence of anxiety, hatred [21,25] or the formation of tribal nations within the Indonesian society [23].

The questionnaire was developed online using Google Forms and distributed to the target participants using the Google Forms link. The link was sent directly to the accessible and potential teacher and student participants via social media. Access to the study questionnaire was also posted in teachers' and students' social media groups, such as school WhatsApp groups, with permission from the group administrators. The original questionnaire was reported to have a high level of reliability with Cronbach's alpha was at 0.88 for the whole items, and so the reliability of the IPA domain (Cronbach's alpha = 0.83), TS domain (Cronbach's alpha = 0.84), LGA domain (Cronbach's alpha = 0.89), and CP domain (Cronbach's alpha = 0.80) respectively. Only the NA domain was shown to have a reasonable level of internal consistency with Cronbach's alpha = 0.67). The comparison of the reliability level between the earlier study and the current study is shown in Table 3.

4. Data analysis

The quantitative data analysis was done using a Rasch model analysis following the procedure offered by Ningsih et al. [26]. First, the data were downloaded from the Google form server and tabulated in an excel file. The data then were coded, and the teachers' and students' identities were removed from the data to maintain the anonymity of the data. Next, the coded data were converted into a log-odd unit (logit) to keep the interval of the ordinal data at the same size [27]. The conversion from ordinal data into logits data and further Rasch model analyses were done using WINSTEP software version 5.4.0. After the conversion, Rasch fit statistical analysis was performed to examine the appropriateness of the data. Some authors [26,28,29] also suggest that the Rasch fit statistical analysis could be employed to screen the data from misbehaving participants, or those who did not seriously complete the questionnaire were observed. To this end, we observed the MNSQ logit values from each participant. As suggested in the previous literature, the MNSQ logit values higher than +2 or lower than -2 was considered inappropriate due to its potential to distort or degrade the measurement system [30, p. 167]. Such logit values was also examined to indicate the misbehaving participant and was considered outliers [28,29]. Of 157 participants, 59 logit data were considered outliers and thus removed. The remaining 98 logit data then were analyzed using the Rasch model, including the logit data from 21 teachers and 77 students. Linacre [31] suggest that the minimum sample size for Rasch statistical analysis is 50 sample, and accordingly a total of 98 sample size of the current study is still sufficient. Some authors believed that the sample size within the range of 100 is still appropriate for Rasch analysis and produce accurate measurements [26,31-33]. As calculated earlier, the dataset from the study samples has undergone Rasch fit analysis and the result showed that the data fits the Rasch model for both items and persons.

Table 3
Reliability of the data collecting instrument.

	Items No	Choi et al.'s [19] study	The current study
Global domain (N = 26 items)		0.88	0.91
Subdomain			
Internet political activism (IPA)	Q1-9	0.83	0.87
Technical skills (TS)	Q10-13	0.84	0.83
Local/Global awareness (LGA)	Q14-15	0.89	0.64
Critical perspective (CP)	Q16-22	0.80	0.83
Network agency (NA)	Q23-26	0.67	0.68

5. Results and discussion

5.1. Descriptive statistics

Rasch analysis for the descriptive statistics included the person summary statistics and the item summary statistics. The summary statistics as in Table 4 showed that the person logit mean was observed at 88.9 while the item was at 335 with the sample standard deviation of 12.4 and 52.7, respectively. The summary also highlighted two reliability indexes; i.e. person and item reliabilities. In classical test theory (CTT), this person reliability analysis is done to evaluate the internal consistency of a study instrument. In Rasch analysis, person reliability is not only employed to examine the level of internal consistency of the study instrument, but also is used to distinguish the study participants' agreeing level. While the item reliability is not present in CTT, the Rasch item reliability analysis was done to evaluate if the items were reproducible by another group of samples [34,35]. The person reliability was calculated at 0.91, while the item reliability was higher at 0.98. The person and item logits separation were reported consecutively at 3.22 and 7.28. The finding has indicated that the study instrument had a high level of internal consistency. More importantly, the instrument was able to distinguish the ability of person and items. Furthermore, the high level of item questionnaire reliability has indicated that sample of the current study's sample was sufficient for the measurement of Choi et al.'s [19] self-report Digital Citizenship Scale (DCS) questionnaire.

5.1.1. Level of digital citizenship

The first research questions asked what level of digital citizenship teachers and students already had. To address the first research question, the current study evaluated the distribution of teachers' and students' logit data on four domains of the inquiry, i.e. Internet Political Activism (IPA), Technical skills (TS), Local/Global awareness (LGA), Critical perspective (CP) and Network agency (NA). Wright map was developed to describe the distribution of the logit data and was shown in Fig. 1. Table 5 summarises the participants' level of digital citizenship.

"-" represents 1 person. "#" represents 2 persons. M_p : person mean; S_p : one standard deviation of the person mean; T_p : two standard deviations of the person mean; M_i : item mean; S_i : one standard deviation of the item mean; T_i : two standard deviations of the item mean; (Internet Political Activism (IPA): Q1-Q9, Technical Skills (TS): Q10-Q13, Local/Global Awareness (LGA): Q14-Q15, Critical Perspective (CP): Q16-Q22, Network Agency (NA): Q23-Q26).

As shown in Fig. 1, the distribution of logit was divided into two main areas: the left area reflected the distribution of person of logit, and the other was for the item logit. The person logit was divided into five levels to indicate the participants level of digital citizenship, i.e. very high, high, moderate, low and very low levels. As suggested by Rusland et al. [36], the division into five levels were done by classifying the person logit value in reference to their difficulty level as indicated in the left-side of the Wright-person map above. The logit values above one standard deviation of the person mean logit (S) are considered as high level, and those between the person mean (M) and one standard deviation of the person mean logit (S) are regarded as high level. The logit values between S below M and M are classified as moderate level, and those between two standard deviation of the person mean logit (T) below mean and S below M were low level. Finally, the logit values fall below T below M was observed to indicate very low level. The Wright Map analysis of the logit data revealed that many of the participants had a moderate level of digital citizenship (35.71%, $M = 0.09$ logit) and a high (42.86%, $M = 1.37$ logit) to a very high level of digital citizenship (9.18%, $M = 2.76$ logit). The findings indicated that both teachers and students had a sufficient level of awareness related to digital citizenship. The findings also showed that teachers and students from non-vocational schools were observed to have a higher level of digital citizenship than those in the vocational schools.

From the digital citizenship aspects, it was reported that teachers and students had a high level of technological skill ($M = -1.92$ logit) with a sufficient level of awareness about the local/global scale ($M = -1.13$ logit). Furthermore, teachers and students were shown to have an adequate level of critical perspective (CP). Teachers and students acknowledged that the internet had helped them develop their understanding of particular issues ($Q17 = -0.82$ logit), and it assisted them to promote their offline events ($Q19 = -0.96$ logit). However, it is interesting that teachers and students were reported to have less political activity online. Teachers and students seemed reluctant to regularly post about political or social matters on social media ($Q4 = 1.24$ logit) and not willing to contact the government officials to report on particular issues in their surroundings ($Q5 = 2.05$ logit). Moreover, teachers and students did not seem to have a strong motivation to volunteer for online political events ($Q8 = 1.67$ logit). They were not willing to discuss political and social issues in the online community ($Q9 = 1.67$ logit).

Regarding the Network Agency domain, the Rasch analysis has shown that the teachers and the students have moderate ability to control and use online technology to share information with other individuals in their social environment. More importantly, they were reported to enjoy having online communication with others ($Q24 = -0.21$ logit). The findings were not surprising that teachers and students felt it convenient to use digital technology for communication purposes. Mulyono et al. [29] suggest that students who enjoy using social media or other web applications tend to maintain their use of the applications. Furthermore, some authors have indicated that digital application such as social media has eased communication and interaction among individuals in a society, and it

Table 4
Reliability of the data collecting instrument.

	Min	Max	Mean	Standard Deviation	Reliability
Person	46	116	88.9	12.4	0.91
Item	240	423	335	52.7	0.98

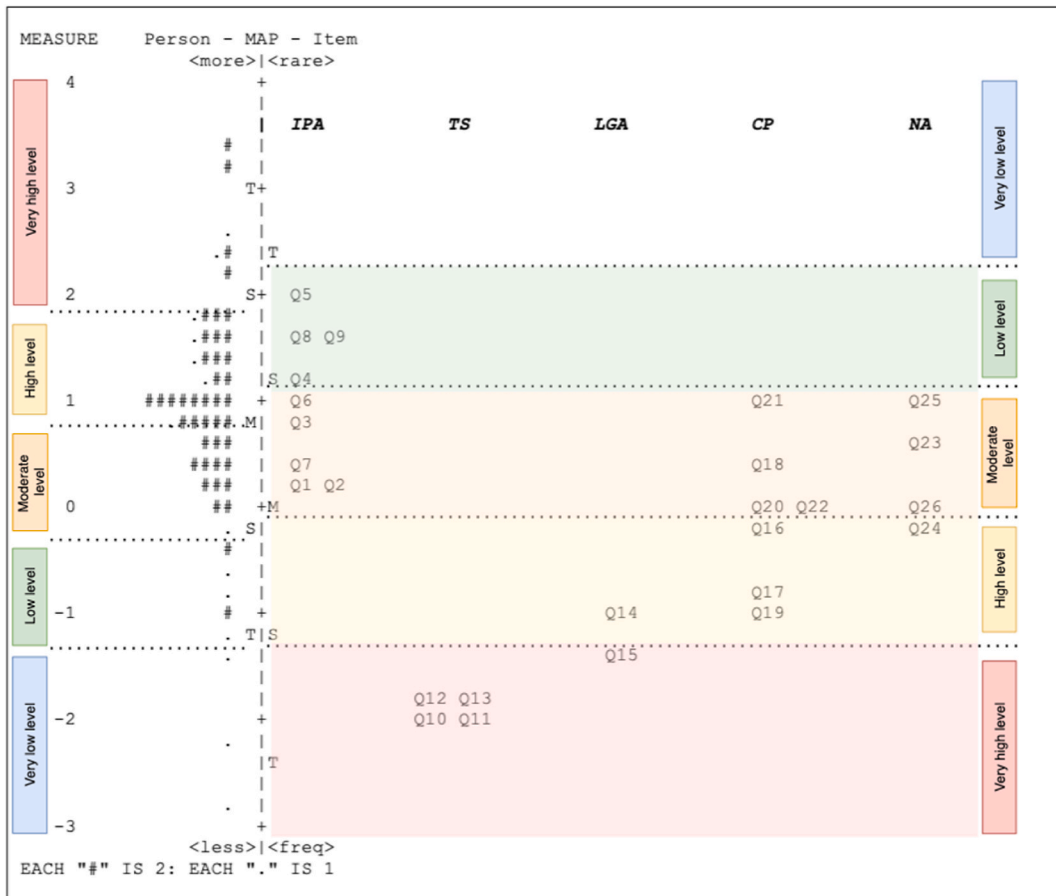


Fig. 1. Wright person-item map (N = 98).

Table 5
Participants' level of digital citizenship.

Level of digital citizenship	Vocational schools		Non-vocational schools	
	Teacher (%)	Student (%)	Teacher (%)	Student (%)
Very high level	0 (0.0)	1 (1.0)	1 (1.0)	8 (8.2)
High level	5 (5.1)	7 (7.1)	4 (4.1)	26 (26.5)
Moderate level	2 (2.0)	10 (10.2)	4 (4.1)	19 (19.4)
Low level	2 (2.0)	2 (2.0)	2 (2.0)	1 (1.0)
Very low level	0 (0.0)	1 (1.0)	1 (1.0)	2 (2.0)
Total	9 (9.2)	21 (21.4)	12 (12.2)	56 (57.1)

has been the tool that nurtures social relationships amongst them [29,37,38]. A study conducted by Mulyono and Saskia [39,40] found that Indonesian students tended to have a higher willingness to communicate in a digital communication environment than in Face-to-face settings.

Interestingly, despite the easy communication benefits, teachers and students were reluctant to share or discuss political and social issues in the online society. Teachers' and students' moderate ability to manage and control the use of technology might have been the reason besides being in a dilemma of using the digital application for political debates. In addition, some authors have reminded that social media may promote social exposure, impose embarrassment, and trigger conflicts among members of a social society [37]. Moreover, many have been sourced from political or social debates [41]. Accordingly, these negative impacts of social media may hinder teachers and students from being active politically or socially in the digital environment.

5.1.2. Demographical difference

The second research question concerns whether or not the participants' responses differ about their demographical background. The Rasch-Welch test was performed by evaluating the differential item functioning (DIF) to address the second research question. The difference in participants' responses was observed when the DIF contrast value was higher than 0.5 logits, and the Rasch-Welch

probability value was lower than 0.05 ($\alpha < 0.05$) [29,33,42]. Table 6 and Fig. 2 summarise the occurrence of DIF in the participants logit data.

The evaluation of DIF on the participants' age domain resulted in a statistical difference in participants' perception of their political activity in the digital environment (see Fig. 2). Younger participants aged below 25 tended to be more active in contacting government officials about an important issue than those over 40 years old (DIF Q5 B = 2.29 logit DIF E = 1.17 logit, $\alpha < 0.05$). In contrast, those over 40 were observed to actively work or volunteer for a political party or candidate online than the younger participants (DIF Q8 E = 2.29 logit, DIF A = 0.17 logit, $\alpha < 0.05$). The finding is not surprising as the earlier study has reported that older individuals are more encouraged to engage in political activities online [43].

In addition, the occurrence of DIF was not found in the participants' status (i.e. students or teachers) ($\alpha > 0.05$). In other words, teachers' and students' awareness and perception of digital citizenship were found to be statistically similar; however, according to the Age DIF finding, all study participants demonstrated strong desire to participate in political discourse through social media, indicating that people from a variety of ages showed political insights into their surrounding society. Studies conducted by Indonesian [21,23,25] sustain the notion that the Indonesian people, regardless of age, feel motivated to develop prospects of making change out of something felt unjust, and to eradicate prospects of the birth of anxiety and hatred inspired by forming tribal nations within Indonesian contexts. Although, by looking at the demography status, the finding does not correspond to the earlier study by Martin et al. [44] suggesting that teachers had negative perceptions about students' understanding and practice of digital citizenship. Students were perceived to have insufficient knowledge of digital citizenship and thus had less digital citizenship practice. More importantly, teachers' and students' similar awareness about digital citizenship indicated that teachers themselves were not ready to be a member of digital society [1]. Thus, the Indonesian government and the education stakeholders should equip teachers for digital citizenship access so that they could be more literate and accordingly practice such type of digital citizenship. When teachers have a sufficient level of literacy on digital citizenship, they could provide lessons or play as a role model for digital citizenship not only for teachers themselves, the students, parents, technology professionals and the education stakeholders [45,46].

The current study findings also revealed that participants from vocational and non-vocational secondary schools were shown to have different perspectives on internet political activity, local/global awareness, and technical skills. Participants from public non-vocational secondary schools were observed to have more online political activities than private vocational schools. Participants of these vocational schools frequently contact government officials about particular issues they are concerned about (DIF Q5 N = 2.52 logit, DIF P = 1.12 logit, $\alpha < 0.05$). They also liked to work or volunteer for political party figures or events (DIF Q8 N = 2.08 logit, DIF P = 0.89, $\alpha < 0.05$) and participated in online groups to discuss political or social issues (DIF Q9 N = 2.11 logit, DIF P = 0.81 logit, $\alpha < 0.05$). Regarding the skills to access information online, participants from private vocational secondary schools were shown to have more competencies than those from public and private non-vocational schools. Particularly, the private vocational schools'

Table 6
DIF analysis by the demographic.

Item	Age	DIF measure	DIF contrast	t	Probability
Q5	B	2.29	1.12	2.62	0.02
	E	1.17			
Q8	E	2.29	2.11	2.95	0.01
	A	0.17			
Item	Type of School	DIF measure	DIF contrast	t	Probability
Q5	N	2.52	1.40	4.16	0.00
	P	1.12			
Q8	N	2.08	1.19	3.56	0.00
	P	0.89			
Q9	N	2.11	1.30	3.89	0.00
	P	0.81			
	P	-1.08			
Q10	M	-2.81	1.43	3.78	0.00
	P	-1.08			
Q11	N	-2.51	1.12	3.00	0.00
	P	-1.17			
	N	-2.29			
Q12	P	-1.00	1.19	3.23	0.00
	N	-2.19			
	P	-1.17			
Q13	M	-2.81	0.92	2.49	0.01
	P	-1.17			
	N	-2.08			
Q14	P	-0.42	0.73	2.11	0.03
	N	-1.15			
Q15	P	-0.83	0.75	2.10	0.04
	N	-1.57			

Note: A = aged below 15, B = aged between 15 and 25, E = aged above 40, P = private vocational schools, N=Public non-vocational schools, M = Private non-vocational schools.

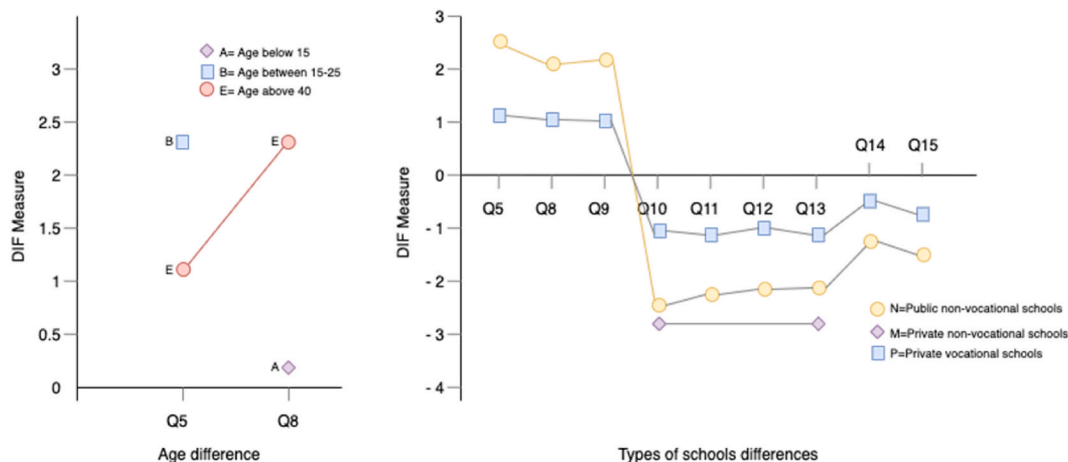


Fig. 2. DIF plot graphic. Note: DIF = differential item functioning, Q = Question, A = age below 15, B = age between 15 and 25, E = age above 40, P=Private vocational schools, N=Public non-vocational schools, M = Private non-vocational schools.

participants were more able to operate the technologies to obtain their communication goals (DIF Q12 P = -1.00 logit, DIF N = -2.19 logit, $\alpha < 0.05$). Accordingly, they were shown to be more informed about political or social issues spread online. This might be the case of the frequent use of social media or other online communication tools that are already incorporated in the vocational school classroom settings [47]. The intense use of social media among Indonesian youths has offered an access opportunity to the world, and might encourage them to take part into the discussion and thus help them address their real-world problems [29,48].

6. Conclusion and recommendation

The current study was carried out to evaluate teachers’ and students’ awareness and perception about digital citizenship. Therefore, the first research question of the study was mainly to answer the question related to teachers’ and students’ awareness and perception about digital citizenship. The findings of the current study have shown that teachers and students had a high-level awareness and were positive about digital citizenship. However, although teachers and students perceived that the internet had helped them develop an understanding of political and social issues, they were reported to have fewer political activities online. They were reluctant to discuss political and social issues in the online community.

The second research question concerned the different perceptions about the participants’ demographical background. The analysis of Rasch DIF revealed that teachers’ and students’ awareness and perception about digital awareness were statistically similar. Although, findings showed the participants’ activity in political activity was statistically different about their age. However, teachers and students were shown to have a similar level of digital citizenship. The difference in awareness of digital citizenship between vocational and non-vocational schools has indicated the discrepancy in the teaching process of digital citizenship on the two school types. While the current curriculum 2013 has suggested similar materials and learning outcomes, redesigning the school curriculum should address this gap. The current study’s findings should be interpreted within the condition that the data collected were from a self-reported survey. Choi et al. [1] suggest that self-reported survey data relies on the participants’ responses and thus may potentially be biased. Moreover, although the sample participants were regarded sufficient for the Rasch analysis, the size is still limited to generalise the study findings and thus, further similar study requires a greater number of the study participants. The quantitative analysis using Rasch were also constrained to explore the intercorrelation among the variables i.e. the Internet political activism (IPA), Technical skills (TS), Local/Global awareness (LGA), Critical perspective (CP), Network agency (NA) and their role in promoting teachers and students’ level of digital citizenship. Further study in a similar field should include more study participants and employ other inferential statistical analysis such as multiple regression and ANOVA. The use of other qualitative methods such as interviews and direct observation is strongly recommended to the extent of enabling researchers to examine in depth the teacher and student participants’ digital citizenship.

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Author contribution statement

Purnomo Ananto: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Sri Kusuma Ningsih: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools

or data; Wrote the paper.

Data availability statement

The data that has been used is confidential.

Additional information

No additional information is available for this paper.

Declaration of Competing 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

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