

PRE-SERVICE TEACHERS' DIGITAL COMPETENCIES: A TRANSFORMATIVE MEDIUM TOWARD LANGUAGE TEACHING

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ABSTRACT

Given the subsequent turn of the epidemic in language education field, this study aimed to investigate the perceptions of pre-service teachers in the English Language Education Department of Atma Jaya Catholic University of Indonesia toward their own digital competencies within their teaching performance. Regarding the use of information and communication technologies (ICT), pre-service teachers are expected to have sufficient high-level digital competencies. In this context, digital competencies are seen as a means to transform language education in the post-pandemic era. In this study, digital competencies refer to five dimensional skills, namely 'information and data literacy', 'communication and collaboration', 'digital content creation', 'security', and 'problem solving'. Fifty-five (55) pre-service teachers who were still enrolled in some particular ICT courses and who performed online teaching participated in the study by completing the Teacher Competency Framework Questionnaire and doing an interview session to assess their digital competencies in the use of ICT within online teaching context. The results showed that the pre-service teachers placed a high value on all five dimensions of digital competence to facilitate their online teaching through the use of ICT, covering both technological and pedagogical functions, making their online teaching delivered more beneficially and effectively. The more acknowledgements toward the role of their digital competencies and required skills of ICT use for pre-service teachers have been increasing due to the switching from offline to online classroom settings as a consequence of COVID-19 pandemic. However, further research into integrated curriculum planning based on the schoolwide ICT curriculum is recommended to promote constructive strategies to support the development of the pre-service teachers' digital competencies. The much wider digital competencies scope and more specific pre-service teachers ICT educational programs investigation should be adapted in the future research to provide deeper and further analysis toward the pre-service teachers' self-efficacy about their own digital competencies in online learning context at the same time.

Keywords: digital competencies, ICT, online learning, pre-service teachers

ABSTRAK

Merujuk pada konsekuensi dampak pandemik yang muncul pada bidang pendidikan bahasa, penelitian ini bertujuan untuk menyelidiki persepsi calon guru di Prodi Pendidikan Bahasa Inggris Universitas Katolik Indonesia Atma Jaya terhadap kompetensi digital mereka dalam kinerja pengajaran mereka. Dalam konteks penggunaan teknologi informasi dan komunikasi (TIK), para calon guru diharapkan memiliki kompetensi digital yang memadai. Dalam konteks ini, kompetensi digital dianggap sebagai sarana untuk mengubah cara pembelajaran bahasa dalam era paska pandemi. Dalam penelitian ini, kompetensi digital mengacu pada lima dimensi keterampilan, yaitu 'literasi informasi dan data, komunikasi dan kolaborasi, penciptaan konten digital, keamanan, dan pemecahan masalah'. Lima puluh lima (55) calon guru yang masih terdaftar sebagai mahasiswa yang sedang mempelajari mata kuliah digitalisasi pendidikan dan yang melakukan pengajaran online berpartisipasi dalam penelitian ini dengan menyelesaikan Kuesioner Kerangka Kompetensi Guru dan melakukan sesi wawancara untuk menilai kompetensi digital mereka dalam penggunaan TIK pada konteks pengajaran daring. Hasil penelitian menunjukkan bahwa para calon guru berpendapat bahwa kelima dimensi kompetensi digital itu memfasilitasi pengajaran online mereka melalui penggunaan TIK, mencakup fungsi teknologi dan pedagogis, sehingga pengajaran daring mereka disampaikan secara lebih bermanfaat dan efektif. Kesadaran akan pentingnya peran kompetensi digital para calon guru dan keterampilan yang diperlukan dalam penggunaan TIK untuk calon guru ini juga telah meningkat karena peralihan dari pengaturan ruang kelas luring ke daring sebagai konsekuensi dari pandemi COVID-19. Namun, penelitian lebih lanjut mengenai perencanaan kurikulum terintegrasi berdasarkan kurikulum TIK di seluruh sekolah direkomendasikan untuk dilakukan demi mempromosikan strategi yang konstruktif untuk mendukung pengembangan kompetensi digital para calon guru. Cakupan kompetensi digital yang jauh lebih luas dan penelitian mengenai program pendidikan TIK para calon guru yang lebih spesifik harus menjadi perhatian untuk memberikan analisis yang lebih lanjut dan mendalam terhadap efikasi diri para calon guru terhadap kompetensi digital mereka sendiri pada konteks pembelajaran daring.

Kata kunci: calon guru, kompetensi digital, pembelajaran daring, teknologi informasi dan komunikasi

INTRODUCTION

With the advent of digital technologies, the landscape of language teaching and learning has changed significantly. In this digital age, pre-service teachers' digital competencies have become an important factor in shaping the quality of language education. Digital competency, also known as digital literacy or digital fluency, refers to the ability to use digital tools and technologies effectively and efficiently in various

contexts. As the demand for digital competencies increases, language teacher education programs must prepare pre-service teachers to meet the changing needs of learners and teaching contexts (Kay, 2006).

The integration of digital competencies in language teacher education is a transformative medium that can enhance the quality of language teaching and learning. It enables pre-service teachers to create meaningful and engaging learning experiences for their students, using digital technologies that promote collaboration, creativity, and critical thinking. Additionally, it provides pre-service teachers with opportunities to develop their own digital competencies, which can positively impact their future teaching practices (Sarkar, 2012).

Despite the potential benefits, there is a lack of research on pre-service teachers' digital competencies in language teacher education programs. Therefore, this study aims to investigate pre-service teachers' digital competencies concerning with language teaching and learning. The study will explore pre-service teachers' perceptions of their digital competencies and their use of digital technologies in language teaching. By investigating pre-service teachers' digital competencies, this study seeks to contribute to the ongoing dialogue about the integration of digital technologies in language teaching and learning. The findings of this study can inform language teacher education programs and curriculum developers about the necessary skills and knowledge that pre-service teachers need to effectively integrate digital technologies in language education.

Objective of the Study

In the light of the previous studies, this research aimed at investigating the perceptions of pre-service teachers in the English Language Education Department of Atma Jaya Catholic University of Indonesia toward their own digital competencies within their teaching performance. It suggested the proposed research questions as the following:

- 1) How competent are the pre-service teachers in implementing their digital competencies in online learning context?
- 2) How can these competencies be harnessed as a transformative medium for effective language teaching ?

Significance of the Study

This research aims to provide valuable insights into the effects of digital competencies on the teaching development of pre-service teachers, particularly in the context of online learning. It will offer practical measurements for Curriculum Developers and lecturers to optimize the online learning system and enhance the educational process of pre-service teachers. Additionally, by stimulating self-efficacy, this research encourages pre-service teachers to reflect on and improve their digital competencies. The findings will not only benefit future research but also contribute to pre-service teachers' belief in their ability to positively impact students' learning outcomes (Klassen et al., 2010; Sammons et al., 2013; Yost, 2006 ; Henson, 2001).

LITERATURE REVIEW

The European Commission (2013) as cited in Ferrari et al. (2013) defined digital competence as a set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using information and communication technology (ICT), and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socialising. As the so-called digital competencies interpreted as a concept that has generated several layers of research in light of the new technological advances, more specifically in the field of ICT, the area of its application has extensive significance to Educational Technology (Lévano-Francia, 2019). In addition, Marza and Cruz (2018) stated that the creative and critical use of ICT in terms of teaching and learning that teachers and students implement in the classroom dynamics are an effective facilitator of the transfer knowledge and innovative information management through teaching and learning resources. On this aspect, support is also given by Aguirre et al. (2015) arguing that an incorporated classroom ICT use that is based on adequate level of digital competencies promotes innovative teaching for the teachers and mediates communicative, collaborative, and creative learning strategies for the students (p. 90). This implies that in relation to any degree or level of education, the critical and effective use of ICT and the implementation of appropriate level of digital competencies are the required instruments for teachers and students in developing mutual educational strategies that help them to obtain the maximum

and proper use of teaching learning dynamics under “the emerging context of the digital culture paradigm” (Freire & Brunet, 2016, as cited in Lévano-Francia et al., 2019).

There have been a lot of previous literatures reviewing pre-service teachers’ DC (Kay, 2006; Enochsson & Rizza, 2009; Tømte, 2013; Tondeur et al., 2012). Similarly, all of them put much more highlight on the relation between the development of pre-service teachers’ DC, especially in the context of ICT utilization, and the various strategies used by the educational institutions in pre-service teachers’ education for their future teaching profession. Lots of variable have also been included throughout those reviews. “Integrated approaches, technology courses and strategies” (Kay, 2006), “content and delivery methods” (Tondeur et al., 2012) are amongst them. Nevertheless, due to the lack of consideration on technological and pedagogical content knowledge and the use of teachers’ modelling on classroom’s ICT use (Røkenes & Krumsvik, 2014), it is suggested that to have a more effective teacher education efficiency for developing pre-service teachers’ DC meaning to take into account the more expanded key themes or variables aligning with theoretical and practical use of ICT for their teaching performance fostering.

As the layout assessment towards the pre-service teachers’ digital competencies, CDCFT - Common Digital Competence Framework for Teachers (INTEF, 2017) is used in this research. This framework is designed based on the global increased awareness toward the roles of DC in education. In regard to the context that DC is considered “perquisite” (Education and Training Monitor, 2013) for educators, teachers and students of all ages to take full advantage of what technology can offer to education, making the educational standards should be accordingly set to develop their knowledge and skills required in today’s society by enhancing technology in any possible environment (European Strategic Framework for Education and Training, 2020). In addition to that point, developing and integrating DC the education system demands an appropriate incorporation of ICT in classroom which at the same time promotes high-level of urgency to ensure that teachers have the inherent professional training in that particular competence (INTEF, 2017). These factors are essential to guarantee that the progression of digital culture in classroom is well-established and to ensure education system syncs with the new “network society” (ibid.). CDCFT, correspondingly, has emerged to fill in the absence of a particular common reference framework to provide all those guarantees and meet all those demands of digital culture in educational context (Calle et al., 2021).

In relation to that framework, Cebi and Reisoglu (2020) proposed an extended dimension of pre-service teachers’ digital competencies. They examined the digital competence of pre-service teachers in Turkey. Through a qualitative research design, they delved into various dimensions of digital competence, including technological knowledge, skills, attitudes, and practices in educational settings. The findings shed light on the importance of providing comprehensive digital competence training for pre-service teachers, emphasizing the need to integrate digital technologies effectively through courses. As this study offers insights and practical implementations on improving digital competence among future educators based on a specific Digital Competence Framework, this study is set as an integrated part of the current study’s theoretical framework.

RESEARCH METHODOLOGY

This research used a mixed method, quantitative and qualitative approaches to figure out the final outcome of the research. The quantitative result was collected through responding to the adapted questionnaire from Cebi and Reisoglu (2020). The qualitative result, on the other side, was comprehended through an interview method.

The respondents of this study were 55 pre-service teachers of English Education Department of Atma Jaya Catholic University of Indonesia who enrolled in the 4th, 6th, and 8th semesters. These respondents were categorized as the pre-service teachers to the extent as defined as the students who enrolled in some teacher preparation programs who must successfully complete degree requirements including the seven courses namely Curriculum and Materials Development, Research Report Reading, Research Methods in ELT, Language Teaching Methodology (Receptive and or Productive Skills), Media and ICT for Teaching (MICT), Micro Teaching, and Teaching Internship as the field experiences before being awarded a teaching license (Ryan, 2017).

The data gathered in this research were responses to the questionnaires, and the results of the open-ended interview questions. The responses to the questionnaire resulted in the likert- scale form, while the results of the interview appeared in the form of comprehensive answers from the interviewees. Most of the items in the questionnaire used by Cebi and Reisoglu (2020) addressing pre-service teachers’ digital competencies investigation along with a manually designed of interview open-ended questions were adapted as the instruments for this research. In total, there were 31 statements of the original questionnaire

items. However, only 30 statements of the items were used and adapted to evaluate pre-service teachers' digital competencies. The interview which consisted of seven (7) items aimed at gaining in-depth understanding toward pre-service teachers' perceptions regarding their own digital competencies. All the questions were developed based on the theoretical framework about the five digital competencies that the pre-service teachers need to possess along with the two additional questions concerning with challenges and solving ways in promoting their own digital competencies.

Table 1. The Adapted Version of Cebi & Reisoglu's (2020) Questionnaire

Digital Competence Areas	No.	Digital Competence Questionnaire Items	Purposes
Information and Data Literacy	1.	I identify my needs when searching for data, information or digital content in online teaching environments.	All these items are intended to check the pre-service teachers' ability in browsing, searching, filtering, evaluating, and managing information and digital content of their teaching materials.
	2.	I use information search strategies to access data, information, and digital content in online teaching environments.	
	3.	I critically evaluate the accuracy of the data, information or digital content for teaching materials I access.	
	4.	I access the data, information and digital content I need in online teaching environments.	
	5.	I investigate from different teaching sources whether the data, information or digital content I access is reliable.	
	6.	I pay attention to source and citation representations when sharing data, information or digital content of teaching materials.	
Communication and Collaboration	1.	I easily organize and store data, information and content in online teaching environments.	All these items are intended to check the pre-service teachers' ability in interacting and stimulating communicative and collaborative teaching material for the students using various digital technologies.
	2.	I use digital technologies to communicate in online teaching environments.	
	3.	I share data, information or digital content of teaching materials using different digital technologies.	
	4.	I use digital technologies to collaborate in online teaching environments.	
	5.	I comply with behavioural norms (ethical rules) when interacting in online teaching environments.	
Digital Content Creation	1.	I develop teaching materials contents in simple forms using digital technologies.	All these items are intended to check the pre-service teachers' ability in developing digital content, teaching materials by taking into account copyright and programming aspect.
	2.	I can develop teaching materials contents in different formats (video, visual, animation, etc.) using digital technologies.	
	3.	I pay attention to copyrights and licensing when developing teaching materials digital contents.	
	4.	I produce teaching materials digital contents by making changes to ready-made sources.	

Safety	1.	I know what to be considered when creating a digital identity (profile) in online teaching environments.	All these items are intended to check the pre-service teachers' ability in protecting their devices, personal data and privacy, health and well-being, and digital environments.
	2.	I am aware that I leave a digital footprint when I navigate in online teaching environments.	
	3.	I am aware of the risks and threats in online teaching environments.	
	4.	I take different measures to protect my digital devices and my own designed teaching materials content.	
	5.	I take precautions about safety and privacy in online teaching environments.	
	6.	I protect personal data and privacy in online teaching environments.	
	7.	I am aware of the effects of digital technology use on health (physical, psychological).	
	8.	I am familiar with data policies (how to use personal data) of the digital services that I am a user of (educational context, social networking, etc.)	
	9.	I am aware of the environmental impact of using digital technologies for my teaching.	
	10.	I know how to deal with online threats.	
Problem Solving	1.	I identify the causes of technical problems I encounter when using digital media and devices in online teaching.	All these items are intended to check the pre-service teachers' ability in solving technical problems, identifying needs and technological responses, using digital technologies and identifying their digital competency gaps accordingly.
	2.	I solve the technical problems I encounter when using digital media and online teaching devices.	
	3.	I use different digital technologies to create innovative online teaching materials.	
	4.	I identify opportunities for the development of my digital competencies in teaching online.	
	5.	I develop my digital competencies by following new educational and pedagogical developments.	

Data Collection

The following were several procedures to collect the data of the research. Firstly, the survey questionnaire was designed to point out the objective of this research. To make sure this survey questionnaire was validated, there were some try out conducted first to three alumni of English Language Education Department Batch 2017 and through a comprehensive review by the thesis advisor. Secondly, all statements of the questionnaire items were included to Google Form. The reason of choosing Google Form was based on its simplicity use to gather the data online since it suggests some flexibility in terms of calculating the data automatically and was also familiar for the students who were the participants. Thirdly, the questionnaire was administered to all respondents through their social media, especially Whatsapp and Instagram to be filled in. The automatic generated calculation of the data from the Google Form provided the result of the questionnaire and therefore it was not counted manually.

In setting up the interview, firstly, some particular participants that had been randomly chosen as the representatives from the three batches were contacted. There were 11 participants got involved in the interview session conducted using Zoom platform that was scheduled based on all parties' agreement. Secondly, before jumping the interview, some materials regarding the overview of the research were provided to trigger their background knowledge toward their own digital competencies. Thirdly, the

research data were comprehended from the participants' answers toward the interview questions. Finally, the research analysis was proceeded.

Data Analysis

Questionnaire responses and open-ended answers of the interview were the data collected in this research. Microsoft Excel 2016 was utilized for measuring the participants' level of digital competence from their responses to the questionnaire and the manual coding was used for analyzing the transcripts of the interview under classified categories in the form of excerpts. Several procedures were taken to analyze the questionnaire and the interview results. Firstly, the data from Google Form in the form of graphics and spreadsheet was obtained and categorized to five aspects of pre-service teachers' digital competencies. Secondly, the data percentage of likert-scale questionnaire was described in the findings as it had been calculated to result the mean score of each item of digital competence skills using the weighted average calculation of Microsoft Excel 2016. Thirdly, the responses in the questionnaire were matched with the coded interview transcripts to see how respondents clarified their questionnaire responses. Fourthly, the data was interpreted by comparing the mean score of each item with the answers in the interview session. The grand mean score of the five digital competencies was also calculated to ensure on what level of competence the pre-service teachers were in dealing with those competencies. Referring to the theoretical framework of the current research, the interpretation of the mean score and the grand mean score was categorized as the following:

Table 2. The Mean Score Interpretation

The Range of the Mean & Grand Mean Score	Category
3,26 - 4	Highly Competent
2,6 – 3,25	Fairly Competent
1,76 – 2,5	Moderately Competent
1 - 1,75	Less Competent

The relationships of the participants' answers in the survey questionnaire were matched with their answers in the interview whether both of them were related one to another. The goal was to explain variation in the responses that can be attributed to variation in the explanatory variables and also to identify the relationship between the responses in the questionnaire and the answers in the interview.

FINDINGS AND DISCUSSIONS

The findings on Information and Data Literacy (IDL) competence of pre-service teachers indicate that the majority of pre-service teachers have grasped and put the knowledge of IDL competencies into practices to some specific extents elaborated within the DigComp. framework which provides help in terms of improving their online teaching. The CILIP-Chartered Institute for Library and Information Professionals (2011) as cited in McKeever et al. (2017) stated "IDL have been found to have a positive effect on student attainment and are essential for effective learning and teaching in the information society". Correspondingly, these findings suggest that the pre-service teachers have considerably met five out of six IDL standards of teacher education for pre-service teachers set by Association of College & Research Libraries (ACRL) (2011), namely as the following:

- 1) Define and articulate the need for information and select strategies and tools to find that information;
- 2) Locate and select information based on its appropriateness to the specific information need and the developmental needs of the student;
- 3) Organize and analyze the information in the context of specific information needs and the developmental appropriateness for the audience;
- 4) Synthesize, process, and present the information in a way that is appropriate for the purpose for which information is needed;
- 5) Evaluate discrete pieces of information as well as the entire information-seeking process.

Communication and collaboration management are two particular areas in online classroom setting (Taghizadeh & Amirkhani, 2021). The findings denote that most of pre-service teachers have utilized digital technologies into their online teaching accordingly and purposefully. As the literature in the CC above referred to the video conferencing and digital learning media use for maximizing their teaching,

correspondingly, Francis & Oluwatoyin (2019) emphasized that CC aspect is also highly related to all the efforts that pre-service teachers put into classroom management by offering instruction through communication, ensuring an effective learning process, giving and receiving students' feedbacks mutually, evaluating and informing learning outcomes, and maintaining discipline among students in the context of online classroom setting.

Digital content creation is highly connected to the substantial part of teaching and learning dynamics, more especially in the context of online classroom setting. Based on the findings, the pre-service teachers have had an adequate competency level in terms of effectively developing their digital content teaching materials. It is reported that they have been capable in developing teaching materials starting from simple forms to more complex ones, appearing in the different formats (video, visual, animation, etc.) using digital technologies. Not only relying on their own designed digital contents, they have also figured out how to create online teaching materials by making required changes to ready-made sources. Demirkan (2019) emphasized that in regard to that demand and need, teachers should develop themselves as reflective practitioners and role model for their students to utilize their pedagogy approaches by setting up interesting, engaging, and fun digital content teaching materials.

In terms of safety skills, the results of this study showed that the pre-service teachers have had arguably and considerably adequate awareness toward the risks, the effects, the measures, and the ways dealing the use of digital technologies in online teaching environment. The risks definitely come from the online threats since the world of digital data gets everything exposed if they are not kept safely and accordingly. The effects refer to psychological and physical health, and also environmental aspects as digital technologies influencing online and offline classroom setting as well. It is notable based on the safety, the only item that got the mean score below that (3,00) was on the safety skill item 10 (2,98) about "how to deal with online threats" meaning that in this particular skill the pre-service teachers might be fairly competent.

As one of the most needed twenty-first century life skills, problem solving skills are considered a process that can be taught and learned (El-Bassuony, 2021), including in the context of digital and educational context. The rapid development of the ICT has to bring the technology-based learning approaches to boost pre-service teachers' problem solving skill as well. Regarding this, Livingston (2010) urges the importance that pre-service teachers preparation programs have an obligation to explore ways to upgrade pre-service teachers' creativity in solving technical problems and more complex issues of using digital teaching and learning media along with the online teaching devices. The majority of pre-service teachers had shown to have adequate level of problem-solving skills, both in terms of technical issues and substantial aspects in teaching and learning process.

When it came to the interview results, the pre-service teachers had also indicated that they found the use of their digital competencies seemed to have affected the outcome of the students' learning as well. All of them also shared a similar view that they considered all five-dimensional skills of digital competence were equally important for their teaching. Their collective agreement also went on when it came to the importance of teachers' digital competencies development, stated that the education stakeholders and curriculum developers should take into account this particular competence when they set up educational programs and courses for the pre-service teachers. Most of them rated the effectiveness of their own DC in the range of 6-10 out of 10 with various technical and substantial reasons of utilizing ICT in online classroom setting, ranging from the functional tools to a must integrated approach for getting the maximum outcome of their online teaching and the students' online learning.

CONCLUSIONS AND SUGGESTIONS

The findings of this research imply that pre-service teachers in the English Language Education Department of Atma Jaya Catholic University of Indonesia were highly competent in all of the five digital competencies in the average based on Common Digital Competence Framework for Teachers (CDCFT). The more acknowledgements toward the role of their digital competencies and required skills of ICT use for pre-service teachers have been increasing due to the switching from offline to online classroom settings as a consequence of COVID-19 pandemic.

Due to the limitation of the pre-service teachers who participated in the survey, the measurement of effectiveness of their own digital competencies might be subjective and insufficient in representing the pre-service teachers as a whole in the English Language Education Department of Atma Jaya Catholic University of Indonesia. In addition, the analyzed aspects of this research are also limited to five dimensional skills of digital competencies, i.e. information and data literacy, communication and

collaboration, digital content creation, safety, and problem solving. In regard to this reason, further research into integrated curriculum planning based on the schoolwide ICT curriculum is recommended to promote constructive strategies to support the development of the pre-service teachers' digital competencies. The much wider digital competencies scope and more specific pre-service teachers ICT educational programs investigation should be adapted in the future research to provide deeper and further analysis toward the pre-service teachers' self-efficacy toward their own digital competencies in online learning context at the same time.

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CURRICULUM VITAE

Complete Name	Institution	Education	Research Interests
Lukas Damianus Fernandez	Universitas Katolik Indonesia Atma Jaya	S1 Pendidikan Bahasa Inggris	. Digital Education . ICT Utilization in Teaching Learning Process . Artificial Inteligence in Educational Context
K. M. Widi Hadiyanti	Universitas Katolik Indonesia Atma Jaya	S2 Pendidikan Bahasa Inggris	EFL Learning and Teaching