Study of the Mastery of Digital Self-Efficacy through the Learning Process among Students of Universities in the Livestock Sector

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ABSTRACT: Mastery of digital skills is essential for animal husbandry students because digital technology has changed the way of work and innovation in the livestock industry. With digital skills, students can optimize livestock management, track livestock health and reproduction, and predict market developments more efficiently. Perceptions of self-efficacy regarding the ability to use digital technology will encourage increased digital skills for students. Many studies examine digital skills, but limited studies discuss what is the influence of institutional support, instructors, peers and of digital culture on digital self-efficacy among students of universities in the livestock sector. Therefore, this study examines a structural model for forming digital self-efficacy involving institutional support, instructor influence, peer influence, and digital literacy. A total of 263 students were involved in filling out the research questionnaire. This study uses structural equation modeling (SEM) analysis with SmartPLS software. The study results reveal that digital self-efficacy is directly influenced by peer influence and digital literacy. Meanwhile, institutional support and instructor influence do not directly affect digital self-efficacy. Another finding, digital literacy mediates the influence of institutional support, instructor influence, and peer influence on student digital self-efficacy. This study discusses in depth how to master digital self-efficacy through the learning process on campus and the implications of this study for universities.

Keywords: Digital skills, digital self-efficacy, digital literacy, lecturer support, friend support, campus support.

I. INTRODUCTION

Today, digitization impacts all aspects of society, including workplaces and educational institutions [1-3]. The development of the digital era has changed the landscape of the world of work significantly. Digital technology and the internet have presented new opportunities, changing how people work, collaborate and interact in professional environments [3, 4]. Adopting digital tools, such as email communication, instant messaging applications, and online collaboration platforms, has accelerated communication and enabled geographically dispersed teams to work together efficiently. Individuals are now able to carry out activities that are increasingly complex or connected to highly individualized systems thanks to the proliferation of digital systems [5]. According to research by Larson and DeChurch [6], individuals must become increasingly tech-savvy and adaptive to meet evolving demands and seize new opportunities. In particular, the development of the digital era has had a significant impact on the livestock sector in the world of work. The use of technology and digitization has changed the way of work and brought innovations in work management [5], including in the field of animal husbandry [7]. Dedicated software and applications for animal health monitoring, feedstock management, and data analysis have simplified day-to-day operational tasks [7-9].

In addition, technological developments have also led to the adoption of artificial intelligence (AI), automation, and data analytics in various industries [9, 10]. This has increased operational efficiency, faster data processing and more accurate decision-making. Some simple, routine work may be replaced by machines or algorithms, while new jobs focusing more on technology and analysis emerge [4, 5]. In the livestock sector, digital applications also enable

more targeted nutrition monitoring and feed management [7, 11-13]. With advanced data analysis and algorithms, farmers can optimize feed composition, monitor feed intake and reduce resource wastage. This technology helps increase production efficiency and animal welfare while reducing environmental impact.

Although the development of the digital era provides many benefits, there are challenges in adopting this technology in the livestock sector [14-16]. Some farmers may need to increase their understanding of digital technologies and skills in using digital tools [7, 17]. It requires investment in the right technology infrastructure, training and support to ensure digital technologies' successful and effective deployment in the livestock environment. Furthermore, rapid technological change can also challenge farmers [7, 18]. Software updates, new equipment, or constantly evolving applications require constant updating and adjustments in the farmer's knowledge and skills. Farmers must be able to adapt quickly to these changes in order to remain relevant and effective in their use of digital technology.

The need for understanding and mastery of digital technology for breeders has prompted the need to prepare skilled human resources using digital technology through education [19-21]. In the era of digitalization that continues to grow, the need to prepare prospective workers who can master technology and digitization in the livestock sector through an educational process is very important. Education focusing on technology and digitization in the context of livestock enables prospective workers to understand and master the latest tools, applications and systems used in modern livestock management. With good preparation through education, prospective workers will be ready to face the challenges and opportunities of technological developments and digitalization in the livestock industry. Animal husbandry students as prospective business actors in animal husbandry, livestock extension workers, educators, and government employees in the livestock sector need to improve their digital skills as a preparation and competency provision when they enter the world of work.

Peiffer et al. [22] found that objective skills and subjective perceptions of competency influence the effective use of digital systems. Self-efficacy regarding the use of digital systems, in particular, has been shown to predict the effective use of digital systems [23]. Despite their close relationship, competency and beliefs must be distinguished because they influence learning, motivation, and performance independently [24, 25]. In the context of this study, we will explicitly highlight the importance of digital self-efficacy as a fundamental predictor of completing activities effectively about ICT use in this study [26, 27]. Mastery of digital self-efficacy is very important in facing the ever-evolving digital era. Digital self-efficacy refers to individual beliefs in using and adapting to digital technology [28]. In an increasingly digitally connected world, confidently leveraging software, applications, and online platforms is becoming an indispensable skill. Individuals with high digital self-efficacy have confidence in navigating technology, searching for information, communicating effectively, and solving problems in a digital environment.

Many studies have shown studies on digital self-efficacy to be the main determinant of whether and how individuals utilize digital systems and how individuals intend to use them [29, 30]. Digital self-efficacy also includes the ability to critically understand and analyze information and maintain online security and privacy [31]. By mastering digital self-efficacy, individuals can confidently face challenges in the digital era, such as competition in the increasingly global job market, demands using technology in everyday life, and increasing dependence on digital platforms. By possessing these skills, individuals will be better prepared to take advantage of the opportunities offered by technology, maintain relevance in a changing digital world, and increase their ability to participate actively in a digital society.

Based on previous research, there is evidence showing a significant influence of factors such as institutional support, instructor influence, and peer influence on the development of individual digital self-efficacy [32, 33]. In addition, other studies also prove that digital literacy has a relationship with digital self-efficacy [34]. Prior et al. [35] also shows that digital literacy has an influence on digital self-efficacy. Although separate previous studies have provided consistent evidence that institutional support, instructor influence, peer influence, and digital literacy have an important role in the development of digital self-efficacy for livestock students. However, previous studies have not collaboratively proven whether these antecedent factors influence the development of digital self-efficacy for livestock students. Therefore, this study aims to fill the void in this study, specifically to prove how institutional support, instructor influence, peer influence, and digital literacy influence the digital self-efficacy of livestock students.

II. LITERATURE REVIEW

1. DIGITAL SELF-EFFICACY IN THE DIGITAL ERA

Digital self-efficacy is a concept in psychology that refers to an individual's belief in using digital technology effectively [23, 26, 27, 35]. This theory is based on the theory of self-efficacy put forward by Albert Bandura [26], which states that an individual's belief in his abilities influences the behavior and achievements achieved. In the context of digital self-efficacy, individuals with high confidence tend to have a positive attitude toward technology and feel confident that they can master and deal with various tasks and challenges associated with using technology [28]. They feel able to learn new skills, solve technology problems, and adapt quickly to changes in technology.

Digital self-efficacy theory also recognizes that technological knowledge, previous experience, and positive feedback can influence an individual's confidence level in a digital context [34, 36]. For example, individuals with higher technology knowledge and skills tend to have higher levels of digital self-efficacy because they feel more confident in facing technology-related tasks and challenges [34]. In addition, digital self-efficacy also emphasizes the importance of practical experience in strengthening individual beliefs [26]. Through successful experiences in using technology and completing related tasks, individuals can strengthen their self-confidence and increase their digital self-efficacy.

By understanding digital self-efficacy theory, practitioners and educators can develop effective strategies to increase individual confidence levels in dealing with and using digital technology. This can involve education and training designed to strengthen technology skills, provide constructive feedback, and provide opportunities for individuals to face technological challenges in a supportive environment. Thus, the theory of digital self-efficacy provides an important basis for developing individual digital competence in the ever-evolving digital era.

Social norms: The role of institutional support, instructor influence, peer influence on digital self-efficacy

Huang [37] states that individual beliefs about using technology effectively are influenced by social norms factors which include institutional support, instructor influence, and peer influence. Social norms describe how much an individual believes that significant others believe he or she should (or should not) engage in certain behaviors, in this case, using the Internet [38]. One of the social norms factors is institutional support. Previous studies have consistently shown that institutional support is important in shaping student digital self-efficacy [32], [33, 37]. Institutional support refers to the support provided by institutions or institutions in terms of technology infrastructure, accessibility, and policies that support the use of digital technology [30, 37]. Research has shown that students who receive strong institutional support, such as easy access to technological tools and resources, relevant training, and adequate technical support, tend to have higher levels of digital self-efficacy [37]. Thus, this study believes that institutional support has an important influence on digital self-efficacy.

H1: Institutional support plays a role in influencing student digital self-efficacy.

In addition, instructor influence is important in influencing individual beliefs about using technology [37]. Students' perceptions of how eager their lecturers are to use the internet and new technologies are called instructor influence [37]. Teachers or lecturers considerably influence their students' adoption of educational technology [39]. Instructional quality and interactions between instructors and students in teaching digital technology contribute to developing digital self-efficacy [39]. Instructors who provide effective guidance, training, and constructive feedback can increase individual confidence in digital technology. Previous studies have shown that instructor encouragement and support significantly impact the quantity and quality of students' self-use of technology for learning [40, 41].

H2: Instructor influence plays a role in influencing student digital self-efficacy.

Another factor that has an important role in forming individual beliefs about using digital technology is peer influence [37]. Peer Influence refers to the extent to which a student believes that his peers or acquaintances expect him to use Internet-based technologies for educational purposes [37, 42]. Scholars have hypothesized that peers influence technology adoption, as socially persuasive information can motivate students to perceive systems as beneficial and promote acceptance [43]. Social media technology has been shown to have a positive relationship with peer influence [44]. In addition, peer support increases individual internet self-efficacy [45]. Therefore, in this study, positive interactions with peers with high digital abilities can motivate and increase individual confidence in using digital technology.

H3: Peer influence plays a role in influencing student digital self-efficacy.

2. *THE EFFECT OF DIGITAL LITERACY ON DIGITAL SELF-EFFICACY*

Furthermore, digital literacy has a strong relationship with the development of digital self-efficacy [34]. Individuals with high digital literacy skills, such as the ability to find, evaluate, and use information effectively, tend to have better digital self-efficacy. Martin [46] defines digital literacy as the perception, attitude, and ability to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources to construct and communicate new knowledge. In other words, digital literacy includes the technical ability to access digital resources, the cognitive ability to generate and evaluate digital information through critical and periodic internet searches, and the ability to use the internet responsibly according to the rules [47].

In the same way, Knutsson et al. [48] said that digital literacy is an important learning factor. Ting [49] says that digital literacy is related to learner freedom. Digital literacy is important in increasing digital self-efficacy [34]. Individuals acquire the knowledge and confidence necessary to navigate the digital landscape with competence and proficiency by acquiring digital literacy skills. Digital literacy enables individuals to understand and utilize digital tools, platforms and resources.

Digital literacy is heavily influenced by social support [50-53]. Previous studies also state that support positively influences digital literacy, and need satisfaction partially mediates the relationship between perceived support and digital literacy, indicating that autonomy and competence are more important than relatedness in developing digital literacy [54]. Some examples of social support are institutional support [55, 56], peer influence [57, 58], and teacher influence [59]. Institutional support such as schools, libraries and community centers have an important role in facilitating the development of digital literacy. These institutions create an environment that supports learning and exploration by providing access to technology, training programs and resources. In addition, support and encouragement from peers also contribute significantly to the development of digital literacy [58]. Through collaborative learning, knowledge sharing and mutual motivation, peers can inspire each other to develop digital skills and stay updated with the latest technological developments.

Equally important is the teacher's role as a mentor and facilitator [59]. Educators with strong digital literacy can guide students in developing the critical thinking, information evaluation, and problem-solving skills needed to become effective digital citizens. Their expertise in navigating the digital realm and their ability to provide meaningful mentoring help students university become thoughtful consumers and creators of digital content. In conclusion, the synergies between institutional support, peer influence, and teacher guidance play a central role in shaping individuals' digital literacy, empowering them to thrive in an increasingly digital world. Based on previous literature, this study develops a conceptual model for the formation of digital self-efficacy shown in Figure 1.

H4: Digital literacy plays a role in influencing students' digital self-efficacy
H5: Institutional support plays a role in influencing student digital literacy
H6: Instructor influence plays a role in influencing student digital literacy
H7: Peer influence plays a role in influencing student digital literacy
H8: Digital literacy mediates the effect of institutional support on students' digital self-efficacy
H9: Digital literacy mediates the influence of instructor influence on student digital self-efficacy
H10: Digital literacy mediates peer influence on student digital self-efficacy

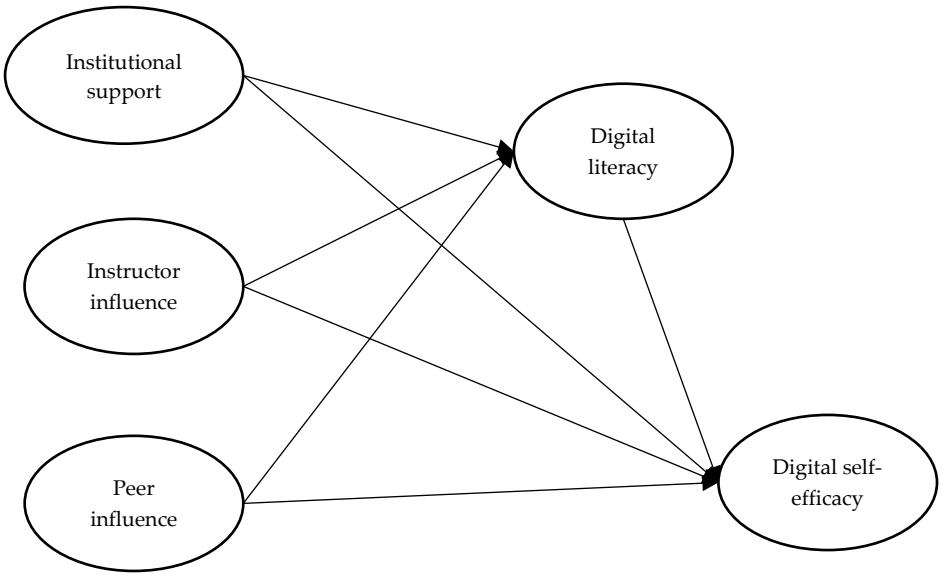

FIGURE 1. Contextual model

III. MATERIAL AND METHOD

Our research methodology adopts an adjusted positivism epistemological stance, as it aligns with our objective to systematically observe and measure social phenomena in a way that acknowledges the influence of contextual variables. In addition, this study uses a quantitative research approach. This study involved students at one of the state universities in Central Java, Indonesia. The total population was 414 students, with a 5% error rate, the number of respondents involved was 263 students [60]. The impact of institutional support, instructor influence, peer influence, and digital literacy on students' sense of digital self-efficacy was assessed using a survey completed by 263 college students. The survey was conducted using online data collection with the Google Form platform. The students filled out a questionnaire with a self-administered questionnaire technique. Data was collected over two months online. In this study, demographic information from respondents is described in Table 1. This study aims to analyze the relationship between these factors and the digital self-efficacy of animal science students. By involving a significant number of respondents and variations in gender and level of study, it is hoped that this research can provide a deeper understanding of the influence of social factors on digital literacy and digital self-efficacy of animal husbandry students. The results of this research are expected to provide valuable input for developing educational strategies and policies in higher education institutions in Indonesia, especially in improving digital skills.

Table 1. Background of participants (N-263)

Attribute	Categories	N	%
Gender	Male	97	36.89
	Female	166	63.11
Class	1st grade	82	31.18
	2nd grade	74	28.17
	3th grade	63	23.95
	4th grade	44	16.70

A questionnaire from a previous study [61] was used to examine the students' judgments of their own level of digital self-efficacy. This questionnaire asks you three questions: "I think I can easily learn how to use digital devices," "I believe I can use digital devices well," and "I can solve problems with digital devices all by myself."

Students are given a Likert scale with five points to use to express the degree to which they agree or disagree with statements made about the digital self-efficacy (the scale runs from strongly disagree to strongly agree). The digital literacy of animal science students is measured using a scale devised by Ng [47], which consists of ten digital literacy items. We used a five-point Likert scale, with responses ranging from (1) "Strongly disagree" to (5) "Strongly agree." Higher scores indicate good digital literacy.

In order to quantify institutional support, teacher impact, and peer influence, this study makes use of a questionnaire that was developed by Huang et al. [37]. There are a total of five questions that make up the institutional support questionnaire (For instance, my campus is committed to the vision of using digital technology for learning). The instructor influence questionnaire contains a total of three questions (for example, my instructor believes that digital technology is essential for learning). And, the peer influence questionnaire asks three questions (for instance, my classmates believe that using digital technology is very important for learning). In this study, students' opinions of institutional support, teacher influence, and peer influence were measured using a Likert scale that ranged from strongly disagreeing to strongly agreeing on a scale of five points.

For the purpose of this study, structural equation modelling (SEM) was utilized to carry out the data analysis. The software known as Smart-PLS is utilized in the testing of SEM models that are associated with digital self-efficacy. This study used SmartPLS software version 3. According to Hair et al. [62], good model requirements include having NFI (Normed Fit Index) values that are greater than 0.800 and SRMR (Standardized Root Mean Square Residual) values that are less than 0.080. The outer model and the inner model are the two types of analyses that are used in the PLS (Partial Least Squares) method of data analysis. It is determined, with the help of an external model analysis, whether the items or measurement indicators for each variable have validity. According to Gozali (2014) [63], an indicator is thought to be reliable if the value of the loading factor parameter is either more than or equal to 0.70. In addition, when testing this hypothesis, a reference p-value that is either less than or equal to 0.05 is utilized [64].

IV. RESULT

After the research questionnaire data was collected from 263 animal husbandry students, it was followed by an analysis of the validity and reliability tests to ensure the reliability and accuracy of the instruments used. The validity test measures the extent to which this questionnaire measures the desired variable. Table 2 displays the findings of the item validity test carried out with the PLS algorithm test. Item criteria are declared valid if each variable does not contain items with a score lower than 0.7. In Table 2, all items in each variable have an outer loading value above 0.7, meaning all items are declared valid.

Table 2. Validity test results

Code	Items	Digital Literacy	Institutional Support	Instructor Influence	Peer Influence	Digital Self-efficacy
DL1	I know how to solve my own technical problems	0.816				
DL2	I can learn new technologies easily	0.911				
DL3	I keep up with important new technologies	0.911				
DL4	I know about a lot of different technologies	0.814				
DL5	I have the technical skills I need to use ICT for learning and to create artefacts (e.g. presentations, digital stories, wikis, blogs) that demonstrate my understanding of what I have learnt	0.900				
DL6	I have good ICT skills	0.909				

DL7	I am confident with my search and evaluate skills in regards to obtaining information from the Web	0.813				
DL8	I am familiar with issues related to web-based activities e.g. cyber safety, search issues, plagiarism	0.908				
DL9	I frequently obtain help with my university work from my friends over the Internet e.g. through Skype, Facebook, Blogs	0.906				
DL10	ICT enables me to collaborate better with my peers on project work and other learning activities	0.811				
InstS1	My campus is committed to the vision of using digital technology for learning		0.830			
InstS2	My campus is committed to supporting my efforts to use digital technology for learning		0.833			
InstS3	My campus strongly encourages the use of digital technology for online learning		0.718			
InstS4	My campus will appreciate my efforts to use digital technology for learning		0.726			
InstS5	The use of digital technology for learning is important for my campus		0.711			
InstrI1	My lecturer thinks that digital technology is very important for learning			0.903		
InstrI2	The opinion of my lecturer is important to me			0.907		
InstrI3	If my lecturers use digital technology to support their teaching, I will be encouraged to use digital technology to learn			0.762		
Peer 1	My classmates think that using digital technology is very important for learning				0.805	
Peer2	The opinion of my classmates is important to me				0.818	
Peer 3	If most of my classmates used digital technology to support their learning, it would encourage me to do the same.				0.821	
DSE1	I think I could easily learn how to use digital devices					0.706
DSE2	I believe I can use digital devices well					0.841
DSE3	I can solve problems with digital devices myself					0.795

The reliability of the questionnaire was examined by the use of the reliability test in this study. The results of the reliability test revealed that the Cronbach's Alpha, Composite Reliability, and AVE scores were all satisfactory in meeting the requirements. For instance, the range of the Cronbach's Alpha score in this study was from 0.748 to 0.964 (Cronbach's Alpha above 0.700), which indicates that all questions were deemed reliable for measuring university students' institutional support, instructor impact, peer influence, digital literacy, and digital self-efficacy.

Table 3. Reliability test results

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Digital Literacy	0.964	0.964	0.969	0.759
Digital Self-efficacy	0.781	0.792	0.825	0.612
Institutional Support	0.822	0.820	0.876	0.586
Instructor Influence	0.823	0.822	0.895	0.74
Peer Influence	0.748	0.752	0.856	0.664

1. *HYPOTHESIS TESTING*

This study's hypotheses were evaluated through structural equation modeling (SEM) analysis, which allows the examination of direct and indirect effects. Before testing the hypothesis on each SEM path, an assessment of the model suitability criteria of the SEM model was first carried out at an early stage. Assessment of model fit using the Normed Fit Index (NFI) and Standardized Root Mean Square Residual (SRMR) as evaluative metrics. The results of the fit model test show that the NFI value is greater than 0.8 (NFI = 0.82), and the SRMR is lower than 0.08 (SRMR = 0.06) [65, 66].

Furthermore, a comprehensive analysis was carried out to test the hypotheses proposed in this study. The process of hypothesis testing involves the utilization of bootstrapping, wherein a subsample of 500 is employed alongside a significance level of 0.05. The confidence interval method utilized in this context is the Bias-corrected and accelerated (BCa) bootstrap, and the type of test employed is the two-tailed variety. Figure 2 is the result of the t-values test with SmartPLS software. The outcomes of the direct effect examination between the independent and dependent variables are presented in Table 4. The acceptance of a hypothesis is contingent upon the attainment of a p-value that is below 0.05.

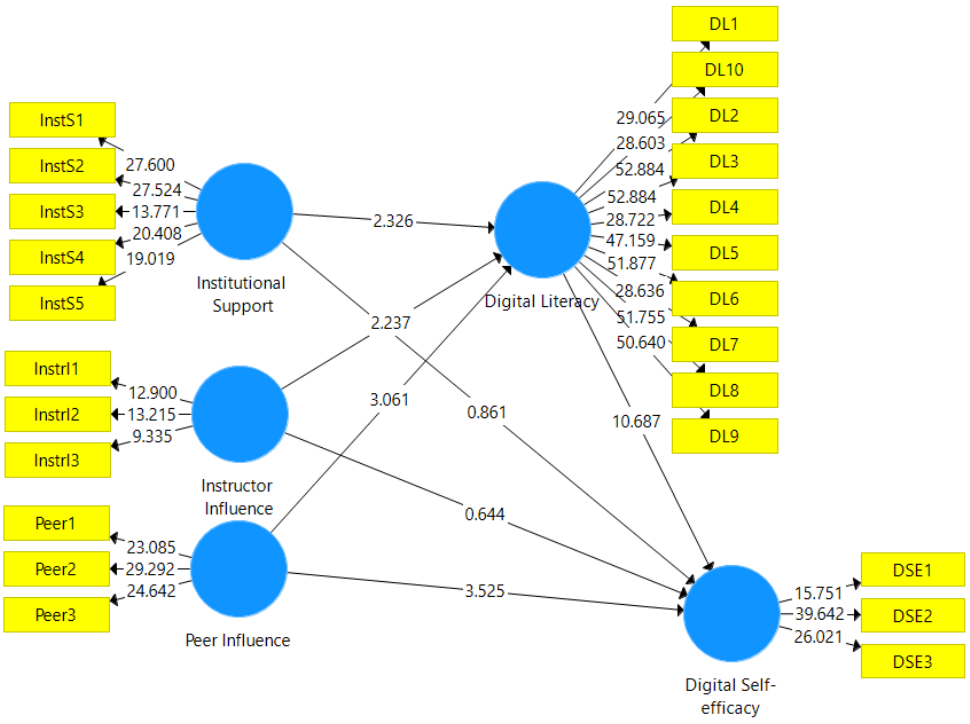

FIGURE 2. PLS T-value test results

In Table 4, the results of the direct influence test on the model show that digital self-efficacy is positively and significantly influenced by digital literacy (estimate= 0.556; p-value=0.000) and peer influence (estimate= 0.210; p-value=0.000). Meanwhile, findings about the absence of direct influence of institutional support (estimate= 0.054; p-

value=0.390) and instructor influence (estimate= 0.031; p-value=0.520) on digital self-efficacy. Other findings in this study also examine the direct influence of institutional support, instructor influence, and peer influence on digital literacy. The results of the analysis reveal that digital literacy is directly influenced by institutional support (estimate= 0.175; p-value=0.020), instructor influence (estimate= 0.139; p-value=0.026), and peer influence (estimate= 0.196; p-value=0.002).

Table 4. The results of the analysis of the direct influence

Path Among Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P-Values
Digital Literacy -> Digital Self-efficacy	0.556	0.554	0.052	10.687	0.000
Institutional Support -> Digital Literacy	0.175	0.179	0.075	2.326	0.020
Institutional Support -> Digital Self-efficacy	0.054	0.060	0.063	0.861	0.390
Instructor Influence -> Digital Literacy	0.139	0.141	0.062	2.237	0.026
Instructor Influence -> Digital Self-efficacy	0.031	0.036	0.049	0.644	0.520
Peer Influence -> Digital Literacy	0.196	0.203	0.064	3.061	0.002
Peer Influence -> Digital Self-efficacy	0.210	0.209	0.060	3.525	0.000

In addition, this study also examines the role of digital literacy mediators in the influence of institutional support, instructor influence, and peer influence on digital self-efficacy (see Table 5). The test results show that digital literacy is proven to be able to mediate the influence of digital self-efficacy antecedents, which include institutional support (estimate= 0.097; p-value=0.022), instructor influence (estimate= 0.077; p-value=0.033), and peer influence (estimate = 0.109; p-value = 0.004).

Table 5. The results of the indirect influence analysis

Path Among Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Institutional Support -> Digital Literacy -> Digital Self-efficacy	0.097	0.099	0.042	2.305	0.022
Instructor Influence -> Digital Literacy -> Digital Self-efficacy	0.077	0.079	0.036	2.138	0.033
Peer Influence -> Digital Literacy -> Digital Self-efficacy	0.109	0.113	0.038	2.902	0.004

Meanwhile, to be able to see the largest total effect of the antecedent factors on the digital self-efficacy formation model of animal husbandry students, it can be seen in Table 6. Table 6 shows that the largest total effect affecting the digital self-efficacy of livestock students is digital literacy (estimate = 0.556; p-value=0.000). Furthermore, the antecedent factor that has the greatest influence on the formation of digital literacy is peer influence (estimate = 0.196; p-value = 0.002).

Table 6. Results of total the effect analysis

Path Among Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Digital Literacy -> Digital Self-efficacy	0.556	0.554	0.052	10.687	0.000
Institutional Support -> Digital Self-efficacy	0.151	0.159	0.067	2.269	0.024
Instructor Influence -> Digital Self-efficacy	0.109	0.115	0.056	1.951	0.052

Peer Influence -> Digital Self-efficacy	0.32	0.322	0.057	5.651	0.000
Institutional Support -> Digital Literacy	0.175	0.179	0.075	2.326	0.020
Instructor _Influence -> Digital Literacy	0.139	0.141	0.062	2.237	0.026
Peer Influence -> Digital Literacy	0.196	0.203	0.064	3.061	0.002

V. DISCUSSION

1. THE DIGITAL SELF-EFFICACY ANTECEDENTS

Mastery of digital self-efficacy is very important for livestock students in today's digital era. Animal husbandry as a field of study has made significant progress with the development of information and communication technology. Therefore, animal science students must have strong digital skills and master the latest technological tools related to their field of study. Mastery of digital self-efficacy is important in preparing students to face challenges in an increasingly digitally connected world of work. Students who have mastered digital self-efficacy will have a competitive advantage and be ready to face technological changes in the livestock industry. This study highlights the important role of institutional support, instructor influence, peer influence, and digital literacy in forming student digital self-efficacy. The findings of this study reveal that digital self-efficacy is directly influenced by digital literacy and peer influence (hypotheses 3 and 4 are accepted). These results corroborate previous studies that state that digital literacy has a strong relationship with digital self-efficacy [34]. Digital literacy is an important factor in shaping one's digital self-efficacy. Digital literacy includes the knowledge, skills and attitudes needed to effectively operate and utilize digital technology. Individuals with high levels of digital literacy tend to have stronger beliefs about their abilities to use digital tools, solve technical problems, and adapt to new digital environments [47]. Students who deeply understand digital platforms, applications, and online resources are likely to increase their overall digital self-efficacy. Digital literacy empowers individuals to explore and utilize digital tools and resources, increasing their confidence in their digital abilities.

This study also proves that peer influence is important in shaping digital self-efficacy. This finding is also relevant to previous studies that place peer influence as an important predictor factor of digital self-efficacy [37]. Peers can be a source of inspiration, encouragement and support in the digital world. Seeing their friends confidently using digital technology and achieving positive results can increase their belief in their digital abilities [42]. Positive peer influence can create a sense of social validation and motivation so that individuals develop higher levels of digital self-efficacy. On the other hand, negative peer influence or a lack of a supportive network of friends can hinder the development of digital self-efficacy.

Meanwhile, institutional support and instructor influence did not directly affect student digital self-efficacy (Hypothesis 1 and Hypothesis 2 were rejected). This finding contrasts with previous studies, which state that institutional support is an important factor in shaping student digital self-efficacy [32, 33, 37]. In the context of this study, there may be low support regarding the use of digital technology in learning on campus, thus encouraging no contribution of institutional support to the formation of student digital self-efficacy. Of course, this condition will also impact the extent to which lecturers influence the formation of student digital self-efficacy.

It cannot be denied that the lecturer's role significantly influences the learning process and student development. However, in the context of forming student digital self-efficacy, sometimes the lecturer has no direct role in this regard. Other factors, such as personal digital literacy and peer influence, influence digital self-efficacy. In some cases, lecturers may not have sufficient digital knowledge and skills to provide in-depth guidance or coaching regarding digital self-efficacy. What is more, learning about digital technology and its use continues to develop rapidly, making it difficult for lecturers to stay in tune with the latest developments.

2. THE ANTECEDENTS OF STUDENT DIGITAL LITERACY

Previous findings have proven that digital self-efficacy is influenced by digital literacy. The findings of this study also show that digital literacy, which acts as a mediator, is also influenced by institutional support, the influence of lecturers, and the influence of friends. Relevant to previous studies that state that social aspects influence digital literacy [50, 52]. Specifically, this study shows that institutional support is important in building student digital literacy (Hypothesis 5 is accepted).

Institutional support is key to promoting digital literacy [55, 56]. Institutions, such as universities or educational institutions, can create an environment that supports and encourages the development of student digital literacy. This can be done by providing adequate technological resources, access to relevant platforms and software, and training or learning programs specifically designed to increase digital literacy. Good institutional support provides a strong foundation for students to develop the knowledge, skills and attitudes needed in the digital era.

Apart from institutional support, the influence of lecturers also plays an important role in shaping student digital literacy. One of the findings of this study reveals that digital literacy is influenced by the influence of lecturers (Hypothesis 6 is accepted). Lecturers can be a source of knowledge, mentors, and mentors in digital technology [59]. Lecturers can improve students' digital literacy by delivering learning materials that incorporate digital technology, providing assignments that encourage the use of digital tools, or providing in-depth guidance on online resources. The positive and active influence of lecturers in encouraging students to participate and explore the digital world can form a positive attitude towards technology and encourage the development of better digital literacy.

In addition, the findings of this study reveal that peer influence also plays a significant role in digital literacy (Hypothesis 7 is accepted). Interaction with peers with high levels of digital literacy can motivate and inspire students to improve their digital knowledge and skills [58]. Through discussions, sharing online resources, or collaborating on digital projects, peers can provide mutually beneficial support and information exchange to increase digital literacy.

3. THE MEDIATING ROLE OF DIGITAL LITERACY

In this study model, digital literacy acts as a mediator. In the findings of this study, digital literacy mediation acts as a connecting mechanism between institutional support and digital self-efficacy in the context of student development (Hypothesis 8 is accepted). As discussed in this finding, institutions do not directly influence student digital literacy. This is where the mediating role of digital literacy emerges. Digital literacy mediation includes internalizing students' digital literacy knowledge, skills and attitudes through interaction with institutions' resources and programs [46]. Through this process, students assimilate digital literacy into their daily lives, strengthening their confidence in using digital technology effectively. In digital literacy mediation, students can combine the knowledge and skills gained from institutional support with their personal experiences in using digital technology.

Another finding is that digital literacy mediators are important in linking lecturer influence to students' digital self-efficacy (Hypothesis 9 is accepted). As a mediator, digital literacy helps internalize knowledge and skills obtained from the influence of lecturers regarding the use of digital technology. Through this process, students can combine guidance, guidance, and direction provided by lecturers with their personal experiences interacting with digital technology. Digital literacy gained through the influence of lecturers strengthens students' confidence in their ability to use digital tools, solve technical problems, and adapt to an evolving digital environment. Because digital literacy is an important learning factor that can strengthen their learning outcomes [48]. Thus, digital literacy mediators play a role in changing the influence of lecturers to increase student digital self-efficacy.

The results of this study reveal that the role of digital literacy mediator in the relationship between peer influence and students' digital self-efficacy is very relevant (Hypothesis 10 is accepted). This mediator assists in strengthening the influence of friends on the development of digital self-efficacy by internalizing digital literacy knowledge, skills and attitudes exchanged in interactions with peers. Digital literacy, influenced by the influence of friends, plays an important role in shaping student confidence in their ability to use digital technology effectively and achieve positive results.

The implications of this research emphasize the importance of educational institutions in providing comprehensive support, lecturers skilled in the use of digital technology, and creating a social environment that supports collaboration and exchange of knowledge between students. By strengthening students' digital self-efficacy, improving the quality of education can occur because students will be more confident, competent, and able to face technological challenges in the context of learning and their professional future. The results of this study indicate that efforts to improve digital self-efficacy in students should focus more on strengthening peer influence and improving digital literacy. Future researchers can focus their studies on how interventions designed to improve these two aspects can effectively improve digital self-efficacy. In addition, given that institutional support and instructor influence do not have a direct effect on digital self-efficacy, future studies need to further explore how

the roles of institutions and instructors can be optimized. Researchers can investigate whether there are other factors that might mediate or moderate this influence. OECD, "Skills for a digital world," 2016.

VI. CONCLUSION

This study reveals that digital self-efficacy is directly influenced by digital literacy and peer influence. Meanwhile, institutional support and instructor influence did not directly affect student digital self-efficacy. On the other hand, digital literacy as a mediator is also directly influenced by antecedent factors, which include institutional support, instructor influence, and peer influence. This study also proves that digital literacy successfully mediates the relationship between the antecedent factors (institutional support, instructor influence, and peer influence) and student digital self-efficacy. This study shows that digital literacy mastery, institutional support, lecturer influence, and peer influence contribute to developing students' digital self-efficacy. Animal science students need to use digital technology effectively to face challenges and opportunities in the livestock industry, which is increasingly connected to technology. Increasing digital self-efficacy will help students feel confident, competent, and ready to face future technological changes. Therefore, educational institutions and lecturers must provide support, guidance, and a good learning environment. At the same time, peers can act as a source of inspiration and collaboration in developing digital self-efficacy for animal science students. Thus, developing digital self-efficacy is crucial in preparing animal husbandry students for success in the digital era.

This study has limitations in the form of not considering other variables that can also affect digital self-efficacy, such as individual motivation, previous experience with technology, or socio-economic factors. The absence of these variables can reduce the completeness of the proposed model. Thus, these variables need to be studied further. Also, the results of this study recommend longitudinal research to explore how peer influence and digital literacy affect digital self-efficacy in the long term. This study can see how changes in peer influence and digital literacy over time affect the development of digital self-efficacy in students. In addition, in the future, comparative studies are also needed to see how peer influence and institutional support affect digital self-efficacy in various types of educational institutions, such as state, private, and universities.

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Author contribution

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data are available from the authors upon request.

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