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MEDIATING ROLE OF SELF-EFFICACY TO USE ICT ON THE RELATIONSHIP BETWEEN DIGITAL PROFILE AND COMPETENCE

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ABSTRACT

The purpose of the study was to assess the digital competence of senior high school students and teachers in the Division of Batangas City. The study used the descriptive quantitative research design. The samples of 590 students and 165 teachers from different private and public senior high schools of the Division of Batangas City were selected through stratified random sampling. Guided by the Digital Competence Framework (Digicomp 2.0), the digital profile, self-efficacy, and self-assessment report on the five (5) digital competence areas and 21 descriptors were examined and analyzed using weighted mean, standard deviation, frequency count, and relative frequency. The results revealed that the senior high school students and teachers were equipped with the necessary information communications technology (ICT) experience and possessed the potentials to develop the digital competence. The senior high school students and teachers were intermediate or independent and proficient or advanced in their digital competence, respectively. They have high ratings in the areas of safety, communication and collaboration, and problem solving. Furthermore, the relationship between senior high school teachers' ICT experience, potentials to develop digital competence, and the level of digital competence was mediated by self-efficacy to use ICT. This implies that self-efficacy to use ICT increases the likelihood of developing the digital competence.

Keywords: *digital competence, digital profile, self-efficacy, senior high school, Philippines*

INTRODUCTION

There is a growing research interest in information communications technology (ICT) in both industry and academe. The 21st century education focuses on producing digitally literate learners especially on their technical knowledge and skills in using digital tools in productive ways. The development of the ICT skills and integration of digital tools are given greater emphasis and attention in both the basic and higher education. However, there is a need for competent use of these available digital technologies and ICT for the successful implementation (Khateeb, 2017). The changing paradigm of the society that involves ICT is making an impact on education, and in consequence, affecting teachers and students in all educational levels (Perez & Torello, 2012). The acquisition and utilization of the digital skills, digital literacy, and ICT skills may not be enough. Digital competence is an essential skill because it can potentially enable the person to participate and benefit from digital opportunities (Vuorikari, Punie, Carretero Gomez, & Van den Brande, 2016). Hence, there is a need to properly educate the teachers and students in the use of ICT to develop their digital competence (Rokenes & Krumsvik, 2014).

In response to the changing nature and strong impact of ICT in the society, the European Union developed the Digital Competence Framework for Citizens (DigiComp 2.0) (Vuorikari, Punie, Carretero Gomez & Van den Brande, 2016). The DigiComp has five key areas which include information and data literacy with three competences, communication, and collaboration with six competences, digital content creation, safety, and problem solving with four competences each. The underlying principle behind the DigiComp is to enable individuals to use digital technologies in a way that is critical, collaborative, and creative. The proponents of the framework purported that the lack of this skill have an intense effect on life chances and employability. Siddoo, Sawattawee, Janchai and Thinnukool (2019) identified that educational agencies were not fully aware of the needs of the industries who will hire graduates. Because of this, administrators and leaders in education must keep up with the situation and give emphasis to accelerate plans in producing quality graduates to meet the needs of industry.

Petterson (2017) regarded digital competence as an organizational task which is influenced and driven by several contextual factors embedded within and across a wider school organization. Perez and Torello (2012) concluded that teachers should provide an adequate professional response to the current and future social needs, integrating all the necessary digital competences in order to develop and improve the profession, given the transversal nature and impact of ICTs to their professional roles and professional activities. Hatlevik and Christophersen (2013) suggested that the identification of digital deficiencies and achievements is a must to sustain the inclusion as there are variations in the requirements and needs of students and schools. Moreover, it was noted that self-efficacy in the form of academic aspirations and mastery orientation as well as culture and language have positive impact on digital competence (Hatlevik, Ottestad & Throndsen, 2014; Hatlevik & Christophersen, 2013).

However, some studies suggest that digital competence is less evident in the practices of schools due to an incorrect notion of equating the later with actual or frequent use of digital technologies (Sancho Gil & Padilla Petry, 2016; Janssen, Stoyanov, Ferrari, Punie, Pannekeet & Sloep, 2013). In addition, some studies (Calvani, Fini, Ranieri & Picci, 2012; Somyurek & Coskun, 2013) contradicts the claims that the younger generations have the innate capacity to be digitally competent; hence, proposing that the basic education sector must give attention to the development of competence rather than focusing only with the use of digital technologies.

From the foregoing discussion, it can be surmised that there is a need to delineate use of technology from development of digital competence and to identify indicators that may help improve the digital competence among students and teachers in senior high school. The main objective of the study is to assess the digital competence of senior high school students and teachers in the Division of Batangas City, Philippines. Specifically, it aims to describe the

demographic profile of the senior high school students and teachers, describe the students' and teachers' digital profile in terms of ICT experience, potentials to develop digital competence and digital activities, assess the students' and teachers' self-efficacy in the use of ICT, evaluate the students' and teachers' level of digital competence and construct a structural equation model that describes the relationship between the respondents' digital profile and digital competence when mediated by self-efficacy in the use of ICT.

LITERATURE REVIEW

Technology has become one of the most powerful resources of learning in the 21st century. The evolution of information and communication technology especially in teaching and learning process has grown by leaps and bounds. The rapid emergence of information and communication technology (ICT) has had implications for the education system and teacher education. The study investigated the extent to which teacher education assists student teachers in developing their professional digital competence (PDC) in general and, more specifically, their competence in using ICT responsibly. Responsible use of ICT is here taken to include privacy and copyright issues, ethical issues, and the ability to evaluate digital information (Gudmundsdottir & Hatlevik, 2020).

A survey of related literature and studies available in the library and other sources of information like the internet, journals, articles, unpublished materials, and other publications were used to guide the researchers to gain insights that would guide them in undertaking this study.

Digital Competence

Digital competence is a combination of knowledge, skills, and attitudes with regards to the use of technology to perform tasks, solve problems, communicate, manage information, collaborate, as well as to create and share content effectively, appropriately, securely, critically, creatively, independently, and ethically. Digital competence involves the confident and critical use of electronic media for work, leisure, and communication. These competencies are related to logical and critical thinking, high-level information management skills, and well-developed communication skills (Vázquez, 2021).

The European Commission's science and knowledge service (2019) identifies the key components of digital competence (DigComp 2.0) in 5 areas which can be summarized as below:

1.*Information and data literacy*: To articulate information needs, to locate and retrieve digital data, information, and content. To judge the relevance of the source and its content. To store, manage, and organize digital data, information, and content.

2.*Communication and collaboration:* To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.

3.*Digital content creation:* To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licenses are to be applied. To know how to give understandable instructions for a computer system.

4. *Safety:* To protect devices, content, personal data, and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.

5. Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up to date with the digital evolution.

The measurable building blocks for digital competence must be constructed in the light of the general advantages and disadvantages, across several spheres of life, and include elements from all learning domains (Skov, 2016). Digital skills can benefit people in different ways specially in education in which digital tools and media provide a new dimension to lifelong learning. In terms of innovation, digital competence is important for both individuals and organizations to keep pace with developments to increase efficiency and innovate new products and processes. Those who do not have the skills to take advantage of digital media are excluded from the new possibilities offered by the technology. Digital networks are also important for any entrepreneur, as it is easy to create an online platform for innovative business areas, even if they have a very narrow audience (Skov, 2016).

Self-Efficacy to use ICT

With the development of internet and mobile technologies, the Information and Communication Technology (ICT) has become a more interactive structure. While access to information and the possibility to share information through ICT provide great innovations to many professional fields, it should also be organized according to the appropriate environments and activities that enable learning ICT abilities in the field of education. It is thought that teachers'effective use of these technologies in learning teaching process plays an important role in increasing the quality of education because many countries make hardware and software investments in technology to use in their educational systems (Simsek & Sarsar, 2019). Computing related content is introduced in school curricula all over the world, placing new requirements on teachers and their knowledge. Little attention has been paid to fostering the skills and attitudes required to teach the new content. This involves not only traditional computing topics, such as algorithms or programming, but also the role of technology in society as well as questions related to ethics, safety, and integrity. As technology develops at a fast rate, so does the content to be taught. Learning computing content through isolated in-service training initiatives is by no means enough, but rather, teachers need to develop confidence to explore independently and continuously what is new, what is relevant and how to include digital competence in their teaching. Teachers' self-efficacy is hence of crucial importance (Mannila, Nordén, & Pears, 2018).

Self-efficacy is one's belief in one's ability. In this context, information, and communication technology (ICT) self-efficacy is the judgment of one's capability to use ICT – the familiar and effective teaching tools for the 21st century classrooms. Kundu, Bej & Dey (2020) investigated the correlation between teachers' ICT self-efficacy and perceived ICT infrastructure in Indian government run secondary school. The study of Stone (2020) found that students are confident in many of their ICT skills, though gender differences still exist in domain areas both traditional (basic computing skills) and more modern (social media skills). Exposure, access and use of ICT were found to have significant relationships with ICT self-efficacy. As ICT skill expectations change in industry, academia, and society, educators must be careful to construct curricula appropriate for learning the skills of the modern and future environments that students will enter.

The study of Musharraf et al. (2019) examines both general and Internet and Communication Technology (ICT) self-efficacy in cyber-victims, cyber-bullies, and cyber bully victims in comparison to un-involved students. Multinomial logistic regression analysis indicated that ICT self-efficacy significantly decreased the probability of being a cyber-victim and significantly increased the chances of being a cyber-bully whereas GSE appeared to have no role in predicting participant roles in cyberbullying after controlling for covariates (i.e., age, gender, traditional bullying, traditional victimization, social desirability, Internet usage, time spent on the Internet,

and social networking sites (SNS). Findings of the study have important implications for developing and enhancing interventions with respect to the inclusion of ICT related skills in anti-cyberbullying programs. With respect to gender, findings showed that females reported a higher level of victimization while males reported higher perpetration on both traditional and cyberbullying.

THEORETICAL BACKGROUND

Digital technologies are a necessary part of the learning process and there is a need to promote them to make teaching and learning process more effective. The common digital competence framework claims the standard basis of ICT in classroom environments such as information and literacy, communication and collaboration, digital content creation, safety, and problem solving. SAMR and TPACK are the two models which represents the integration of ICT in the classroom. SAMR has been widely adopted by teacher educators and schools as a pragmatic guide for signposting ICT development progress, as they work towards what is seen as the utopian position of curriculum Redefinition through technology (Geer et al. 2017; Hilton 2016). TPACK builds on the earlier work of Shulman (1986), "to explain how teachers' understanding of educational technologies and pedagogical content knowledge (PCK) interact with one another to produce effective teaching with technology" (Koehler et al. 2013, p. 14).

This study investigated the relationship between the potentials to develop digital competence, ICT experience and the digital competence of senior high school students and teachers. In addition, self-efficacy to use ICT was introduced as mediating variable. A conceptual framework depicted in Figure 1. The structural model of Smart PLS (Partial Least Square) was deployed to test the following hypothesis:

H1: *There is no significant relationship between the ICT experience and the digital competence.*

H2: *There is no significant relationship between the potentials to develop digital competence and the digital competence.*

H3: *There is no significant mediating effect of self-efficacy to use ICT to the relationship between ICT experience and the digital competence.*

H4: *There is no significant mediating effect of self-efficacy to use ICT to the relationship between the potentials to develop digital competence and the digital competence.*

Figure 1 shows the hypothetical or proposed model for the senior high school students' and teachers' development of digital competence. In the proposed model, the ICT experience (Hatlevik, 2017; Instefjord & Munthe, 2017; Hatlevik, Guomundsdottir & Loi, 2015) and the potential to develop digital competence (Jara, et al., 2015; Kusminska, Mazorchuk, Morze, Pavlenko & Prokhorov, 2018) were theorized to have impact in the development of the digital competence mediated by self-efficacy in the use of ICT (Hatlevik, Ottestad & Throndsen, 2014; Hatlevik & Christophersen, 2013).

Digital competence is essential for learning, work, and active participation in society. For school education, as important as understanding the competence itself is knowing how to help develop it (SEG, 2017). The findings of this study will rebound to the benefit of both students and teachers in public and private schools since digital competence plays an important role in the teaching and learning process.

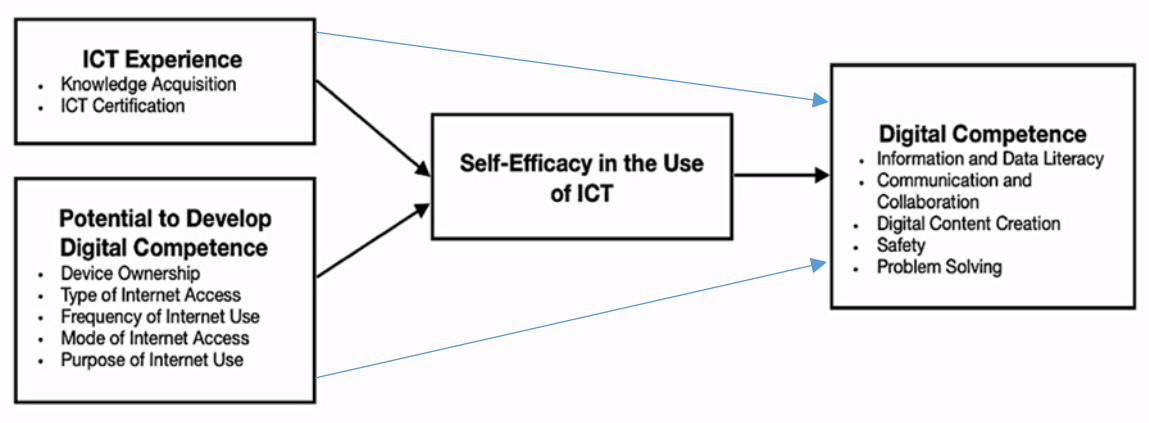

Figure 1. Hypothetical Model for Senior High School Students' and Teachers' Digital Competence

METHODOLOGY

Respondents of the Study

The study used the descriptive-quantitative research design. Teachers and students from different private and public senior high schools in the Division of Batangas City were the respondents of the study. Both teachers and students were selected as the respondents because the researchers believe that the result of the study will greatly help them know more about their digital competence. The sample was identified through stratified simple random in the sense that the teachers and students were selected from three (3) private and ten (10) public senior high schools. The questionnaires were validated after consulting experts and finally distributed 250 and 800 questionnaires for teachers and students, respectively. A total of 755 (165 from teachers and 590 from students) were received back duly filled in. Because of data privacy act, some private schools did not participate in the study.

Table 1 shows the demographic profile of the senior high school students who participated in the study. The mean age of the students is 17.17 years old with a standard deviation of 0.81 years. More than half of them are female (54.58%) and attend Grade 11 (64.07%) in the different public senior high schools (65.25%) in the division. The senior high school students are the so-called Gen Z learners. These learners tend to embrace social learning environments and expect digital learning tools to be deeply integrated in their learning. They can connect academic experiences through technology (Kozinsky, 2017).

Table 2 presents the demographic profile of the senior high school teachers who participated in the study. The mean age of the teachers is 30.71 years old with a standard deviation of 7.54 years. More than two-thirds are female (69.70%) and are employed in the different public senior high schools (66.06%) in the division. Almost three-fourths of them are teaching for 1-10 years (74.55). In terms of career stage, majority of the teachers are classified as proficient teachers (67.27%).

Teacher professional development happens in a continuum from beginning to exemplary practice. Anchored on the principle of lifelong learning, the set of professional standards for teachers recognizes the significance of a standards framework that articulates developmental progression as teachers develop, refine their practice, and respond to the complexities of educational reforms. Proficient teachers are professionally independent in the application of skills vital to the teaching and learning process. They provide focused teaching programs that meet curriculum and assessment requirements. They display skills in planning, implementing, and managing learning

programs and actively engage in collaborative learning with the professional community for mutual growth and advancement (Department of Education Order 42, s. 2017).

Table 1. Description of senior high school students in the Division of Batangas City

Demographics	Frequency	%
Age		
16 years old	115	19.49
17 years old	259	43.90
18 years old	190	32.20
19 years old	26	4.41
Mean ± SD	17.17 ± 0.81	
Gender		
Male	268	45.42
Female	322	54.58
School Type		
Private	205	34.75
Public	385	65.25
Grade Level		
Grade 11	378	64.07
Grade 12	212	35.93

Note: percentage (%) is computed based on 590 students

Table 2. Description of senior high school teachers in the Division of Batangas City

Demographics	Frequency	%
Age		
21-30 years old	103	62.42
31-40 years old	40	24.24
41-50 years old	20	12.12
51-60 years old	2	1.21
Mean ± SD	30.71 ± 7.54	
Gender		
Male	50	30.30
Female	115	69.70
School Type		
Private	56	33.94
Public	109	66.06
Years in Service		
Less than 1 year	29	17.58
1-10 years	123	74.55
11-20 years	8	4.85
21-30 years	5	3.02
Career Stage		
Beginning Teacher	29	17.58
Proficient Teacher	111	67.27
Highly Proficient Teacher	10	6.06
Did not indicate	15	9.00

Note: percentage (%) is computed based on 165 teachers

Questionnaire Development and Statistical Techniques

The respondents were asked to answer the self-diagnostic questionnaire which was structured in four theme blocks: ICT experience and potentials to develop digital competences, digital activities, competence areas, and self-efficacy. The ICT experience included items related to acquisition and certification while the potential for developing digital competence looked into the students' devices, connectivity, and internet usage.

The competence areas were based on the Digital Competences Self-Assessment Grid develop by the European Union (2015). This part consisted of 21 items, which were contextualized for teacher and student respondents. The continuum response scale ranging from 1 (I am not able to/I don't know it) to 10 (I have a thorough knowledge of it) was used in assessing the digital competence. Descriptive statistics such as frequency count, relative frequency, and mean were used to describe the sample characteristics and summarize study variables.

The digital profiles of the respondents were determined using the combined mean scores of the digital competencies and competence areas. The digital competence was classified as a basic user or beginner (1.00 - 3.49), an independent user or intermediate (3.50 - 7.49), or a proficient user or advanced (7.50 - 10.00) (Vuorikari, Punie, Carretero Gomez & Van den Brande, 2016). The last part of the questionnaire consisted of 6 items on self-efficacy rated through a 4-point Likert scale (1-Strongly Disagree, 2-Disagree, 3-Agree, 4-Strongly Agree). Structural Equation Modeling (SEM), particularly Path Analysis via Smart PLS, was used to assess the relationship between the independent factors and the dependent variable as mediated by self-efficacy.

RESULTS AND DISCUSSION

This section presents the highlights of the study, which includes digital profile, self-efficacy in the use of ICT, and level of digital competence of the students and teachers in the different senior high schools of the Division of Batangas City. Furthermore, a structural equation model is constructed to determine the relationship of the respondents' ICT experience and potentials to develop digital competence to their digital competence mediated by their self-efficacy to use ICT.

The digital profile of the senior high school students and teachers

Table 3 shows the ICT experience of students and teachers in terms of ICT knowledge acquisition and ICT certification. Majority of the respondents acquired their knowledge in ICT from the academic institutions that they have attended (60.26%) or are self-taught from watching how-to-videos or reading books on ICT (42.78%) and a few attended the training centers to acquire ICT skills (11.39%). However, almost a third of them still have little knowledge at a digital level (29.80%). It may also be noted that more than a quarter have training certificates to prove their ICT skills (27.15%) majority of which are students (25.08%). However, the vast majority are confident that they can demonstrate their ICT skills through practical examinations (72.85%).

Table 3. Students' and teachers' ICT experience

ICT Experience	Student		Teacher		Total	
	f	%	f	%	f	%
*Knowledge Acquisition**						
Self-taught	219	37.12	104	63.03	323	42.78
Training centers	80	13.56	61	36.97	86	11.39
School/University/College	372	63.05	83	50.30	455	60.26
Little knowledge at a digital level	181	30.68	44	26.67	225	29.80
Certification						
Training certificate	148	25.08	57	34.55	205	27.15
None	442	74.92	108	65.45	550	72.85

*Note: *multiple responses allowed*

The rapid development and advancement in Information and Communication Technology helps both students and teachers maximize the learning experiences. Students no longer rely on teachers as the main source of knowledge since information is abundant and can now be accessed from anyplace and at any time. Thus, the role of teachers is multifaceted and no longer fit the well-known term 'sage on stage', depending on their function in students' learning (Mahmud & Ismail, 2010).

Table 4 presents the potential to develop digital competence of the senior high school student and teacher. It can be gleaned from Table 4 that the respondents own several equipment, devices, or gadgets ranging from computers (56.03%), conventional phones (33.91%), smart/android phones (74.70%), and PC tablet (21.85%). It can also be noted that more teachers own multiple devices as compared to the students. In terms of internet access and use, majority of the students and teachers are connecting to either internet that is not broadband (38.41%) or from broadband internet with an average speed of 30 Mbps (between 12.00 - 16.00%).

Majority of them connects from home and/or school (67.94%) using their smartphones, android phones or computer (67.82%) practically on a daily basis (69.40%). Moreover, the respondents use the internet mainly for online messages (80.79%), information search and consultation (80.00%), entertainment (78.54%), downloading applications and media contents (76.03%), and email or communication (61.85%).

On the average, the students and teachers are engaged in 12.37 digital activities with a standard deviation of 5.92 activities in the past six months. Top in the list are activities related to gaming and entertainment with an average of 2.88 out of 4 activities, communication with an average of 3.08 out of 5 activities, and academic and internet searches with an average of 2.67 out of 6 activities. Majority of the respondents used internet for school work (93.51%), watch video clips (85.56%), download music or films (82.52%), used instant messaging (74.30%), or uploaded/posted photos, videos, or music to share with others (72.85%).

The digital competence is very important for both students and teachers in achieving success in the digital era. The students and teachers optimize the use of digital tools and communications.

Table 4. Students' and teachers' potentials to develop digital competence

Potentials to Develop Digital Competence	Student		Teacher		Total	
	f	%	f	%	f	%
*Equipment/Devices**						
Desktop, laptop and/or other portable computers	278	47.12	145	87.88	423	56.03
Conventional mobile phones, without internet access	200	33.90	56	33.94	256	33.91
Smartphones/android phones, with internet access	436	73.90	128	77.58	564	74.70
PC tablet	111	18.81	54	32.73	165	21.85
*Type of Connection**						
No internet connection	134	22.71	10	6.06	144	19.07
Internet connection, but is not broadband	217	36.78	73	44.24	290	38.41
Broad band internet connection (<10 Mbps)	86	14.58	29	17.58	115	15.23
Broad band internet connection (10-30 Mbps)	75	12.71	37	22.42	112	14.83
Broad band internet connection (>30 Mbps)	78	13.22	16	9.70	94	12.45
Frequency of Internet Use						
practically on a daily basis	377	63.90	147	89.09	524	69.40
several times a week	162	27.46	14	8.49	176	23.31
occasionally	51	8.64	4	2.42	55	7.29
*Mode of Internet Access**						
mainly form a computer	56	9.49	4	2.42	60	7.95
mainly from a smartphone or android phone	341	57.80	111	67.30	452	59.87
mainly from a tablet	33	5.59	3	1.82	36	4.77
from any of the devices available	155	26.27	46	27.90	201	26.62
Location						
At home	144	24.41	32	19.391	176	23.31
At work/school	22	3.73	29	7.5841.	51	6.75
Both at home and at work/school	217	36.78	69	82	286	37.88
At a public location with an internet connection	33	5.59	2	1.21	35	4.64
At any of these locations	174	29.49	33	20.00	207	27.42
*Purpose**						
Information search and consultation	451	76.44	153	92.73	604	80.00
Email & communication	330	55.93	137	83.03	467	61.85
Private/Instant/Direct messages	460	77.97	150	90.91	610	80.79
Downloading applications and media contents	437	74.07	137	83.03	574	76.03
Entertainment	476	80.68	117	70.91	593	78.54
Active participation in social networking sites	265	44.92	97	58.79	362	47.95
Online banking	72	12.20	65	39.39	137	18.15
Online purchases.	113	19.15	91	55.15	204	27.02
Cloud storage and download services	122	20.68	52	31.52	174	23.05
Videoconferencing.	91	15.42	51	30.91	142	18.81
Active participation in forums	62	10.51	27	16.36	89	11.79
Online collaboration	88	14.92	36	21.82	124	16.42
File sharing	208	35.25	87	52.73	295	39.07
Blogging	46	7.80	11	6.67	57	7.55
Online marketing	35	5.93	9	5.45	44	5.83

*Note: *multiple responses allowed*

The senior high school students and teachers were also asked about the digital activities they engaged into in the past six months. The 21 digital activities are classified as academic and internet searches, communication, collaboration and file sharing, security, and gaming and entertainment as presented in Table 5.

Table 5. Senior High School Students' and Teachers' Digital Activities (in the past 6 months)

Digital Activities	Students n=590		Teachers n=165		Overall	
	f	%	f	%	f	%
Academic & Internet Search	2.67 ± 1.53		2.68 ± 1.38		2.67 ± 1.50	
Used internet for schoolwork	546	92.54	160	96.97	706	93.51
Read/watch the news on the internet	390	66.10	136	82.42	526	69.67
Spent time in a virtual/digital environment/world	176	29.83	49	29.70	225	29.80
Bookmark a website	126	21.36	38	23.03	164	21.72
Change filter preferences	126	21.36	27	16.36	153	20.26
Compare different websites to decide if information is true	211	35.76	33	20.00	244	32.32
Communication	2.90 ± 1.62		3.72 ± 1.65		3.08 ± 1.66	
Used instant messaging	421	71.36	140	84.85	561	74.30
Visited a social networking profile	355	60.17	145	87.88	500	66.23
Sent/received email	351	59.49	143	86.67	494	65.43
Visited chatroom	205	34.75	63	38.18	268	35.50
Accept/sent a friend request	381	64.58	123	74.55	504	66.75
Collaboration & File Sharing	1.77 ± 1.30		2.07 ± 1.39		1.84 ± 1.33	
Upload/posted photos, videos, or music to share with others	420	71.19	130	78.79	550	72.85
Upload or posted a message on a website	260	44.07	94	56.97	354	46.89
Use file sharing sites	244	41.36	95	57.58	339	44.90
Written a blog/online diary	122	20.68	23	13.94	145	19.21
Security	1.99 ± 2.09		1.55 ± 1.80		1.90 ± 2.04	
Block messages from someone you don't want to hear from	265	44.92	39	23.64	304	40.26
Change privacy settings on a social networking profile	240	40.68	68	41.21	308	40.79
Delete the record of which sites you have visited	222	37.63	56	33.94	278	36.82
Block unwanted adverts/junk mail/spam	183	31.02	43	26.06	226	29.93
Find information on how to use the internet safely	265	44.92	50	30.30	315	41.72
Gaming & Entertainment	2.98 ± 1.31		2.52 ± 1.12		2.88 ± 1.29	
Played internet games on your own/against the computer	386	65.42	70	42.42	456	60.40
Watch video clips	497	84.24	149	90.30	646	85.56
Download music or films	480	81.36	143	86.67	623	82.52
Played games with other people	398	67.46	53	32.12	451	59.74
Overall	12.32 ± 5.99		12.55 ± 5.67		12.37 ± 5.92	

Note: Percentage (%) is computed based on total respondents per group

Senior high school students' and teachers' self-efficacy in the use of ICT

Table 6 summarizes the students' and teachers' level of self-efficacy in the use of ICT. It can be surmised that students (2.67) and teachers (2.81) have a relatively high level of self-efficacy in the use of the internet. They have a strong belief that they know a lot about the Internet (2.96), which surpasses that of their peers, colleagues, or someone who is older than them.

Technology used to access the internet is no longer limited to computers. Students and teachers nowadays own cellphones and or tablet that are helpful to any internet activities such as increasing communication with friends and family and providing entertainment like playing online video games. In an interview with the teachers about self-efficacy in the use of ICT, most of them say they use the internet mostly for instructional purposes and teaching practices. Hatlevik, I. K.R. & Hatlevik, O. E., (2018) emphasized teachers and students' general ICT self-efficacy could provide ways of preparing teachers to use ICT in their own teaching practice.

Table 6. Students' and teachers' self-efficacy in the use of ICT

Indicators	Mean	Verbal Interpretation
Students know…		
more about the internet than their friends.	2.56	Somewhat true
more about the internet than their parents.	2.83	Somewhat true
more about the internet than their teachers.	2.41	A bit true
more about the internet than their classmates.	2.52	Somewhat True
more about the internet than somebody a lot older than him/her.	2.77	Somewhat True
a lot of things about the internet.	2.96	
Overall Mean	2.67	Somewhat True
		Somewhat True
Teachers know…		
more about the internet than their students.	2.83	Somewhat true
more about the internet than their peers.	2.81	Somewhat true
more about the internet than their co-teachers.	2.70	Somewhat true
more about the internet than their department/school head.	2.65	Somewhat true
more about the internet than somebody a lot older than him/her.	2.98	Somewhat true
a lot of things about the internet.	2.92	
Overall Mean	2.81	Somewhat true
		Somewhat true

Note: 1.00-1.49, Not true; 1.50-2.49, A bit true; 2.50-3.49, Somewhat true; 3.50-4.00, Very true

The digital competence of senior high school students and teachers in the Division of Batangas City

It can be deduced from Table 7 that the senior high school students are intermediate or independent users (6.95) while teachers are advanced or proficient users (7.63) of ICT. Specifically, the respondents have the high ratings in the area of safety (7.31) and communication and collaboration (7.22) and low in the areas of information and data literacy (6.86) and digital content creation (6.82). It must also be noted that the students and teachers are advanced or proficient in managing digital identity (7.77) and netiquette (7.62).

The students rated themselves intermediate or independent as regards safety (7.16), particularly highest in the protection of one's health and well-being (7.41). They also rated themselves intermediate or independent, although lowest, in information and data literacy (6.64), particularly in evaluating data, information, and digital content (6.54).

The teachers rated themselves advanced or proficient users as regards communication and collaboration (7.87), particularly highest in managing digital identity (9.06). They also rated themselves advanced or proficient users, although lowest, in digital content creation (7.11), particularly in developing digital content (6.83).

Ferrari (2012) considered digital competence as the set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT and digital media to perform tasks, solve problems, communicate, and manage information, collaborate, create and share content and build knowledge effectively. Extending and improving digital competence is an essential component in the development of employable senior high school graduates as well as competent and digitally inclined teachers.

Table 7. Senior high school students' and teachers' digital competence

Competence Areas/ Descriptors	Students		Teachers		Overall	
	Mean	VI	Mean	VI	Mean	VI
Information and Data Literacy	6.64	IU	7.63	PU	6.86	IU
Browsing, searching and filtering data, information & digital content	6.69	IU	7.68	PU	6.91	IU
Evaluating data, information and digital content	6.54	IU	7.45	IU	6.74	IU
Managing data, information and digital content	6.69	IU	7.74	PU	6.92	IU
Communication and Collaboration	7.04	IU	7.87	PU	7.22	IU
Interacting through digital technologies	7.15	IU	7.71	PU	7.28	IU
Sharing through digital technologies	6.68	IU	7.67	PU	6.90	IU
Engaging in citizenship through digital technologies	6.41	IU	7.55	PU	6.66	IU
Collaborating through digital technologies	7.03	IU	7.44	IU	7.12	IU
Netiquette	7.57	PU	7.79	PU	7.62	PU
Managing digital identity	7.42	IU	9.06	PU	7.77	PU
Digital Content Creation	6.74	IU	7.11	IU	6.82	IU
Developing digital content	6.87	IU	6.83	IU	6.86	IU
Integrating and re-elaborating digital content	6.48	IU	7.24	IU	6.65	IU
Copyright and licenses	6.71	IU	7.24	IU	6.83	IU
Programming	6.88	IU	7.12	IU	6.94	IU
Safety	7.16	IU	7.86	PU	7.31	IU
Protecting devices	6.94	IU	7.61	PU	7.08	IU
Protecting personal data and privacy	7.10	IU	7.66	PU	7.22	IU
Protecting health and well-being	7.41	IU	8.21	PU	7.58	PU
Protecting the environment	7.20	IU	7.97	PU	7.37	IU
Problem Solving	7.06	IU	7.59	PU	7.17	IU
Solving technical problems	7.21	IU	7.78	PU	7.34	IU
Identifying needs and technological responses	6.88	IU	7.65	PU	7.05	IU
Creatively using digital technologies	7.36	IU	7.70	PU	7.43	IU
Identifying digital competence gaps	6.78	IU	7.23	IU	6.88	IU
Digital Competence	6.95	IU	7.63	PU	7.10	IU

Legend: 1.00-3.49, Beginner/Basic User; 3.50-7.49, IU – Intermediate/Independent User; 7.50-10.00, PU – Advanced/Proficient User

Data analysis using PLS-SEM

The present study has employed Partial Least Squares-Structural Equation Modelling to facilitate data analysis to achieve the research objectives. Table 8 shows the result of Reliability and Validity analyses. Reliability analysis is conducted for the scales using Cronbach's Alpha. Normally reliability coefficient of Cronbach's Alpha ranges between 0 to1 (Rouf & Akhtaruddin, 2018). Results of Cronbach's Alpha suggest that digital competence (0.901), ICT competence (0.354), potential to develop digital competence (0.047) and self-efficacy (0.827) were in an appropriate range.

Table 8. Internal Consistency Reliability, Validity, and R-Square

	Cronbach's Alpha	rho_A	CR	AVE	R^2 Square	R^2 Adjusted
Digital Competence	0.901	0.908	0.926	0.716	0.297	0.295
ICT Competence	0.354	0.397	0.747	0.601	-	-
Potential to Develop Digital Competence	0.047	0.55	0.365	0.394	-	-
Self-Efficacy	0.827	0.84	0.875	0.542	0.067	0.065

CR = Composite Reliability, AVE = Average Variance Extracted

Table 9 shows the discriminant validity criterion which measures the degree to which a variable is not equivalent to other constructs (Shahzad, Hassan, Aremu, Hussain & Lodhi, 2020). The diagonals are the square root of the AVE of the latent variables and indicates the highest in any column or row. Based on Fornell and Larckel criterion, each construct's AVE should be compared to the squared inter-construct correlation (as a measure of shared variance) of that same construct and all other reflectively measured constructs in the structural model. The shared variance for all model constructs should not be larger than their AVEs (Hair, Risher, Sarstedt, Ringle, 2019). Since the table below shows that each construct shares larger variance values with its own measures than with other measures, then the measurement model confirmed that the discriminant validity is well established.

Table 9. Discriminant Validity (Fornell and Larckel criterion)

Construct	DC	ICT Competence	PTDDC	SE
Digital Competence (DC)	**0.846**			
ICT Competence	0.138	**0.775**		
Potential to Develop Digital Competence (PTDDC)	0.439	0.201	**0.628**	
Self-Efficacy (SE)	0.392	0.227	0.169	**0.736**

Note: DC =

Structural equation model on the relation between the digital profile and digital competence when mediated by self-efficacy in the use of ICT

Figure 2 shows the structural equation model of the senior high school students' digital competence. It should be noted that ICT experience has no direct effect to the digital competence. The relationship between senior high school students' ICT experience, in particular the ICT skills certification and knowledge acquisition, and their digital competence is fully mediated by their self-efficacy to use ICT. This indicates that senior high school students' self-efficacy to use ICT increases the likelihood in developing their digital competence.

As shown in Table 10, the specific indirect effects as regard mediating effect of self-efficacy to the relationship between senior high school students' ICT experience and digital competence has a path coefficient of 0.081, t-value of 5.220 and p-value of <0.001. However, Figure 2 shows no direct relationship between ICT experience and digital competence. This suggests a full mediation in the relationship between ICT experience and digital competence by the self-efficacy to use ICT, as shown also by Figure 2.

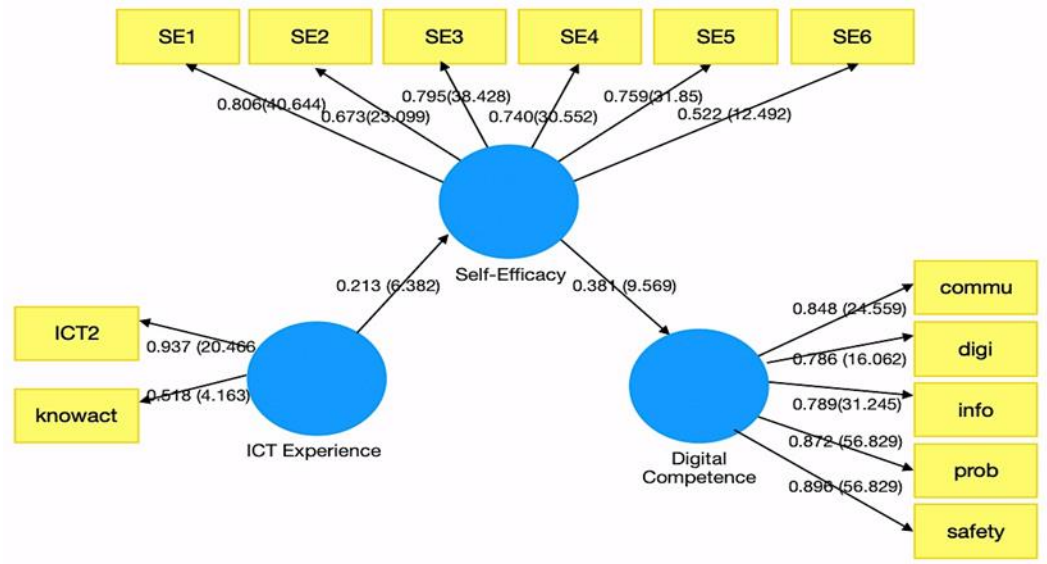

Figure 2. Structural Equation Model of the Senior High School Students' Digital Competence with path coefficients for the Outer Loading (t-value is significant at 5%)

Table 10. Path Coefficients of the Senior High School Students' Digital Competence Model

Path	Beta	t-value	p-value	Decision
H1: ICT Experience -> DigiComp	0.081	5.220	<0.001	Supported
H2: Potential_DigiComp-> DigiComp	0.072	1.102	0.325	Not Supported
H3: ICT Experience -> Self Efficacy -> DigiComp	0.101	4.620	<0.001	Supported
H4: Potential_DigiComp -> Self Efficacy -> DigiComp	0.0762	1.321	0.241	Not Supported

Figure 3 shows the structural equation model of the senior high school teachers' digital competence. It should be noted that ICT experience has no direct effect to the digital competence. Hence, the relationship between senior high school teachers' ICT experience, in particular the ICT skills certification and knowledge acquisition, and their digital competence is fully mediated by their self-efficacy to use ICT. This indicates that senior high school teachers' self-efficacy to use ICT increases the likelihood in developing their digital competence.

As shown in Table 11, the specific indirect effects as regard mediating effect of self-efficacy to the relationship between senior high school teachers' ICT experience and digital competence has a path coefficient of 0.106, t-value of 3.031 and p-value of 0.003. This suggests a full mediation in the relationship between ICT experience and digital competence by the self-efficacy to use ICT, as shown in Figure 3.

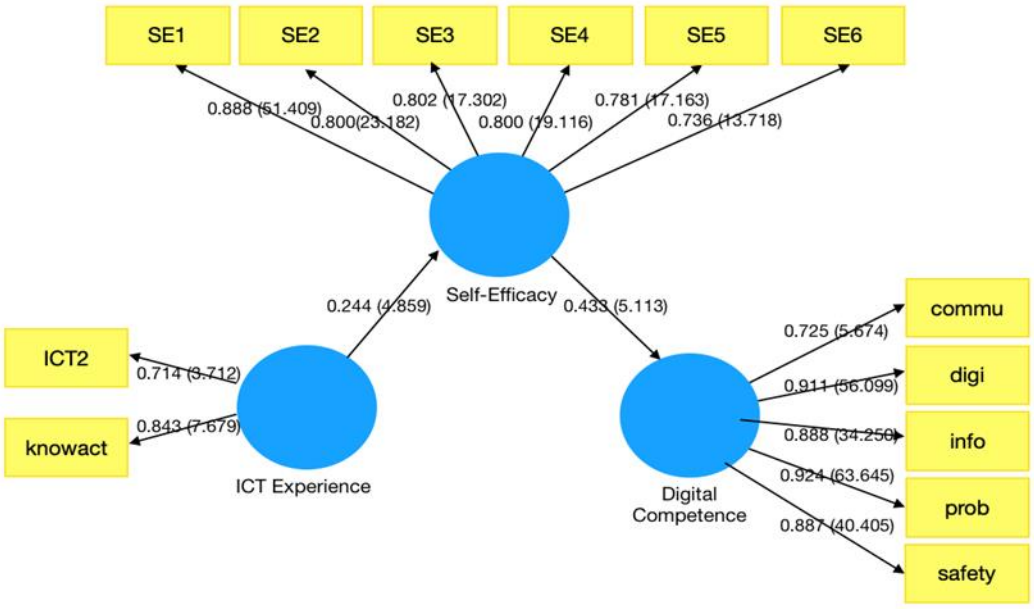

Figure 3. Structural Equation Model of the Senior High School Teachers' Digital Competence with Path Coefficients for the Outer Loading (t-value is significant at 5%)

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Table 11. Path Coefficients of the Senior High School Teachers' Digital Competence Model

Path	Beta	t-value	p-value	Decision
H1: ICT Experience -> DigiComp	0.106	3.031	0.003	Supported
H2: Potential_DigiComp -> DigiComp	-0.052	.0214	0.620	Not Supported
H3: ICT Experience -> Self Efficacy -> DigiComp	0.134	2.960	0.003	Supported
H4: Potential_DigiComp -> Self Efficacy -> DigiComp	0.075	0.613	0.325	Not Supported

Figure 4 shows the structural equation model of the senior high school students' and teachers' digital competence. It should be noted that ICT experience has no direct effect to the digital competence. Thus, the relationship between senior high school students' and teachers' ICT experience, in particular the ICT skills certification and knowledge acquisition, and their digital competence is fully mediated by their self-efficacy to use ICT. This indicates that senior high school students' and teachers' self-efficacy to use ICT increases the likelihood in developing their digital competence.

Figure 4. Structural Equation Model of the Senior High School Students' and Teachers' Digital Competence

Moreover, Figure 4 indicates a direct effect of the senior high school students' and teachers' different potentials, such as internet connectivity and frequency of internet use, device ownership, and purpose for which internet was used, in developing digital competence, as evidenced by the path coefficient of 0.426 and t-value of 15.472. Thus, a partial mediation by self-efficacy exists between the two. This suggest that ICT activity, internet use and access, and device ownership increases the likelihood of developing digital competence.

As shown in Table 12, the specific indirect effects as regard mediating effect of self-efficacy to the relationship between senior high school students' and teachers' ICT experience and digital competence has a path coefficient of 0.066, t-value of 5.449 and p-value of <0.001. This suggests a full mediation of the self-efficacy to use ICT on the relationship between senior high school students' and teachers' ICT experience and their digital competence.

Table 12. Path Coefficients of the Senior High School Students' and Teachers' Digital Competence Model

Path	Beta	t-value	p-value	Significance
H1: ICT Experience -> DigiComp	0.066	5.449	<0.001	Significant
H2: Potential_DigiComp -> DigiComp	0.426	15.472	<0.001	Significant
H3: ICT Experience -> Self Efficacy -> DigiComp	0.066	5.449	<0.001	Significant
H4: Potential_DigiComp -> Self Efficacy -> DigiComp	0.042	2.995	0.003	Significant

It can also be gleaned that the direct effects of senior high school students' and teachers' potential to develop digital competence with their digital competence has a path coefficient of 0.426, t-value of 15.472, and p-value of <0.001. Moreover, Figure 4 shows a direct effect of the potential to develop digital competence and the digital competence. This suggests that the relationship between senior high school students' and teachers' potential to develop digital competence and

their digital competence is partially mediated by the self-efficacy to use ICT, as shown by Figure 4.

Self-efficacy in the use of ICT among senior high school students and teachers has a positive impact for their digital competence and describe the potential to develop their digital competence as supported by the study of Hatlevik and Hatlivik (2018). Furthermore, the findings of the study of agrees with the idea of Instefjord and Munthe (2017) that teacher educators with relatively high digital competence will contribute on the development of students' digital competence. In addition, responsible and intelligible use of the internet and digital devices contributes to the development of digital competence, which is also stated in the study of Jara, et al., (2015).

Based on the findings of the study, majority of the students are female who attend Grade 11 from public senior high schools while majority of the teachers are female, young professionals and employed in the public schools who are proficient teachers. Majority of the respondents have the necessary potentials to develop digital competence but somewhat lacking the necessary ICT experience and engagement with digital activities. The respondents have relatively high level of self-efficacy to effectively use ICT. The digital competence of the senior high school students is in the intermediate level while the teachers are in the proficient level. The relationship between ICT experience and digital competence is fully mediated by their self-efficacy to use ICT while the relationship between potential to develop digital competence is partially mediated by their self-efficacy to use ICT.

Implications

The use of technology develops teachers' and students' competencies and makes them capable of a 21st century educators and learners. It changes their roles inside the classroom making them more efficient and effective. Technology helps them in making teaching and learning more meaningful and fun, but they must devote additional time and effort to improve their digital skills. Administrators are catalysts and facilitators of change. Successful integration of information and communications technology is clearly related to actions taken at school level. Principals and coordinators must develop a more collaborative and active approach to innovation to foster an environment in which such innovation has greater benefits for their staff and students.

LIMITATIONS AND FUTURE DIRECTIONS

The respondents in this study were limited to students and teachers in the division of Batangas City, Philippines. Hence, the researchers strongly recommend to also include other divisions in both private and public schools for future studies related to digital competence. Future research may include other indicators or factors as mediator between the digital profile and digital competence. The senior high school students and teachers may improve on their ICT experience and digital experience by subjecting oneself to ICT skills certification and redirecting efforts to utilize ICT in a more academic or professional use, respectively. In addition, the curriculum for basic education may include the teaching, practice, and development of digital competence at all grade levels. Continuous professional development should be given much attention for both teachers and teacher educators to ensure that they are all kept abreast of all technological changes and partnership at different levels involving different stakeholders.

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