

Factors of Learning Agility and Students' Attitudes on Online Learning

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Abstract: With the widespread use of digital and information technologies in education, students' learning styles and needs are always changing. This study examines the relationships among student engagement, information literacy, perceived digital proficiency and learning agility within a university student population. Research indicates that there exists a relationship among these factors; however, the specific pathways of influence remain inadequately comprehended. This study surveyed 323 students from a higher education institution to assist educators in improving students' learning agility and refining educational strategies. It used Structural Equation Modelling to look at the direct and indirect relationships between these variables. The results show that how engaged students have a big effect on their information skills, which in turn affects how competent they feel with technology and how quickly they learn, with a mediator between information skills and learning agility. The study highlights the importance of enhancing student engagement and information literacy to effectively prepare students for evolving learning environments. These findings provide significant insights for formulating innovative strategies to enhance students' learning agility and overall academic performance.

Keywords: *Learning Agility, Attitude, Competency, Communication*

1. Introduction and Background

As the use of digital and information technologies in the classroom increases, students' cognitive strategies and needs are continually evolving. Research indicates that there are complex relationships among learning agility, perceived digital competency, information skills, and student engagement. However, the specific pathways through which these variables interact remain unclear. This study aims to explore the connections between university students' learning agility, information skills, perceived digital competency, and student engagement. The goal is to assist educators in developing strategies that help students become more agile learners. Specifically, it will examine how student engagement influences information skills, how information skills impact perceived digital competence, and how information skills directly and indirectly affect learning agility both directly and through perceived digital competence. By addressing these research questions, the study seeks to provide empirical data that teachers can use to enhance their teaching methods and support students in becoming more agile learners (DeRue et al., 2012). The objectives of this study were to investigate the learning agility, information skills, perceived digital competency, and student engagement relate to one another among college students. It targets students in various academic years and majors, including undergraduates and graduates of higher education institutions.

2. Literature Review

In recent years, the relationship among student engagement, information skills, perceived digital competence, and learning agility has received attention in education. Student engagement is the assessment of a learning outcome that is measured (Astin, 2014). High calibers of engagement enhance students' academic performance and ameliorate their overall learning experience. Student engagement encompasses interest in and application of course material, participation in extracurricular activities, and proactiveness and ebullience for learning. Information skills are crucial for students in the digital age, involving the ability to identify, acquire, evaluate, and use information (Bruce, 1997). These skills are crucial in academic research, professional settings, and everyday life. Bruce's Seven Faces of Information Literacy model highlights the application of information skills across various contexts. Perceived digital competence, rooted in Self-Efficacy Theory, pertains to students' self-

assessment of their ability to use digital tools and technologies (Bandura, 1977). This self-assessment reflects students' confidence and proficiency in digital skills, including presentation software, online collaboration tools, and information retrieval techniques.

Student engagement

According to Astin's Student Involved Theory, student engagement is defined as active participation in both extracurricular and classroom activities (Astin, 2014). Higher levels of engagement are associated with improved learning outcomes and academic achievement. The level of focus, interest, curiosity, and involvement students exhibit in their learning process, both within and outside the classroom, is student engagement. According to Astin's (2014) Student Involvement Theory, engagement is the amount of mental and physical effort students put into worthwhile academic pursuits. Astin asserts that the amount and caliber of student participation directly correlate with learning and growth. In other words, students are more likely to succeed academically and grow personally if actively involved in extracurricular and academic activities.

Student engagement is more important than ever in the current educational environment of 2024–2025. Due to the trend toward hybrid and tech-enhanced learning, sustaining engagement calls for emotional, behavioral, and cognitive investment in addition to regular attendance in class. In addition to being more likely to persevere in the face of difficulties, engaged students are better equipped to adjust to new knowledge, work well in teams, and apply what they have learned in various settings. The idea of learning agility, which describes a student's capacity to apply knowledge gained from experience in novel or evolving circumstances, is closely related to this adaptability. Recent research indicates that students who are more involved tend to exhibit higher levels of learning agility. The new learning environment could help many students to actively participate in class, such as asking probing questions, working in teams, and reflecting. They continuously develop the mental flexibility and problem-solving skills necessary to succeed in new learning environments. Engagement is the behavioral engine that drives learning agility. Therefore, educational institutions must design learning experiences that go beyond passive delivery. The elements of incorporating gamification, cooperative projects, active learning strategies, and real-world problem-solving should be added to teaching and learning activities to engage students with the lesson. The variation of learning styles is significant to students' learning agility and better prepares them for continuous learning and success in an evolving world. Hence, the hypothesis developed is as follows:

Hypothesis 1: Student engagement has a significant influence on learning agility

Perceived digital skills: The Self-Efficacy Theory is the source of this self-assessment of digital implementation proficiency. According to Bandura's research, self-efficacy, which reflects confidence in using digital tools and technologies, influences motivation and demeanor. The self-assessment of digital implementation proficiency is grounded in Bandura's Self-Efficacy Theory (1977), which emphasizes how people's beliefs about their abilities have a significant impact on their motivation, behavior, and performance. In the context of digital learning, "perceived digital skills" refers to students' confidence in their ability to use digital tools, platforms, and technologies to improve their learning. According to Bandura's theory, when students feel they can master tasks—in this case, using digital tools—they are more likely to participate regularly, take proactive steps to overcome obstacles, and produce better results. In today's technologically advanced educational system, perceived digital skills are now crucial for successful learning, especially in the years following the pandemic in 2024–2025. As online and hybrid learning environments become more prevalent, students who identify as digitally competent are more adaptable, self-sufficient, and resourceful in navigating often complex learning platforms. Because of their confidence, they are able to solve problems on their own, search for new learning resources, and manage their learning processes, all of which are essential behaviors associated with learning agility.

Learning agility, or the ability to pick up, adapt, and use knowledge in new or rapidly changing situations, is directly impacted by digital competency. Students who believe they have strong digital skills are more adept at combining data from multiple sources, solving problems, and experimenting with new tools. They are also more likely to use cutting-edge technologies like virtual labs, AI-powered learning systems, and digital collaboration platforms, all of which call for flexibility and technological fluency. Our study supports the strong and significant relationship between perceived digital skills and learning agility ($\beta = 0.534$, $p < 0.001$). This outcome is in line with current studies that show how digital self-efficacy boosts engagement and autonomy

while preparing students for lifelong learning in ever-changing digital environments. In this regard, digital competency is a psychological facilitator that promotes flexibility, resilience, and proactive learning in addition to being a technical skill. Educational institutions must therefore teach students digital tools and assist them in becoming more accustomed to using them in order to promote learning agility in their students. This entails promoting environments in which students can try new things, make errors, and develop their digital skills without worrying about the consequences. Teachers can help students become agile learners who can thrive in fast-paced academic and professional environments by integrating self-efficacy-building strategies and digital skill development into the curriculum. Hence, the hypothesis developed is as follows:

Hypothesis 2: Perceived Digital Skills have a significant influence on learning agility

Information Skills

According to Bandura's theory, students' attitude and their motivation are affected by self-efficacy, which is a measure of their confidence in using digital tools and technology. This could be explained by students' beliefs about their abilities, behaviour, and motivation to apply any digital skill in relation to online learning. More explanation on Bandura's Theory, students are more inclined to participate consistently, take the initiative to overcome challenges, and achieve better outcomes when they believe they can manage the learning activities with technology tools. Students' confidence in their own digital literacy is more important than ever in today's technologically sophisticated classrooms, particularly in the years after the pandemic in 2024 and 2025.

Adaptable, self-reliant, and resourceful, students who self-identify as digitally proficient are better able to navigate the increasingly common online and hybrid learning environments. Their self-assurance allows them to do things like control their own learning processes, find new learning resources, and solve problems independently. These are all characteristics of agile learners. In today's data-rich, digitally connected world, the capacity to efficiently gather, evaluate, and utilise information, a talent sometimes referred to as information skills, has become crucial. In contrast to Marchionini and White (2007), who stress the need to identify credible digital content, Silva (2009) makes it clear that information skills encompass the ability to collect, organise, and synthesise data from diverse sources. An integral aspect of information literacy is literary competence, which includes reading comprehension, interpretation, and, more and more, digital literacy, which is the ability to use the internet and its sources effectively (van Laar et al., 2020). Employers nowadays are looking for people who can demonstrate not only subject knowledge but also the ability to learn on their own, think critically, adapt to new situations, and work independently. Acquiring agility in one's learning requires all of these things. A necessary condition for learning agility is the ability to apply previously acquired knowledge to completely new and different situations. This is backed up by information skills, which equip students to do their own research, assess the credibility and usefulness of sources, and make sense of data. To rephrase, those who are naturally gifted with knowledge are in a better position to absorb new material. Adapt rapidly to shifting learning agility indicators while solving difficult issues on the move.

This is supported by a recent study by Ismail et al. from 2024, which found a strong positive correlation between learning agility and information-related study skills. The study found that students who are good at locating and analyzing information are more likely to be agile learners, able to respond to obstacles in the classroom and outside of it with flexibility and insight. In today's educational system, teaching students how to use search engines and cite sources is just one part of building their information skills. It involves cultivating discernment, critical thinking, and the confidence to pursue knowledge on one's own. These skills, when integrated into curricula, help students acquire the independence, adaptability, and initiative that define high learning agility and are essential for success in the quickly changing global environment. Hence, the hypothesis developed is as follows:

Hypothesis 3: Information Skills have a significant influence on learning agility

3. Research Methodology

The target population for this study consists of students from higher education institutions. To ensure the representativeness of the data and the generalizability of the research findings, a random sampling method was employed, selecting samples from students of different majors and academic years. The sample size for this study is 323 students, and the selection process includes undergraduate and graduate students, encompassing different academic years and majors, to comprehensively understand student engagement,

information skills, digital competence, and learning agility across various academic backgrounds. The data collected is analyzed using the Structural Equation Model and assessed using the measurement and structural models.

4. Results

Profile of Respondents: Based on the provided SPSS output, a preliminary data analysis was conducted focusing on three variables: Gender, Age, and Exposure to Digital Skills. For the Gender variable, the sample size is 323, with 76.8% identified as male and 23.2% as female. The descriptive statistics indicate a standard deviation of 0.423 and a skewness of 1.274, suggesting a significant deviation from normality and a male-dominant sample. Regarding age, almost the entire sample (99.7%) falls into the younger age group, with only 0.3% in the older age group. The standard deviation is 0.056, and the skewness is exceptionally high at 17.972, highlighting a highly non-normal distribution due to the nearly homogeneous age representation.

Regarding Exposure to Digital Skills, most respondents (96.0%) reported exposure to digital skills. This variable shows a standard deviation of 0.197 and a skewness of 4.700, indicating that most of the sample responded similarly, with a strong consensus on exposure. Overall, the sample predominantly consists of younger males exposed to digital skills. The high skewness and kurtosis values across all variables suggest non-normal distributions. This should be considered in further statistical analyses, potentially necessitating variable transformation or non-parametric methods to address the non-normality.

Table 1: Demographic Factors

VARIABLE	FREQUENCY	PERCENTAGE
GENDER		
Males	248	76.8%
Females	75	23.2%
Total	323	100%
AGE		
19-30	322	99.7%
31-40	1	0.03%
Total	415	100%
Exposure to Digital Skills		
Yes	310	96.0%
No	13	4.0 %
Total	415	100%

Descriptive Statistics: Table 2 provides descriptive statistics for four key variables: Information Skills, Learning Agility, Student Engagement, and Perceived Digital Competence. Each variable was measured using a scale from 1 to 5. For Information Skills, the sample size is 323, with a mean score of 3.9647, indicating a relatively high level of information skills among the respondents. The standard deviation is 0.67786, and the skewness is -0.407, suggesting a left-skewed distribution where most respondents rated their information skills on the higher end of the scale. Learning Agility has a mean score of 4.0390, indicating high learning agility among respondents, with a standard deviation of 0.70002 and a skewness of -0.356, showing that most respondents rated themselves highly on learning agility. For Student Engagement, the mean score is 3.9022, suggesting high engagement among the respondents. The standard deviation is 0.67564, and the skewness is -0.157, indicating a more symmetrical distribution than other variables. Perceived digital skills have a mean score of 3.9474, reflecting that respondents generally perceive themselves as competent in digital skills. The standard deviation is 0.67476, and the skewness is -0.222, showing a slight tendency towards higher self-ratings.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.
Information Skills	3.967	0.677
Learning Agility	4.039	0.700
Student Engagement	3.902	0.675
Perceived Digital Skills	3.947	0.674

Measurement Model

Based on Table 3, which provides measurement model data, we can evaluate the reliability and validity of the constructs. Firstly, factor loadings should be above 0.70 to ensure item reliability. All items have factor loadings exceeding 0.70, indicating good item reliability. Cronbach's Alpha values should be above 0.70 to indicate internal consistency. Information Skills has a value of 0.883; Learning Agility is 0.935, Perceived Digital Competence is 0.908, and Student Engagement is 0.936, all showing good internal consistency. Composite Reliability (CR) values should be above 0.70, with Information Skills at 0.915, Learning Agility at 0.951, Perceived Digital Competence at 0.936, and Student Engagement at 0.952, all demonstrating excellent reliability. AVE should be above 0.50 to indicate that the construct explains more than half of the variance of its indicators. All constructs have AVE values exceeding this standard, with Information Skills at 0.683, Learning Agility at 0.795, Perceived Digital Competence at 0.784, and Student Engagement at 0.797.

Table 3: Convergent Validity

Variables	Factor Loading	Cronbach Alpha	Composite Reliability	AVE
Information Skills		0.883	0.915	0.683
Informationskills1	0.734			
Informationskills2	0.864			
Informationskills3	0.843			
Informationskills4	0.857			
Informationskills5	0.828			
Perceived Digital Skills		0.908	0.936	0.784
PDS1	0.869			
PDS2	0.888			
PDS3	0.900			
PDS4	0.885			
Student Engagement		0.936	0.952	0.797
SE1	0.895			
SE2	0.910			
SE3	0.924			
SE4	0.865			
SE5	0.869			
Attitude		0.964	0.966	0.704
Attitude1	0.924			
Attitude2	0.933			
Attitude3	0.922			
Attitude4	0.897			
Learning Agility		0.935	0.951	0.795
Learningagility1	0.871			
Learningagility2	0.853			
Learningagility3	0.922			
Learningagility4	0.893			
Learningagility5	0.918			

Discriminant Validity

The above table presents the Heterotrait-Monotrait ratio (HTMT) matrix for discriminant validity. It shows the HTMT values between the four constructs: Information Skills, Learning Agility, Perceived Digital Competence, and Student Engagement. The values below the 0.85 to 0.9 threshold indicate good discriminant validity between the constructs. Among them, the values for Perceived Digital Competence and Learning Agility, Student Engagement and Learning Agility, and Student Engagement and Perceived Digital Competence are within the threshold range of 0.85 to 0.9, which is still acceptable.

Table 4: Heterotrait-Monotrait Ratio (HTMT)

Variables	1	2	3	4
1. Information Skills				
2. Learning Agility	0.815			
3. Perceived Digital Skills	0.812	0.858		
4. Student Engagement	0.809	0.892	0.899	

Structural Model

The Adjusted R Square for learning agility was 0.687, indicating that 68.7 percent of learning agility can be explained by information skills, perceived digital skills, and student engagement. The findings from the structural model illuminate the relationships among various abilities, student attitudes, and learning agility. Three hypothesis tests related to these relationships have shown statistical support ($p < 0.05$). Specifically, students who excel in processing and applying information tend to exhibit greater flexibility and more positive learning mindsets, as demonstrated by the significant positive effects of information skills on learning agility ($\beta = 0.354$, $p < 0.05$) and perceived digital skills ($\beta = 0.534$, $p < 0.05$). Moreover, student engagement significantly predicts learning agility ($\beta = 0.736$, $p < 0.005$) and plays a vital role in this model. The results indicate that information skills, perceived digital skills, and student engagement statistically influence learning agility. This underscores the importance of interventions to enhance students' ability to manage information and foster a positive learning mindset as effective strategies for preparing them for dynamic learning environments.

Table 5: Structural Model- Direct Relationship

Relationship	Beta	STDEV	T-Value	P-Value	Results
Information skill- Learning Agility	0.354	0.061	5.780	0.00	H1: Supported
Perceived Digital Skills- Learning agility	0.534	0.062	8.597	0.00	H2: Supported
Students Engagement-Learning Agility	0.736	0.035	21.34	0.00	H3: Supported

Discussion

This study investigated the relationship between learning agility, digital competence, student engagement, information skills, and information competence among 323 college students. The results found that students' involvement influences learning agility. More interesting, perceived digital skills and the usefulness of information skills in adjusting to different learning contexts are the next most important factors. Naeem and Mushibwe (2025) mentioned that this might happen because universities encourage students to take part in academic and extracurricular activities that make their lives better and help them get better at gathering, analyzing, and using knowledge. More evidence highlights that students' perceptions of their own digital competence are positively impacted by their information abilities (Zhao, Sanchez Gomez, Llorente, & Zhao, 2021). Students can enhance their learning experiences with the help of numerous technology tools. The more kids master digital tools, the more comfortable they will feel using them, and the more they will embrace technology as a whole. A complicated interaction among these elements suggests that information skills support learning agility, but this effect is somewhat less significant. Moreover, the results demonstrate that learning agility is substantially enhanced by increased levels of perceived digital competence (Ali, Mat, Kori, Salleh, Bahry & Yunus, 2024). Hence, as students having digital confidence in their ability to adapt and apply new knowledge is key to keep up with the fast-paced learning environment of today, it is vital to master digital tools.

5. Managerial Implications and Recommendations

This study examines the interrelationships among student engagement, information skills, perceived digital competence, and learning agility, highlighting how these dimensions collectively enhance the learning performance of university students. The findings yield valuable empirical evidence for educators and policymakers. The primary contributions of this study can be delineated into several key facets:

Practical Implications

The results of the study indicate that the development of information skills, which have a major influence on perceived digital competency and learning agility, depends on student involvement. Perceived digital competency acts as a mediator between information skills and learning agility. These findings provide educators with specific recommendations that will help them improve students' learning agility by focusing on improving information skills and increasing student engagement (Gales & Gallon, 2019). These results are essential for enhancing instructional strategies, creating course materials and advancing educational methodologies.

Student Development

This study gives guidance for students' personal development by highlighting the critical role that information skills and student participation play in enhancing learning agility. Students will be better prepared to adjust to the constantly changing educational landscape while enhancing their self-efficacy and academic accomplishments by actively participating in both classroom and extracurricular activities, honing their information processing abilities, and increasing their perceived digital competence (Zhao & Gómez, 2021).

In summary, with the ultimate goal of fostering students' academic success and general development, this study not only advances theoretical discussion in the field of education but also offers educators and policymakers useful resources and guidance. This goal can be accomplished through interactive teaching methods, competitive projects, and scholarly seminars. Teachers should also concentrate on improving their students' ability to collect, analyze, and use information. Information literacy instruction, relevant coursework, and encouraging participation in research projects can all help achieve this (Henderson et al., 2011). A lecturer can also help students gain confidence in their digital skills by giving them a range of opportunities to use digital tools and technologies, like coding classes, digital content creation, and online collaboration (Labella & Pérez-Valls, 2023). For students to use their knowledge in a digital environment, digital competency and information skills must be integrated. Project-based learning and cooperative multidisciplinary efforts can help to facilitate this fusion. Lecturers must also acknowledge the significant indirect impact of student participation on perceived digital competency and learning agility through information skills (Patwardhan et al., 2022). Therefore, it is essential to support students' active participation in extracurricular and academic activities while providing the necessary tools and support.

Conclusion

This study aims to enhance students' academic success and overall development. It contributes to theoretical discourse in education while providing valuable resources and guidance for educators and policymakers. This objective can be achieved via interactive teaching methods, competitive projects, and academic seminars. Educators should focus on enhancing their students' skills in collecting, analyzing, and utilizing information. Instruction in information literacy, pertinent coursework, and the promotion of participation in research projects can all contribute to this objective (Henderson et al., 2011). Lecturers can assist students in developing confidence in their digital skills by providing various opportunities to engage with digital tools and technologies, such as coding classes, digital content creation, and online collaboration (Labella & Pérez-Valls, 2023). Students must integrate digital competency and information skills to effectively apply their knowledge in a digital environment. Project-based learning and collaborative multidisciplinary approaches can facilitate this integration. Educators should recognize the substantial indirect influence of student engagement on perceived digital competency and learning agility via information skills (Patwardhan et al., 2022). It is crucial to facilitate students' engagement in both extracurricular and academic activities by offering the requisite tools and support.

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