

Exploring the impact of digital literacy on the self-efficacy of maritime education faculty



Richard Regencia Cabaron *

College of Maritime Education, Jose Rizal Memorial State University, Dapitan City, Zamboanga del Norte, Philippines

ARTICLE INFO

Article history:

Received 10 March 2024

Received in revised form

1 July 2024

Accepted 12 July 2024

Keywords:

Digital competence

Self-efficacy

Maritime education faculty

Descriptive-correlation analysis

Information and data literacy

ABSTRACT

The maritime industry is continually evolving, requiring educators in this field to be proficient in both technical knowledge and digital skills. This study aims to assess the digital competence and self-efficacy of maritime education faculty, recognizing the importance of these skills in enhancing job performance. Using a descriptive-correlation analysis, the research underscores the need for educators to improve their digital abilities to increase their confidence and teaching effectiveness. This study highlights the positive effects of enhancing digital competence among educators, ultimately leading to better educational outcomes for students in the maritime sector. It is recommended that maritime education faculty focus on improving their skills in information and data literacy, communication and collaboration, digital content creation, and safety. Additionally, educators should develop problem solving skills to excel in all areas of maritime education. By continuously improving their digital skills, educators will be better prepared to provide high-quality instruction and prepare students for success in the ever-changing maritime industry.

© 2024 The Authors. Published by IASE. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Teachers who possess digital competency may use systematic technology-based instruction and learning (Hatlevik, 2017; Ogodó et al., 2021). They possess a high level of digital competency and may confidently utilize a variety of digital tools and resources to help students engage in organized and stimulating learning activities. This entails utilizing internet resources for research and project-based learning, developing multimedia presentations and interactive learning materials, and leveraging digital platforms for communication and collaboration.

Teachers who embrace digital competence are better equipped to fulfill the varied learning demands of their pupils and adjust to the quickly evolving technology context (Sá and Serpa, 2020). Teaching and learning experiences that are more effective and tailored might result from this capacity to use technology in a meaningful and purposeful way. They were more likely to take advantage of online professional development opportunities and

were willing to try out cutting-edge, tech-enhanced teaching techniques. Furthermore, those who demonstrated greater levels of digital competency also felt more assured about their capacity to successfully incorporate technology into their lessons.

When a teacher has confidence in their own skills, they are more likely to face new challenges with hope and fortitude. They can effectively manage class activities, engage students, and adapt their methodology to meet the needs of different learning styles. On the other hand, teachers with low self-efficacy beliefs may struggle with managing classroom dynamics, self-doubt, and feelings of inadequacy. Self-efficacy beliefs, according to Lemon and Garvis (2016), are associated with an individual's belief in their ability to effectively complete a task or activity. When it comes to teaching, a teacher's self-perception of their own efficacy has a big impact on their competence and confidence in the classroom.

People may be more driven to study and develop their digital abilities if they have more self-efficacy, which would eventually result in higher levels of digital competency. For example, Lemon and Garvis (2016) emphasized that increasing one's self-efficacy in utilizing technology may be essential to raising one's level of digital proficiency. Helping people feel more at ease and confident while utilizing digital technologies may entail offering support and

* Corresponding Author.

Email Address: richardcabaron@jrmsu.edu.ph<https://doi.org/10.21833/ijaas.2024.07.019>

Corresponding author's ORCID profile:

<https://orcid.org/0000-0002-4070-3478>

2313-626X/© 2024 The Authors. Published by IASE.

This is an open access article under the CC BY-NC-ND license

[\(http://creativecommons.org/licenses/by-nc-nd/4.0/\)](http://creativecommons.org/licenses/by-nc-nd/4.0/)

training. People may be more driven to acquire and advance their digital abilities, which will eventually result in higher levels of digital competency by raising their self-efficacy.

There is a gap in the literature regarding the investigation of the relationship between educators' self-efficacy beliefs and their digital competencies. Although the reviewed research emphasizes the importance of digital competency for effective teaching and learning, little is known about how teachers' self-efficacy beliefs affect their ability to acquire and apply digital skills. Specifically, more research is needed to determine how improving self-efficacy in technology use could enhance educators' digital proficiency.

2. Literature review

Digital competence and self-efficacy are important subjects in education and technology. Digital competence means having the skills to use digital technology effectively and appropriately for various purposes, such as finding information, communicating, working together, creating content, staying safe, and solving problems. Self-efficacy is a person's belief in their ability to achieve a specific goal or outcome, such as learning something new, completing tasks, or handling challenges successfully (Mannila et al., 2018).

Several studies have indicated a correlation between digital competence and self-efficacy. Furthermore, it has been found that improving digital competence might boost self-efficacy in academic settings. An empirical investigation conducted by Galindo-Domínguez and Bezanilla (2021) revealed that digital competence exerted a favorable influence on time management and academic self-efficacy, thus leading to a reduction in stress levels among university students. A study conducted by Iordache et al. (2017), which referenced the work of Getenet et al. (2024), found that there was a positive correlation between digital competence and self-efficacy in online learning settings.

In the context of technology integration in education, Choi et al.'s (2018) study examined the link between instructors' self-efficacy, digital competence, and instructional strategies. The researchers assessed teachers' digital competence by assessing their knowledge, skills, and attitudes toward utilizing technology in the classroom. Teachers' confidence in their capacity to successfully integrate technology into their instruction was gauged to determine their self-efficacy. The authors' conclusions showed that educators were more inclined to use technology in the classroom when they had greater levels of self-efficacy and digital competence.

According to the Ogado et al.'s (2021) study, participants' digital competency and self-efficacy were correlated. As a result, those with less experience with instructional technology were less digitally competent and had lower levels of

technological self-efficacy. The authors concluded that those who struggle with instructional technology may have lower self-confidence in their ability to use digital technologies efficiently. This lack of confidence may hinder their ability to perform tasks that call for digital skills, which could affect their overall digital competency.

The findings of Sehar and Alwi's (2023) study emphasized the value of professional development in providing teachers with the technical know-how and digital competency they need to use online teaching tools with a high degree of self-efficacy, which will ultimately enhance their performance in delivering lessons online. These results have consequences for educational institutions and programs that prepare teachers for teaching in online contexts.

In their study on self-efficacy and instructional approaches, Gil-Flores et al. (2017) established a correlation between teachers' self-efficacy and their utilization of ICTs in teaching. Teachers who had a strong belief in their abilities to succeed in their profession preferred to provide pupils with tasks or assignments that involved using information and communication technologies (ICTs). According to Sangkawetai et al. (2020), instructors who have a higher level of self-efficacy in teaching ICT are more likely to successfully integrate ICTs into their teaching.

The aforementioned discovery highlights the significance of digital competencies in augmenting self-assurance and efficacy in professional settings, specifically within the domain of maritime education.

H₁: Digital competence positively impacts self-efficacy.

3. Materials and methods

Tourón et al. (2018) developed a thorough digital competency scale to evaluate faculty members' competence in integrating technology into their instruction. The twenty-five items on the scale addressed a wide range of topics, including problem solving, safety, digital content production, communication and teamwork, and information and data literacy. Respondents graded every item on a 5-point Likert scale that ranged from extremely incompetent to extremely competent. After putting the scale through reliability testing, the researcher discovered that it had a high degree of internal consistency ($\alpha = .92$). The final version of the questionnaire had items with a factor load of 20 or greater.

The researcher used the digital competence scale in addition to the Ohio State Teacher Efficacy Scale (OSTES), developed by Tschannen-Moran and Hoy (2001), to assess faculty members' self-efficacy in utilizing technology for instruction. Originally, the OSTES included 52 items; however, a condensed version with 12 items was made specifically for this study, with an emphasis on student engagement,

classroom management, and instructional strategy efficacy. The self-efficacy questionnaire demonstrated a good level of reliability ($\alpha=.90$), rendering it a suitable instrument for evaluating teacher efficacy in the context of technology integration in education. A strong framework for assessing faculty members' digital competency and self-efficacy in utilizing technology for instruction was created by combining these scales. The researcher utilized purposive sampling. According to Etikan et al. (2016), purposive sampling is done by selecting participants based on their characteristics, group, and theory, which is necessary for the non-random method known as deliberate sampling.

The study examined data from three particular State Universities and Colleges (SUCs) in Zamboanga del Norte. The researcher took steps to ensure the survey responses were reliable and unbiased. Clear instructions were given, confidentiality was maintained, and a comfortable environment was created to encourage respondents to answer truthfully.

4. Results and discussion

Table 1 demonstrates the "highly competent" status of the Maritime Education faculty in the areas of digital content creation ($M = 4.23$, $SD = .82$), safety ($M = 4.31$, $SD = .83$), communication and collaboration ($M = 4.30$, $SD = .79$), and information and data literacy ($M = 4.33$, $SD = .80$). They do, however, have problem solving skills ($M = 4.05$, $SD = .81$). The results of the survey show how highly skilled the faculty members in maritime education at the three schools are in four different areas of digital competency: information and data literacy, safety, communication and cooperation, and digital content production. However, the findings also suggest that educators may benefit from additional development in a few areas, most notably problem solving.

This is in line with the study by Garzón-Artacho et al. (2021), which emphasizes the significance of instructors developing their expertise in these fields. On a positive note, the educators demonstrated remarkable abilities in teamwork and communication while using digital materials. This demonstrates that they have the resources needed to communicate with students and provide digital content effectively. Overall, the results suggest that while marine education faculty members are proficient in some areas of digital competency, there is room for improvement in other areas. Teachers need to keep honing their digital skills in order to meet the needs of their pupils in the digital age.

According to Damrongpanit et al. (2023), instructional management was the main use of technology in educational settings. The study also made clear how important technology was for easing communication, carrying out knowledge evaluations, creating educational resources, and incorporating educational games into teaching methods.

Table 2 shows that the maritime education faculty of the three schools indicated a "great deal" in

their self-efficacy, efficacy in student engagement ($M = 4.35$, $SD = .81$), instructional strategies ($M = 4.47$, $SD = .80$), and classroom management ($M = 4.51$, $SD = .80$). The results indicate that the maritime education faculty in the three schools have high levels of self-efficacy, efficacy in student engagement, instructional strategies, and classroom management. This suggests that these teachers feel confident in their abilities to effectively teach and engage their students.

Table 1: Means of the digital competence of the faculty

Indicators	Mean	Std. deviation
Information and data literacy	4.33	.80
Communication and collaboration	4.30	.79
Digital content creation	4.23	.82
Safety	4.31	.80
Problem solving	4.05	.81

A key element of effective teaching is having the ability to positively impact students' learning outcomes, and a key element of this belief is self-efficacy. Because of their high levels of self-efficacy, the faculty members in this research may possess the skills and confidence necessary to educate students in an effective manner.

Since teachers' self-efficacy is an essential attribute that is closely linked to their effectiveness in the classroom, Gavora's (2010) study shows that instructors have the knowledge and skills associated with educators. The high scores for the instructors' effectiveness in student engagement, instructional strategies, and classroom management demonstrate their proficiency in educating students, providing instruction, and maintaining a pleasant learning environment. An effective teaching practice consists of all of these elements. Results also indicate that the three schools' maritime education faculty members are competent teachers who can engage students, which is encouraging for the caliber of education offered at these institutions.

Table 2: Means of the self-efficacy of the maritime education faculty

indicators	Mean	Std. deviation
Efficacy in student engagement	4.35	.81
Efficacy in instructional strategies	4.47	.80
Efficacy in classroom management	4.51	.80

The relationship between the self-efficacy of Maritime Education faculty and the following areas was found to be positive and significant: information and data literacy, communication and collaboration ($r = .835$), digital and content creation ($r = .821$), safety ($r = .760$), problem solving ($r = .760$), effectiveness in student engagement ($r = .824$), effectiveness in instructional strategies ($r = .797$), and effectiveness in classroom management ($r = .803$). Every probability value is less than 0.05.

Table 3 presents the results, which indicate positive and significant associations between the self-efficacy of the maritime education faculty and the measures of digital competency. This suggests that the faculty's digital abilities have a positive impact on both the instructors' self-efficacy and the

students' engagement. This is a noteworthy indication that the faculty of maritime education is capable of meeting the needs of the digital world. Moreover, this suggests that educators who possess strong digital abilities are more likely to have faith in their capacity to successfully instruct and involve pupils in the subject matter. Furthermore, it appears that these abilities are crucial for both technical proficiency and giving educators the confidence and capability to feel competent in their positions, given the positive correlation that exists between digital competency and self-efficacy. Overall, data suggests that faculty members in maritime education may greatly benefit from investments in digital training and skill development in terms of both student results and efficacy as teachers.

Rohatgi et al. (2016) claimed that self-efficacy can account for variations in teachers' ICT usage and digital competency. This highlights how crucial it is

for teachers to have faith in their abilities while leveraging ICT to meet learning goals. The study by Choi et al. (2018) emphasized how essential it is for teachers' levels of digital competence and self-efficacy to shape their views regarding technology integration in the classroom. Schools and education systems may better educate instructors to prepare students for success in a quickly changing digital environment by assisting them in gaining these competencies.

The study's findings have significant implications for professional development and teacher preparation initiatives. Education institutions may equip instructors to successfully integrate technology into their teaching methods by improving their digital competence and self-efficacy. Students may then benefit from more dynamic and interesting learning opportunities, which will eventually improve academic results.

Table 3: Correlation analysis of digital competence on the self-efficacy of maritime education faculty

Indicators	MIDL	MCC	MDCC	MS	MPS	MESE	MEIS	MECM
Information and data literacy								
R		.835	.821	.847	.760	.824	.797	.803
Sig.		.000	.000	.000	.000	.000	.000	.000
Communication and collaboration								
R			.845	.873	.804	.791	.800	.804
Sig.			.000	.000	.000	.000	.000	.000
Digital content creation								
R				.834	.780	.790	.801	.805
Sig.				.000	.000	.000	.000	.000
Safety								
R					.850	.825	.827	.805
Sig.					.000	.000	.000	.000
Problem solving								
R						.760	.732	.870
Sig.						.000	.000	.000
Efficacy in student engagement								
R							.907	.719
Sig.							.000	.000
Efficacy in instructional strategies								
R								.854
Sig.								.000
Efficacy in classroom management								
R								.887
Sig.								.000

MIDL: Maritime information and data literacy; MCC: Maritime communication and collaboration; MDCC: Maritime digital content creation; MS: Maritime safety; MPS: Maritime problem solving; MESE: Maritime efficacy in student engagement; MEIS: Maritime efficacy in instructional strategies; MECM: Maritime efficacy in classroom management

5. Conclusions and recommendations

The results indicate that the Maritime education faculty demonstrated a high degree of proficiency in a number of field-related domains, such as digital content creation, safety, communication and collaboration, and information and data literacy. This implies that the faculty members possess the necessary tools to instruct and prepare students in these important areas of maritime education. Furthermore, their rating of "competent" in problem solving suggests that they have a respectable degree of competence in this domain. Overall, the results point to the marine education faculty's readiness to offer its students a top-notch education and support the growth of competent workers in the marine sector. Also, the maritime education faculty has a strong sense of self-efficacy in various aspects related to their role as educators. This high level of

self-efficacy is likely contributing to their effectiveness in engaging students, implementing effective instructional strategies, and managing classroom dynamics. This suggests that the maritime education faculty is well-equipped to support student learning and overall academic success. Further research could explore the specific practices and beliefs that contribute to this high level of self-efficacy and effectiveness in the classroom. Furthermore, it can be said that among faculty members teaching maritime education, self-efficacy, and digital competence have a significant and favorable association. This shows that those with higher degrees of digital competency also tend to have higher levels of self-efficacy in their careers.

It is highly recommended that the maritime education faculty expand upon their strengths in digital content creation, collaboration and communication, information and data literacy, and

safety to further improve their educational offerings. To thrive in all facets of maritime education, efforts should also be made to enhance their capacity for problem solving. All things considered, the faculty members deserve recognition for their exceptional expertise, devotion to providing their students with a top-notch education, and ability to develop competent workers for the marine sector. Future studies might concentrate on examining the particular behaviors and viewpoints that support this high degree of self-efficacy and success in the classroom to enhance educational methods in the maritime education area.

Educational policymakers and institution administrators may invest in professional development opportunities for faculty to enhance their skills in digital content creation, collaboration, communication, information and data literacy, and safety. This can include workshops, seminars, online courses, and peer-to-peer learning opportunities. They may also provide digital tools, technical support, and funding for equipment and software upgrades.

The researcher acknowledges that the results are based on data from three specific State Universities and Colleges in the Zamboanga Peninsula, which may limit the broader applicability of his findings to other maritime education contexts or regions. The researcher took measures to ensure that the survey responses were reliable and unbiased. He provided clear directions, maintained confidentiality, and created a comfortable environment in which respondents provided their answers truthfully. To ensure a more representative sample, future researchers may conduct a study in a more diverse range of institutions.

Future researcher/s will also utilize multiple regression analysis as another statistical tool to explore the predictive power of digital competence on self-efficacy. In addition to multiple regression analysis, researchers may also investigate using qualitative methods, such as interviews or focus groups, to acquire a better understanding of the subjective experiences and perceptions of people with different degrees of digital competence. This multi-method approach can lead to a more comprehensive and nuanced understanding of the complex relationship between digital competence and self-efficacy. Furthermore, they may explore additional contextual factors affecting digital competence and self-efficacy, such as organizational support, access to technology, and ongoing professional development opportunities.

Compliance with ethical standards

Ethical considerations

Ethical approval for this study was obtained from the relevant institutional review board. Informed consent was obtained from all participants, and their confidentiality and privacy were strictly maintained.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

- Choi M, Cristol D, and Gimbert B (2018). Teachers as digital citizens: The influence of individual backgrounds, internet use and psychological characteristics on teachers' levels of digital citizenship. *Computers and Education*, 121: 143-161. <https://doi.org/10.1016/j.compedu.2018.03.005>
- Damrongpanit S, Chamrat S, and Manokarn M (2023). The development of skills and awareness in integrating content, teaching methods, and technology in the learning management for teachers in the education sandbox, Thailand. *International Journal of Advanced and Applied Sciences*, 10(11): 202-212. <https://doi.org/10.21833/ijaas.2023.11.025>
- Etikan I, Musa SA, and Alkassim RS (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1): 1-4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Galindo-Domínguez H and Bezanilla MJ (2021). Promoting time management and self-efficacy through digital competence in university students: A mediational model. *Contemporary Educational Technology*, 13(2): ep294. <https://doi.org/10.30935/cedtech/9607>
- Garzón-Artacho E, Sola-Martínez T, Romero-Rodríguez JM, and Gómez-García G (2021). Teachers' perceptions of digital competence at the lifelong learning stage. *Heliyon*, 7(7): e07513. <https://doi.org/10.1016/j.heliyon.2021.e07513>
PMid:34401558 PMCID:PMC8353311
- Gavora P (2010). Slovak pre-service teacher self-efficacy: Theoretical and research considerations. *The New Educational Review*, 21(2): 17-30.
- Getenet S, Cante R, Redmond P, and Albion P (2024). Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. *International Journal of Educational Technology in Higher Education*, 21: 3. <https://doi.org/10.1186/s41239-023-00437-y>
- Gil-Flores J, Rodríguez-Santero J, and Torres-Gordillo JJ (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68: 441-449. <https://doi.org/10.1016/j.chb.2016.11.057>
- Hatlevik OE (2017). Examining the relationship between teachers' self-efficacy, their digital competence, strategies to evaluate information, and use of ICT at school. *Scandinavian Journal of Educational Research*, 61(5): 555-567. <https://doi.org/10.1080/00313831.2016.1172501>
- Iordache C, Mariën I, and Baelden D (2017). Developing digital skills and competences: A quick-scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Education*, 9(1): 6-30. <https://doi.org/10.14658/PUPJ-IJSE-2017-1-2>
- Lemon N and Garvis S (2016). Pre-service teacher self-efficacy in digital technology. *Teachers and Teaching*, 22(3): 387-408. <https://doi.org/10.1080/13540602.2015.1058594>
- Mannila L, Nordén LÅ, and Pears A (2018). Digital competence, teacher self-efficacy and training needs. In the Proceedings of the 2018 ACM Conference on International Computing Education Research, ACM, Espoo, Finland: 78-85. <https://doi.org/10.1145/3230977.3230993>
- Ogodo JA, Simon M, Morris D, and Akubo M (2021). Examining K-12 teachers' digital competency and technology self-efficacy during COVID-19 pandemic. *Journal of Higher Education Theory and Practice*, 21(11): 13-27.

<https://doi.org/10.33423/jhetp.v21i11.4660>
PMid:34671511 PMCID:PMC8525872

Rohatgi A, Scherer R, and Hatlevik OE (2016). The role of ICT self-efficacy for students' ICT use and their achievement in a computer and information literacy test. *Computers and Education*, 102: 103-116.
<https://doi.org/10.1016/j.compedu.2016.08.001>

Sá MJ and Serpa S (2020). COVID-19 and the promotion of digital competences in education. *Universal Journal of Educational Research*, 8(10): 4520-4528.
<https://doi.org/10.13189/ujer.2020.081020>

Sangkawetai C, Neanchaleay J, Koul R, and Murphy E (2020). Predictors of K-12 teachers' instructional strategies with ICTs. *Technology, Knowledge and Learning*, 25: 149-177.
<https://doi.org/10.1007/s10758-018-9373-0>

Sehar S and Alwi SKK (2023). Correlation between teachers' digital competency and their self-efficacy in managing online classes. *Pakistan Journal of Humanities and Social Sciences*, 11(2): 2135-2145.
<https://doi.org/10.52131/pjhss.2023.1102.0513>

Tourón J, Martín D, Asencio N, Pradas S, and Íñigo V (2018). Validación de constructo de un instrumento para medir la competencia digital docente de los profesores (CDD) [Construct validation of a questionnaire to measure teachers' digital competence (TDC)]. *Revista Española de Pedagogía*, 76(269): 25-54. <https://doi.org/10.22550/REP76-1-2018-02>

Tschannen-Moran M and Hoy AW (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7): 783-805.
[https://doi.org/10.1016/S0742-051X\(01\)00036-1](https://doi.org/10.1016/S0742-051X(01)00036-1)