

NAVIGATING DIGITAL DIVIDE: E-LEARNING LITERACY AND COMPETENCY OF SECONDARY SCHOOL TEACHERS IN NORTHCENTRAL, NIGERIA

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ABSTRACT Teachers' level of e-learning literacy and competency is important for the digitalization of education, especially in the context of the increasing advancement of technology in education. It is on this note that, this study investigates the e-learning literacy and competency levels of secondary school teachers in North Central Nigeria. The study is a cross-sectional survey type. The population of the study comprises all the teachers in the region. A structured questionnaire with two subscale was developed by the researcher and used to solicit data from the respondents. The questionnaire was validated by three experts. Cronbach Alpha method was used to test the internal consistency of the instrument and 0.76 was obtained. The instrument was distributed across the region and 1052 teachers responded to the instrument. The data collected was analyzed using descriptive and inferential statistics. For the interpretation of the results, real limits were used. The findings of the study show that teachers have low levels of e-learning literacy and competency. A significant difference was found between male and female teachers' e-learning literacy and competency, and between the teachers of public and private schools in North Central Nigeria. Based on these findings, successful implementation of e-learning in the region might be mired at this educational level. It was therefore recommended that regular training programs and workshops on emerging e-learning technologies be conducted for teachers in the region to improve their e-learning literacy and competency.

KEYWORDS: E-learning, E-learning Literacy, E-learning Competency, Secondary School Teacher.

I. INTRODUCTION

The 21st century is a contemporary era synonymous with technological advancement. The advancement leads to the unification of all communication channel available to man through digital technologies. These technologies enhance the involvement of technology in the classrooms. It has expanded the spectrum of education, embracing innovations such as teaching and learning over electronic media (e-learning). Also, it promises more enriched and personalized educational opportunities (Ibrahim et al., 2024). E-learning has emerged as a crucial element in the global educational landscape, facilitating increased accessibility and enabling teachers to conduct lessons and share materials effectively. It offers several benefits, including heightened academic engagement, expanded access to education, improved quality of learning, enhanced educational choices, instructional flexibility, and administrative efficiency (Almajali & Masa'deh, 2016; Avgerinou & Moros, 2020). Additionally, e-learning significantly enriches the teaching culture by equipping teachers with the skills to utilize e-learning tools, thereby enhancing the teachers' e-learning literacy and competency (Lee et al., 2021).

E-learning caters to diverse educational backgrounds, allowing both teachers and students to engage with lessons electronically. E-learning has transformed the learning environment from traditional, teacher-centered classrooms to electronic-based settings emphasizing student interaction with content through technological means (Eze et al., 2018). Studies argue that e-learning is a compelling and essential strategy for contemporary education (Falana, 2015; Eze et al., 2018). Markus and Robey (1998) opined that teaching, learning and student mentorship are facilitated through PCs, involving digitally delivered content, system-based services, and coaching support which further enhance teachers' e-learning literacy and competency. In Nigeria, the implementation of e-learning is receiving increasing attention due to technological advancements. Also, the COVID-19 pandemic prompted both governmental and non-governmental organizations to initiate measures to

ensure effective instructional delivery, such as providing e-learning facilities and training teachers to improve their e-learning literacy and competency (Adeoye et al., 2020; Ekpo-Eloma et al., 2023; Nannim & Yushau, 2024). Despite these efforts, information about secondary school teachers' e-learning literacy and competency in North Central Nigeria remains slim.

North Central Nigeria, a region rich in cultural heritage and natural resources. The region, comprising states like Niger, Benue, Kwara and Plateau, has made tremendous efforts in its educational development through various governments' initiatives and policies aimed at improving the quality of education. Reflecting on this, the Universal Basic Education Commission's policy underscores the importance of integrating e-learning technologies to improve the educational opportunities (UBEC, 2023). However, the push for integration of e-learning technologies is marked by a digital divide between schools and teachers in the region (Mohammed et al., 2024). Digital divide exists among secondary schools at same or different areas. Some secondary schools have better e-learning technologies, such as computer labs, LMS, and internet connectivity. While some have poor e-learning technologies. This is paramount and got across both public and private secondary schools (Wordu, 2020). Similarly, access to digital devices like personal computers, laptops, tablets or smartphone, and high-speed internet may also vary among teachers with same or different levels of education, professional development or socio-economics status when compared. This unequal access to e-learning technologies may influences the e-learning literacy and competency of teachers in the region. Navigating the digital divide, the role of secondary school teachers' e-learning literacy and competency on the uses of e-learning technologies to improve the educational quality, and foster the achievement of national development goals cannot be overstated. However, at point of conducting this study, no comprehensive data was found on secondary school teachers in the study area on their e-learning literacy and competency. To fill such gap, this study therefore investigated the secondary school teachers' e-learning literacy and competency level in North Central Nigeria. More importantly, this study focuses on factors affecting e-learning literacy and competency, involving gender and school-type disparities.

II. LITERATURE REVIEW

E-learning literacy is imperative in running e-learning as it is mainly a technology driven (Santos & Serpa, 2017). Thus, it is a skill teachers have to use e-learning (Mohammed et al., 2024). E-learning literacy is the skills required to follow a contemporary online or blended class (Hong et al., 2017). Studies on e-learning literacy of teachers paid attention to Information and Communication Technology (ICT) skills, which referred to the use of ICT (Van Laar et al., 2017; Tondeur et al., 2018; Justice et al., 2018; Fernandez-Batanero et al., 2020). E-learning literacy comprises of several literacies, including digital literacy, which refers to the teachers' knowledge, skill, and attitudes in dealing with technologies to facilitate the teaching process (Daniel, 2018; Nguyen & Habok, 2023). On the other hand, E-learning Competency measures the extent to which a teacher can participate in e-learning activities (Daniel, 2018). This competency highlights the ability to effectively apply and transfer knowledge of ICT to live productively as a teacher in this digital age (Chai & Kong, 2017). The development of e-learning competency is particularly important, as it can lead to improved teaching quality, enable teachers to be updated in their field, and enhance online teaching (Nwamaka et al., 2023). As the advancement of technology is transforming the activities of educational settings, teachers not only need to possess skills and abilities related to the use of technological tools but also to understand the principles of ethical and effective usage of digital devices (Meyers et al., 2013; Sithulisiwe, 2022).

Studies on the use of e-learning technologies reveal a clear need for teachers to improve their knowledge in digital content creation, data literacy, and processing tools to enhance teaching activities (Railean, 2015; Al-Khateeb, 2017; Softic, 2018). Findings indicate that while some teachers have high levels of e-learning literacy and competency (Tzafilkou et al., 2023), others display moderate levels (Garcia-Perez et al. 2016; Rahmawati et al., 2024) or low levels (John et al., 2021; Hassan & Mirza, 2021; Alasoluyi, 2021; Fernandez-Batanero, et al. 2022). Understanding these discrepancies among the levels of teachers' e-learning literacy and competency is essential, as they are influenced by factors such as gender and school-type (Sabiou et al., 2018; ThankGod & Innocent, 2021; Fernandez-Batanero, et al., 2022; Abiodun & Olaitan, 2024). Gender is one of the variables consider to impact teachers e-learning literacy and competency. Studies have shown that male teachers tend to have higher levels of e-learning literacy and competency compared to female teachers (Rizal et al., 2021; Qazi et al., 2021). Some studies found female teachers to have more e-learning literacy and competency than male teachers (Sabiou et al., 2018; Falloon, 2020; Fernandez-

Batanero, et al., 2022; Tzafilkou et al., 2023). However, other studies report no significant difference between male and female teachers' e-learning literacy and competency (Ongoren, 2021; Saripudin et al. 2021; Ede et al., 2022; Patrick et al., 2023).

The school-type is one of the factors affecting e-learning literacy and competency among teachers. For example, studies have found a significant difference between private and public school teachers' e-learning literacy and competency in terms of using the ICT facilities in teaching (Nwana, 2012; ThankGod & Innocent 2021; Althubiani, 2024). This disparity is often attributed to private schools having more resources and support for digital literacy initiatives than public schools (Tunmibi et al., 2015). The authors further argue that public schools often face more challenges in terms of infrastructure and resources compared to private schools. Teachers in public schools have limited access to e-learning facilities and training, which affects their ability to effectively implement e-learning (Deebom & Zite, 2016; Samuel et al., 2019; Bolaji & Jimoh, 2023). More importantly, to understand these disparities among teachers in North Central Nigeria. It is therefore, necessary to investigate the e-learning literacy and competency levels of secondary school teachers in North Central Nigeria.

III. RESEARCH METHODOLOGY

This study was a cross-sectional survey research design. The population of the study comprised of all the public and private teachers in North Central Nigeria. Multistage sampling techniques was used in the study. Purposive sampling was used in the initial stage to select only secondary school teachers in the region. This method is effective for targeting specific population who have the characteristics relevant to the objectives of the study (Palinkas et al., 2015). In the second stage, quota sampling was used to ensure that the sample represented various sub-groups within the population, using state, gender, and school type as characteristics. Supporting the process, Creswell (2014) affirmed that quota sampling is beneficial for ensuring diversity and proportional representation, which enhances the generalizability of the findings. Finally, to improve the response rate, snowball sampling was employed to reach additional respondents. Through sharing of the instrument links from the initial respondents to others. This method was particularly useful for improving the number of respondents. The respondents were 1052 teachers including 422 males and 630 females. Using Krejcie and Morgan sample size calculation table, the author considered the sample sufficient for the study. A structured questionnaire with two sub scale was developed by the researcher and used to solicit responses from the respondents. The questionnaire was validated by three experts for face, content and construct validation. Their comments, observations and suggestions were used to develop the final copy of the instrument. A trial version of the study was conducted in North east Nigeria with 40 respondents and the internal consistency of the instrument was established at 0.76 using Cronbach alpha coefficient formula. This study was guided by the following research questions.

1. What is the level of secondary school teachers' e-learning literacy in North Central Nigeria?
2. What is the level of secondary school teachers' e-learning competency in North Central Nigeria?

RESEARCH HYPOTHESIS

The following null hypotheses were formulated and tested at 0.05 alpha level of significance.

- a) There is no significant difference in e-learning literacy between male and female secondary school teachers in North Central Nigeria
- b) There is no significant difference in e-learning competency between male and female secondary school teachers in North Central Nigeria
- c) There is no significant difference in e-learning literacy between public and private secondary school teachers in North Central Nigeria
- d) There is no significant difference in e-learning competency between public and private secondary school teachers in North Central Nigeria

The instrument was distributed across the region using online. A google form copy of the instrument was distributed through schools, Teachers and Proprietors' WhatsApp groups, Facebook groups, X, LinkedIn, and Telegram groups to the respondents across the region. For the interpretation of the results, real limits were used for both e-learning literacy and competency, such that a means score between 1.00 – 1.49 was referred to as; low literacy or competency, 1.50 – 2.49 referred to as medium literacy or competency, while, 2.50 – 3.00 referred to as high

literacy or competency. Research questions were analyzed using descriptive statistics of frequency, percentage, Mean and standard deviation. While the null hypotheses were tested at 0.05 alpha level of significant using independent sample t-test.

IV. RESULTS AND DISCUSSION

The results are presented in Table 1 to 6 to answer the research questions and the null hypotheses tested in the study.

Table 1: Frequency, Percentage, Mean and Standard Deviation Responses of Secondary School Teachers' E-learning Literacy

S/N	Items	I don't know this tool	I know this tool	I have the knowledge on how to use this tool	Mean	SD	Remark
1	Computer	3(0.2%)	1049(99.7%)	1042(99.0%)	1.66	0.10	Medium
2	Smart phones	5(0.4%)	1047(99.5%)	1041(99.0%)	1.65	0.10	Medium
3	Learning Management System like Moodle, Google Classroom, TutorNG, Canvas, etc.	35(3.3%)	1017(96.7%)	652(62.0%)	1.27	0.50	Low
4	Zoom	8(0.7%)	1044(99.2%)	779(74.0%)	1.40	0.44	Low
5	Google Tools (e.g. Google Meet, Form, and Sheet etc.)	34(3.2%)	1018(96.8%)	643(61.1%)	1.26	0.50	Low
6	Microsoft Team	21(1.9%)	1031(98.0%)	670(63.7%)	1.29	0.49	Low
7	E-library	9(0.8%)	1043(99.1%)	590(56.1%)	1.22	0.50	Low
8	Educational games	46(4.3%)	1006(95.6%)	592(56.3%)	1.21	0.51	Low
9	Open Educational Resources like Simulations, course modules, etc.	63 (5.9%)	989(94.0%)	575(54.7%)	1.19	0.52	Low
10	Blended Learning like flipped classroom, gamification, collaborative learning, etc.	65(6.1%)	987(93.8%)	534(50.8%)	1.15	0.52	Low
11	Search engines like google or Ask Mama	7(0.6%)	1045(99.3%)	979(93.1%)	1.59	0.26	Medium
12	Microsoft Word Application	4(0.3%)	1048(99.6%)	989(94.0%)	1.60	0.24	Medium
13	Microsoft PowerPoint	7(0.6%)	1045(99.3%)	984(93.5%)	1.59	0.25	Medium
14	Microsoft Excel	5(0.4%)	1047(99.5%)	971(92.3%)	1.58	0.27	Medium
15	Electronic whiteboard	41(3.8%)	1011(96.1%)	608(57.8%)	1.23	0.51	Low
16	Cloud storage services (Drop box, Google Drive, I Cloud, etc.).	30(2.8%)	1022(97.1%)	586(55.7%)	1.21	0.51	Low
17	Social media like WhatsApp, YouTube	6(0.5%)	1046(99.4%)	1000(95.1%)	1.61	0.22	Medium
18	Online Database	12(1.1%)	1039(98.8%)	603(57.3%)	1.23	0.50	Low
19	School E-mail	7(0.6%)	1045(99.3%)	592(56.3%)	1.22	0.49	Low
20	School Websites	7(0.6%)	1045(99.3%)	582(55.3%)	1.21	0.49	Low
21	E-book	6(0.5%)	1046(99.4%)	560(53.2%)	1.19	0.50	Low
22	Live Webinars with Q&A chats	109(10.4%)	943(89.6%)	546(51.9%)	1.14	0.52	Low
23	Digital Education Tools like Edmodo, Socrative, TED-Ed, etc.	38 (3.6%)	1014(96.4%)	370(35.1%)	1.00	0.48	Low
Grand Mean Score					1.33	0.40	Low

Source: Survey, 2024

Table 1 presents the secondary school teachers' e-learning literacy based on the mean responses across the 23 items. The grand mean of 1.33 (SD = 0.40) was obtained which falls within the mean rating of 1.00 to 1.49, indicating low literacy. Looking at the items, seven out of 23 items had mean ratings between 1.50 and 2.49, showing medium

literacy in these items. While having low literacy in the remaining items. This implies that teachers have medium literacy in some of the items, while their overall e-learning literacy remains low.

Table 2: Frequency, Percentage, Mean and Standard Deviation Responses of Secondary School Teachers' Level of E-learning Competency

S/N	Items	I can use this tool for teaching	I have used this tool for teaching	I can fix some problems that may arise when using the tool for teaching	Mean	SD	Remark
1	Computer	1042(99.0%)	964(91.6%)	706(67.1%)	1.61	0.56	Medium
2	Smart phones	1041(98.9%)	862(81.9%)	692(65.7%)	1.53	0.66	Medium
3	Learning Management System like Moodle, Google Classroom, TutorNG, Canvas, etc.	652(61.9%)	593(56.3%)	453(43.0%)	1.02	0.87	Low
4	Zoom	779(74.0%)	642(61.0%)	481(45.7%)	1.11	0.84	Low
5	Google Tools (e.g. Google Meet, Form, and Sheet etc.)	643(61.1%)	587(55.7%)	453(43.0%)	1.00	0.89	Low
6	Microsoft Team	670(63.6%)	537(51.0%)	480(45.6%)	1.00	0.85	Low
7	E-library	590(56.0%)	537(51.0%)	500(47.5%)	1.00	0.77	Low
8	Educational games	592(56.2%)	543(51.6%)	495(47.0%)	1.02	0.77	Low
9	Open Educational Resources like Simulations, course modules, etc.	575(54.6%)	550(52.2%)	535(50.8%)	1.03	0.98	Low
10	Blended Learning like flipped classroom, gamification, collaborative learning, etc.	534(50.7%)	532(50.5%)	525(49.9%)	1.00	0.99	Low
11	Search engines like google or Ask Mama	979(93.0%)	872(82.8%)	700(66.5%)	1.52	0.66	Medium
12	Microsoft Word Application	989(94.0%)	827(78.6%)	726(69.0%)	1.52	0.68	Medium
13	Microsoft PowerPoint	984(93.5%)	692(65.7%)	480(45.6%)	1.22	0.74	Low
14	Microsoft Excel	971(92.3%)	635(60.3%)	472(44.8%)	1.15	0.75	Low
15	Electronic whiteboard	608(57.7%)	537(51.0%)	495(47.0%)	1.00	0.77	Low
16	Cloud storage services (Drop box, Google Drive, I Cloud, etc.).	586(55.7%)	537(51.0%)	504(47.9%)	1.00	0.79	Low
17	Social media like WhatsApp, YouTube	1000(95.0%)	812(77.1%)	765(72.7%)	1.55	0.59	Medium
18	Online Database	603(57.3%)	573(54.4%)	495(47.0%)	1.02	0.78	Low
19	School E-mail	592(56.2%)	543(51.6%)	495(47.0%)	1.00	0.78	Low
20	School Websites	582(55.3%)	553(52.5%)	497(47.2%)	1.00	0.77	Low
21	E-book	560(53.2%)	542(51.5%)	504(47.9%)	1.00	0.78	Low
22	Live Webinar with Q&A chats	560(53.2%)	530(50.3%)	529(50.2%)	1.01	0.79	Low
23	Digital Education Tools like Edmodo, Socrative, TED-Ed, etc.	544(51.7%)	530(50.3%)	522(49.6%)	1.00	0.80	Low
Grand Mean Score					1.14	0.77	Low

Source: Survey, 2024

Table 2 shows the grand mean of 1.14 (SD = 0.77) falls within the mean rating of 1.00 to 1.49, indicating secondary school teachers have low e-learning competency. Considering the items, five out of 23 items had mean ratings between 1.50 and 2.49, showing medium competency in these items. While having low competency in the remaining items. In other words, teachers show medium competency in some of the items, while their overall e-learning competency remains low.

Table 3: Independent Sample T-test of Male and Female Secondary School Teachers' Level of E-learning Literacy

Gender	N	Mean (\bar{x})	Std. Deviation	<i>t-value</i>	<i>Df</i>	<i>p-value</i>
Male	422	1.36	0.31	2.42	1050	0.02
Female	630	1.32	0.29			

Table 3 revealed that the t-value of 2.42 and the p-value of 0.02 indicate a statistically significant difference in the mean scores of male and female teachers' e-learning literacy.

Table 4: Independent Sample T-test of Male and Female Secondary School Teachers' Level of E-learning Competency

Gender	N	Mean (\bar{x})	Std. Deviation	<i>t-value</i>	<i>Df</i>	<i>p-value</i>
Male	422	1.19	0.59	1.97	1050	0.04
Female	630	1.11	0.59			

Table 4 shows that the t-value of 1.97 and the p-value of 0.04 indicate a statistically significant difference in the mean scores of male and female teachers' e-learning competency.

Table 5: Independent Sample T-test of public and private Secondary School Teachers' Level of E-learning Literacy

Gender	N	Mean (\bar{x})	Std. Deviation	<i>t-value</i>	<i>Df</i>	<i>p-value</i>
Public	873	1.30	0.30	-7.83	1050	0.00
Private	179	1.49	0.24			

Table 5 shows that the t-value of -7.83 and a p-value of 0.00 indicate a statistically significant difference in the mean scores of public and private secondary school teachers' e-learning literacy.

Table 6: Independent Sample T-test of Public and Private Secondary School Teachers' Level of E-learning Competency

Gender	N	Mean (\bar{x})	Std. Deviation	<i>t-value</i>	<i>Df</i>	<i>p-value</i>
Public	873	1.16	0.59	2.05	1050	0.04
Private	179	1.06	0.57			

Table 6 indicates a t-value of 2.05 and a p-value of 0.04. The null hypothesis which states that there is no significant difference between public and private secondary school teachers' e-learning competency in North Central Nigeria was rejected.

The finding of this study as presented in Table 1 revealed that teachers had low level of e-learning literacy in North Central Nigeria. However, it is noteworthy that teachers had medium literacy on some individual items like computers, smartphones, search engines, Microsoft Word Applications, Microsoft PowerPoint, Microsoft Excel, and social media. More than 90% of the teachers agreed to know and have the knowledge of how to operate

computers, smartphones, and Microsoft applications, and how to search for information online as well as collaborate over the social media. This is not surprising, because teachers are familiar with some of these devices. Reinforcing the finding of this study, Edeh et al. (2022) found that teachers possess digital literacy such as the skills to type, edit, print, send, save and retrieve documents, the ability to surf the web, ability to use a projector in presenting contents, skills to protect privacy and data by using strong passwords and ability to communicate with colleagues and students without violating the rules of ICT and the rights of others. However, Osuji and Arannilewa (2022) revealed that teachers in the Ado local government area of Ekiti state possessed positive digital literacy in digital content creation.

Table 2 indicates that teachers had low level of e-learning competency in North Central Nigeria. Similar to that of e-learning literacy, teachers had medium competency on items like; computers, Smart phones, Search engines, Microsoft Word Applications, and social media platforms. With 60% of them agreed they can operate and fix some issues that warrant while using computers and smartphones. Strengthening this deduction further, more than 66% of the teachers can search for information online, use Microsoft applications to prepare lesson notes and can also collaborate through social media. This is evidence that besides the familiarity and knowledge of these devices, teachers to some extent, can still use some of the devices. However, their ability to use them effectively was low. Supporting this evidence, a study conducted by Nwamaka et al. (2022) in Delta State, revealed that teachers' competency in ICT was low. Similarly, Udoudo et al. (2021) found the majority of the vocational teachers in Akwa Ibom state have low competency in use of computer-based resources and internet-based resources for teaching purposes. Also, Fernandez-Batanero et al. (2022), Hassan and Mirza (2021) and Adavbiele (2017) share similar findings in their respective studies that teachers have low competency in the use of digital technologies. Contradicting the findings of this study, Garcia-Perez et al. (2016) found that several teachers in general education showed a moderate level of digital competency with regard to using virtual social networking tools.

Table 3 revealed a statistically significant difference between male and female secondary school teachers' levels of e-learning literacy in the region. In other words, the low level of e-learning literacy among secondary school teachers varies according to gender. This is in line with Rizal et al. (2021) who found that male teachers displayed higher level of digital literacy compared to female teachers. However, gender was found not to be a significant factor that influences the digital literacy of teachers (Ongoren, 2021; Edeh et al. 2022). In Table 4, a statistically significant differences emerged between male and female teachers' level of e-learning competency in the region. Similar to that of e-learning literacy, teachers' low e-learning competency level vary according to gender. The finding of this study is in line with Nwamaka et al. (2022) who found a significant difference between male and female teachers on ICT competency in Delta State during the COVID-19 pandemic favoring male teachers. However, in their study, Fernandez-Batanero et al. (2022) found that teachers differ in their competency levels according to gender as female teachers were perceived to demonstrate more knowledge than male teachers. In contrast to this study, where male teachers show high competency levels than female teachers.

The study revealed further in Table 5, a significant difference between public and private secondary school teachers in their e-learning literacy favoring private school teachers. This is plausible as teachers in private schools might be having more access to e-learning technologies than those in public schools. However, the result presented in Table 6 shows that public school teachers have high e-learning competency compared to private school teachers. This could be influenced by many factors. Unlike this finding, private school teachers were found to have more e-learning competency (Nwamaka et al., 2022; Azubuike, 2021; Olelewe & Nzeadibe, 2015). Conversely, the disparities observed in this study between male and female teachers and between teachers of public and private schools might be influenced by several factors. In their study, Ibrahim et al. (2024), on teachers' level of e-learning resources and awareness, observed that socio-economic status, cultural attitude and value, infrastructure, professional development, availability, awareness and accessibility of e-learning facilities were among the factors contributing to the digital divide among teachers, schools and societies at large.

VI. CONCLUSION

This study provides valuable insights into the teachers' e-learning literacy and competency levels in North Central Nigeria. It established that secondary school teachers in North Central Nigeria have low level of e-learning literacy and competency. Notably, disparities exists with male teachers and private school teachers outperformed their female and public school counterparts respectively. Therefore, given the current levels of e-learning literacy and

competency in the region, successful uses of e-learning might be hindered at this educational level. To promote sustainable e-learning practices, the study recommends conducting of regular training programs and workshops for teachers on emerging e-learning technologies to improve their e-learning literacy and competency in the region. Additionally, providing robust supporting system to public schools will help bridge the disparity among public and private school teachers' e-learning literacy in the region.

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