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Statistical Analysis of the Joint Impact of Digital Awareness and Information Literacy on Educational Quality of Life Using SEM-PLS

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Abstract: In this study, we examine the joint influence of digital awareness and information literacy on the quality of educational life among secondary school students in Saudi Arabia, in alignment with the nation's Vision 2030 educational transformation goals. Employing a descriptive, correlational, and causal-comparative research design, we investigate (a) students' levels of digital awareness, information literacy, and educational quality of life; (b) statistically significant differences in these variables based on gender and academic grade; and (c) the development of a structural model capturing the direct and indirect relationships between these constructs. Data were collected from a stratified random sample of 391 students using three validated instruments. Structural equation modeling via the partial least squares approach (SEM-PLS) was used to analyze the data. The findings revealed that students reported high levels of digital awareness, information literacy, and perceived educational quality of life. Significant differences were observed across academic grade levels, while no differences emerged based on gender or gender–grade interaction. The proposed structural model demonstrated that digital awareness significantly predicts information literacy, both of which exert direct and indirect effects on students' educational quality of life. These results highlight the integrative role of digital and information competencies in shaping students' educational experiences and offer empirical evidence that can inform national strategies for digital integration in secondary education.

Keywords: Digital awareness; Information literacy; Educational quality of life; Secondary education; Structural equation modelling; Saudi Arabia, The Middle East, Gender, Grade Level.

1 Introduction

Secondary education is pivotal in shaping students' academic and professional identities. It is a transitional period that significantly influences their overall educational experience and future trajectories. Considering the rapid technological advancements that have reshaped modern education, the imperative to equip students with digital and information literacy skills has become more pressing than ever. These competencies are essential in enabling learners to engage effectively with digital environments, access reliable information, and participate meaningfully in knowledge-based societies.

Digital literacy, which is often described as a cornerstone of twenty-first-century learning, encompasses more than the operational use of technological tools. It includes the ability to critically assess digital content, understand data security and privacy concerns, and navigate online platforms responsibly (Corradini & Nardelli, 2021). In a similar vein, information literacy emphasizes the capacity to identify information needs, locate and evaluate sources, and utilize information ethically and effectively (Dove, 2015). Together, these literacies constitute a set of cognitive, technical, and social-emotional skills that are necessary for autonomous learning and informed decision-making.

A growing body of research underscores the transformative role of both digital and information literacy in fostering academic success, enhancing critical thinking, and improving students' psychological and emotional well-being (Salimi et al., 2025; Jan, 2024). These literacies not only empower students to engage actively with digital learning environments but also significantly contribute to their quality of educational life—an indicator of satisfaction, motivation, and academic integration within the school context.

Given the increasing integration of digital tools and artificial intelligence into educational systems, particularly under national strategies such as Saudi Arabia's Vision 2030, it is crucial to understand how digital and information awareness collectively influence students' educational outcomes. This study, therefore, seeks to explore the joint impact of digital literacy and information literacy on the quality of educational life among secondary school students in Saudi Arabia using Structural Equation Modeling (SEM-PLS), aiming to provide empirical insights that support policy development and pedagogical practices aligned with contemporary digital transformations.

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2 Literature Review

Digital Literacy and Its Educational Implications

Digital literacy encompasses a complex set of skills that extend beyond technical proficiency to include critical evaluation, responsible digital behavior, and adaptive engagement with rapidly evolving technological environments (Willem et al., 2006; Aviram & Eshet, 2006). It involves the capacity to locate, evaluate, create, and communicate information using digital platforms (Reddy et al., 2020). These competencies are indispensable for students navigating digital learning environments, as they enable informed participation, content creation, and responsible digital citizenship (University of Iowa, 2024).

Corradini and Nardelli (2021) highlight the centrality of digital literacy in school contexts, noting its role in minimizing cybersecurity threats and fostering responsible technology use. Similarly, Garba et al. (2023) emphasize the urgency of embedding digital skills within curricula to prepare learners for the demands of contemporary society. Digital literacy also facilitates students' ability to critically navigate information ecosystems, protect their digital identities, and adapt to new learning tools (Cardona et al., 2023; Salimi et al., 2025). Other studies demonstrate that students with high levels of digital awareness tend to perform better academically, show greater self-efficacy in online environments, and exhibit increased engagement in socioeconomic and civic life (Tabieh et al., 2021; Hussain & Phulpoto, 2024). Digital literacy contributes to self-directed and lifelong learning by enabling students to critically interact with digital content, conduct independent inquiries, and apply knowledge in diverse contexts (Mahmoud, 2024; Özeren, 2023).

Moreover, digital literacy plays a critical role in shaping students' well-being. Students with advanced digital competencies are more capable than others of distinguishing between credible and misleading information, which enhances their critical thinking and reduces their susceptibility to digital misinformation (Ismaeel, 2025). It also strengthens data privacy practices and reduces exposure to cyber threats (Alhothali & Enezi, 2023) while supporting effective participation in collaborative, interactive learning environments (Zhu et al., 2021; Popa & Vasilescu, 2025).

Information Literacy and Academic Empowerment

Information literacy refers to the set of abilities required to recognize when information is needed and locate, evaluate, and use it effectively (Dove, 2015). Enabling students to navigate the overwhelming flow of information available to them with discernment and rigor is a critical competency in the digital age. Merchant and Hepworth (2002) underscore its importance for academic success and informed decision-making, especially in secondary education.

Students with high levels of information literacy exhibit stronger research skills, are better equipped to discern credible sources, and demonstrate higher levels of academic independence as compared to others (Dalal et al., 2025). Van Aalst et al. (2007) found that many secondary students struggle with evaluating online information, which hinders their academic growth—a concern that underscores the importance of integrating information literacy training within curricula. Information literacy also supports the development of self-regulated learning. It enables students to construct knowledge independently through critical engagement with diverse sources (Chourio-Acevedo et al., 2024). This, in turn, enhances logical reasoning, problem-solving, and adaptability—skills necessary for success in both academic and professional spheres (Zhu et al., 2021). Schools that incorporate information literacy programs report improved student motivation and critical reading and writing capabilities (Al-Azmi, 2021; Van Aalst et al., 2007). Moreover, students with stronger information literacy as compared to others experience greater academic satisfaction and reduced levels of academic anxiety (Ahmadi & Omidvar, 2022).

Educational Quality of Life as an Integrative Outcome

Quality of educational life (QoEL) reflects students' satisfaction with their learning environment, level of engagement in academic and extracurricular activities, and sense of belonging within the educational institution (Çöğmen & Özelçi, 2021). A high QoEL is associated with increased motivation, better academic outcomes, and reduced dropout rates (Al-Osaimi, 2022). Multiple factors influence QoEL, including the availability of digital infrastructure; positive student–teacher interactions; and access to support systems, such as mental health services and extracurricular activities (El-Hassan, 2021; Al-Anzi, 2022). Studies also indicate the importance of health-related variables, such as adequate sleep and nutrition, which are critical in optimizing learning experiences (Ahmadi & Omidvar, 2022). Research by Ghasemi et al. (2024) indicates that students' perceptions of their educational environment significantly affect their academic performance. The presence of flexible, personalized learning options enhances autonomy and satisfaction, aligning educational processes with students' needs and aspirations (Suleiman, 2023; Ferdosipour & Musavi, 2022).

The Interplay Between Digital and Information Literacy and QoEL

An emerging body of research has begun to explore how the intersection of digital and information literacy affects students' educational well-being. Studies have found that students who possess advanced competencies in both domains tend to experience

higher levels of educational quality, greater academic autonomy, and a stronger motivation to learn (Nasreen, 2024; Garba et al., 2023). The integration of digital and information literacy enables learners to engage deeply in academic content, adopt effective learning strategies, and participate confidently in technology-mediated educational environments (Dalal et al., 2025; Popa & Vasilescu, 2025). Furthermore, as students become adept at verifying information and using technology responsibly, they are less likely to be misled by disinformation and more likely to leverage digital tools for meaningful academic inquiry (Chourio-Acevedo et al., 2024). Corradini and Nardelli (2021) and Korkmaz and Colak Kilic (2024) argue that moderate to high levels of digital literacy enhance students' ability to regulate their use of technology, avoid digital addiction, and maintain psychological well-being. In turn, these impact on their educational experiences positively.

Structural Modeling of Interrelated Constructs

In the context of Saudi Arabia's Vision 2030, there is a strategic emphasis on developing students' digital competencies as a means of driving educational transformation. Several studies have applied structural equation modeling (SEM-PLS) to investigate these relationships. For example, Nasreen (2024) and Al-Otaibi (2023) utilized SEM to explore the predictive roles of digital and information literacy in shaping academic performance and QoEL. Similarly, Mok and Flynn (2002) identified teacher–student interaction and digital infrastructure as key determinants of students' satisfaction with school life. Given these empirical findings, it becomes critical to examine the combined influence of digital and information literacy on educational quality using robust statistical approaches. This study, therefore, employs SEM-PLS to analyze direct and indirect effects between these variables, providing actionable insights for educational stakeholders seeking to enhance student well-being and institutional performance.

3 Methodology

Research Design

Given the nature of the research variables and the objectives of this study, a descriptive, correlational, and causal-comparative research design was adopted. This approach was selected to effectively address the study's research questions and test the hypothesized relationships between digital awareness, information literacy, and the quality of educational life. The descriptive research was used to outline the current levels of the study variables among the target participants. The correlational research aspect allowed for exploring associations between variables, identifying whether higher levels of digital awareness and information literacy are linked with an enhanced quality of educational life. Lastly, the causal-comparative element was suitable for exploring differences between groups (e.g., by gender or grade level) and inferring potential causal patterns without manipulation, which is appropriate for studies conducted in natural educational settings where experimental control is not feasible.

Population and Sample

Population. The target population comprised secondary school students in the Kingdom of Saudi Arabia during the 2025 academic year, who number 1,209,480 students—582,926 males and 626,554 females—according to the most recent official statistics.

A probabilistic sampling method was employed, specifically stratified random sampling based on gender (male and female). Within each gender stratum, simple random sampling was applied. The final sample consisted of 391 students, a size determined to be statistically adequate based on Steven K. Thompson's sample size calculation formula (2012, pp. 59–60). The sample included 230 males and 161 females drawn from three grade levels in the Saudi secondary school system, which generally corresponds to students aged 15 to 18 years. Specifically, 177 students were from the first year of secondary school (Grade 10), 107 from the second year (Grade 11), and 107 from the third and final year (Grade 12). In addition to the main sample, an exploratory sample of 50 students (30 males and 20 females) was utilized to assess the psychometric properties of the research instruments prior to their full-scale administration.

Research Instruments

The study utilized the following standardized instruments:

1. Digital Awareness Scale (Alismail, 2025)
2. Information Literacy Scale (Elamrousy, 2019)
3. Quality of Educational Life Scale (Abdel-Khalek, 2008)

Internal Consistency

Internal consistency was assessed using Pearson's correlation coefficient (Pearson-r) to determine the relationship between each

dimension and the total score for its respective scale. Table 1 presents the correlation coefficients, all of which were statistically significant at the 0.01 level, indicating strong positive relationships and demonstrating the internal consistency of the three instruments.

Table 1: Correlation Coefficients Between Each Dimension and Its Corresponding Scale Total Score

Dimension	Scale	r
Significance of Digital Awareness and Its Relationship with Digital Education	Digital Awareness	.835**
Modern Digital Awareness and Its Relationship with Technology		.896**
Awareness of Digital Social Media		.880**
Awareness and Intermediate School Curricula		.791**
Identifying Needs, Resources, and How to Access Information	Information Literacy	.952**
Evaluating and Critically Analyzing Information		.970**
Personal Responsibilities and Ethical Use of Information		.942**
Physical Health	Quality of Educational Life	.907**
Mental Health		.880**
Social Relationships		.705**
Environment		.937**

Reliability (Omega Coefficient)

The reliability of the three scales and their respective dimensions was confirmed using the Omega coefficient, which was calculated after administering the instruments to the exploratory sample. Table 2 summarizes the results, showing that all coefficients exceed the acceptable threshold, which supports the reliability of the instruments for use with the research sample.

Table 2: Omega Reliability Coefficients for Study Instruments

Dimension	Scale	Omega	No. of Items
Significance of Digital Awareness	Digital Awareness	.703	7
Modern Digital Awareness		.702	7
Digital Social Media Awareness		.829	8
Intermediate School Curricula Awareness		.796	6
Total		**.909**	**28**
Identifying Needs and Resources	Information Literacy	.921	10
Critical Evaluation of Information		.941	12
Ethical Use of Information		.946	11
Total		**.975**	**33**
Physical Health	Quality of Educational Life	.737	7
Mental Health		.897	6
Social Relationships		.835	3
Environment		.924	8
Total		**.925**	**24**

These results confirm the psychometric soundness of the instruments, demonstrating both internal consistency and reliability and thus validating their use in assessing the constructs among the study's target population.

4 Results and Discussion

Levels of Digital Awareness, Information Literacy, and Educational Quality of Life

To answer the first research question—examining the level of digital awareness, information literacy, and quality of educational life among secondary school students—the three scales were administered, and descriptive statistics were computed, including means and standard deviations. The results are displayed in Table 3.

Table 3: Descriptive Statistics of Digital Awareness, Information Literacy, and Quality of Educational Life

Scale	Mean	Standard Deviation	Level
Digital Awareness	3.7393	0.59219	High
Information Literacy	3.8980	0.72981	High
Quality of Educational Life	4.0182	0.69257	High

As shown in Table 3, students reported high levels across all three scales, with mean scores falling within the upper range of a

5-point Likert scale. Specifically, the mean scores were 3.7393 for digital awareness, 3.8980 for information literacy, and 4.0182 for quality of educational life. These elevated levels may be attributed to the national initiatives embedded within Saudi Arabia's Vision 2030, which emphasizes investment in digital transformation across the educational sector. Examples include the widespread implementation of e-learning platforms, such as Madrasati platform, during the COVID-19 pandemic; the introduction of advanced digital curricula; the provision of tablets and high-speed internet in schools; and the integration of learning management systems, such as Noor and Jusoor. Furthermore, schools have increasingly incorporated artificial intelligence tools and interactive applications, enabling personalized learning experiences and promoting students' digital and information awareness (Chaliha, 2024). Additionally, the presence of academic counseling programs that promote students' mental and emotional well-being (Al-Anzi, 2022), along with well-equipped school laboratories and enrichment programs in digital fields for high-achieving students (Al-Osaimi, 2022), have collectively contributed to creating a supportive and stimulating learning environment. The availability of diverse extracurricular activities has further enhanced students' perceptions of educational life quality and engagement in academic and social domains (El-Hassan, 2021).

Differences by Gender and Grade Level

To address the second research question, regarding whether there are statistically significant differences in digital awareness, information literacy, and quality of educational life based on gender, academic grade, and the interaction between them, a multivariate analysis of variance (MANOVA) was conducted.

Table 4: MANOVA Results for Differences Based on Gender, Grade Level, and Their Interaction

Source		**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	Digital Awareness	6.430a	5	1.286	3.798	.002
	Awareness Information	9.108b	5	1.822	3.531	.004
	Quality of Educational Life	6.099c	5	1.220	2.595	.025
Intercept	Digital Awareness	5033.405	1	5033.405	14867.648	0.000
	Awareness Information	5493.285	1	5493.285	10648.415	.000
	Quality of Educational Life	5785.275	1	5785.275	12307.887	.000
Gender	Digital Awareness	.628	1	.628	1.854	.174
	Awareness Information	1.390	1	1.390	2.694	.102
	Quality of Educational Life	.019	1	.019	.040	.841
Academic level	Digital Awareness	4.727	2	2.363	6.981	.001
	Awareness Information	7.928	2	3.964	7.684	.001
	Quality of Educational Life	5.152	2	2.576	5.480	.005
Gender * Academic level	Digital Awareness	.561	2	.280	.828	.438
	Awareness Information	.214	2	.107	.207	.813
	Quality of Educational Life	.746	2	.373	.793	.453
Error	Digital Awareness	130.341	385	.339		
	Awareness Information	198.613	385	.516		
	Quality of Educational Life	180.968	385	.470		
Total	Digital Awareness	5603.913	391			
	Awareness Information	6148.758	391			
	Quality of Educational Life	6500.196	391			
Corrected Total	Digital Awareness	136.770	390			
	Awareness Information	207.721	390			
	Quality of Educational Life	187.066	390			

The results indicate no statistically significant differences between male and female students across the three scales. Similarly, there was no significant interaction between gender and academic grade. However, statistically significant differences were observed based on academic grade level (first, second, and third secondary grades) across all three variables: digital awareness ($F = 6.981$, $p < .01$), information literacy ($F = 7.684$, $p < .01$), and quality of educational life ($F = 5.480$, $p < .01$). To further explore the direction of these differences, the least significant difference (LSD) post hoc test was employed. Table 5 presents the pairwise comparisons.

Table 5: LSD Post Hoc Comparisons of Academic Levels Across Study Variables

Dependent Variable			**Mean Difference (I-J)**	**Std. Error**	**Sig.**
Digital Awareness	3rd Grade	1st Grade	.20761*	.07136	.004
		2nd Grade	-.03605	.07967	.651
	2nd Grade	1st Grade	.24366*	.07136	.001

Dependent Variable			Mean Difference (I-J)	Std. Error	Sig.
Awareness Information	3rd Grade	1st Grade	.22011*	.08794	.013
		2nd Grade	-.10110	.09818	.304
	2nd Grade	1st Grade	.32121*	.08794	.000
Quality of Educational Life	3rd Grade	1st Grade	.20806*	.08381	.013
		2nd Grade	-.04790	.09357	.609
	2nd Grade	1st Grade	.25595*	.08381	.002

(*$p < 0.05$)

The findings show that students in the second and third secondary grades scored significantly higher on all three scales as compared to students in the first grade. However, no statistically significant differences were found between second- and third-grade students. These results may be interpreted in light of the unified educational policies and programs implemented across Saudi secondary schools, which are intended to enhance students' digital and information literacy regardless of gender. Moreover, students in higher grades may have gained more exposure to and experience with digital tools, artificial intelligence applications, and technology-integrated learning environments, contributing to their greater awareness and more positive educational experiences. These interpretations align with the findings of Dalal, Taylor, and Whitfield (2025) and Popa and Vasilescu (2025).

Structural Model: Direct and Indirect Effects

To answer the third research question, regarding whether a structural model can be established to explain the direct and indirect effects of digital awareness and information literacy on the quality of educational life among secondary school students, Structural Equation Modeling using Partial Least Squares (SEM-PLS) was employed via Analysis of Moment Structures (AMOS) Version 23.

Model Construction. Figure 1 presents the structural model derived from the data, illustrating the direct and indirect relationships between the three key constructs.

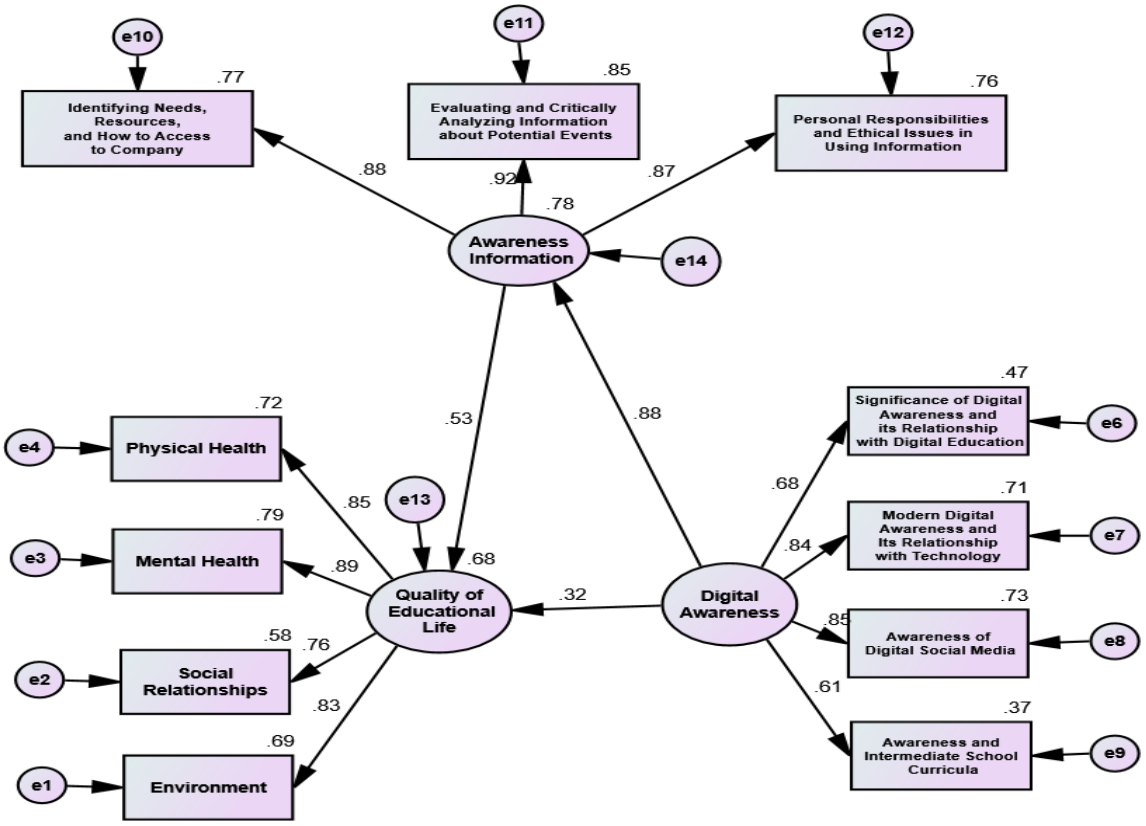

Fig. 1: Direct and Indirect Effects of Digital Awareness and Information Literacy on the Quality of Educational Life.

Figure 1 presents the final structural model illustrating the direct and indirect relationships between digital awareness, information literacy, and the quality of educational life among secondary school students. The path coefficients and loadings demonstrate statistically significant associations, confirming the theoretical assumptions underlying the model. As shown, digital awareness exerts a strong direct effect on information literacy (β = .88), indicating that students' competencies in navigating digital tools and environments substantially contribute to their ability to identify information needs, access resources, evaluate credibility, and apply information ethically and effectively. This finding reinforces the view that digital literacy serves as a foundational precursor for higher-order information processing skills in digital contexts.

The model also reveals a direct and significant effect on the part of information literacy on the quality of educational life (β = .53), which suggests that students with greater information competencies experience higher levels of satisfaction and well-being across multiple dimensions of their educational experience, including physical and mental health, social relationships, and the school environment. Furthermore, digital awareness directly impacts students' perceived educational quality of life (β = .32), albeit to a lesser degree than its indirect pathway through information literacy. This indicates that while digital awareness makes a meaningful contribution to students' educational well-being, its full influence is mediated through the development of refined information literacy capabilities.

In terms of measurement, all observed variables load strongly onto their respective latent constructs. For digital awareness, the strongest indicators include awareness of digital social media (loading = .85) and modern digital awareness and its relationship with technology (loading = .84), followed by awareness of the significance of digital education (loading = .68) and intermediate school curricula (loading = .61). Information literacy has high loadings across its dimensions, including evaluating and critically analyzing information about potential events (.92), identifying needs and accessing information (.88), and addressing ethical issues in information use (.78). The quality of educational life construct is similarly well-represented, with high loadings for mental health (.89), environment (.83), social relationships (.76), and physical health (.72). The model demonstrates that digital awareness exerts a direct and statistically significant influence on both information literacy and quality of educational life. Additionally, information literacy serves as a mediating variable, exerting a direct effect on the quality of educational life and acting as a pathway through which digital awareness further enhances students' educational experiences.

Path Coefficients and Significance. Table 6 shows the standardized and unstandardized regression weights, standard errors, and critical ratios for each path in the model.

Table 6: Standardized and Unstandardized Path Coefficients with Significance Levels

Path	β (Standardized)	B (Estimate)	S.E.	C.R.	Sig.
Digital Awareness → Information Literacy	0.883	2.610	0.209	12.463	*** (p < .001)
Digital Awareness → Quality of Educational Life	0.321	0.552	0.184	3.003	** (p < .01)
Information Literacy → Quality of Educational Life	0.526	0.306	0.061	5.037	*** (p < .001)

(**p < 0.01)

The results revealed the following:

- A strong and statistically significant positive effect on the part of digital awareness on information literacy (β = 0.883, p < .001).
- A statistically significant direct effect on the part of digital awareness on quality of educational life (β = 0.321, p < .01).
- A statistically significant direct effect on the part of information literacy on quality of educational life (β = 0.526, p < .001).

These findings support the model's structure, indicating that information literacy partially mediates the relationship between digital awareness and quality of educational life.

Model Fit Indices. To ensure the adequacy of the model fit, a set of fit indices was examined. The Chi-square (χ^2) and χ^2/df evaluate overall model fit, with χ^2/df < 3 indicating good fit. GFI and AGFI measure how much of the observed variance is explained by the model, adjusted for complexity. NFI and RFI compare the model to a baseline model, with values > 0.90 showing good improvement. IFI, TLI, and CFI are incremental indices that adjust for model complexity; values > 0.95 reflect excellent fit. RMSEA estimates error of approximation; values < 0.08 indicate good fit, and < 0.05 suggest excellent fit. Table 7 provides the key values and their acceptable thresholds.

Table 7: Model Fit Indices for the Proposed Structural Model

Fit Index	Value	Acceptable Range	Interpretation
χ^2 (Chi-square)	77.402	–	Acceptable
Df	41	–	Acceptable
χ^2/df	1.888	< 3	Good fit
GFI	0.965	> 0.90	Good fit
AGFI	0.943	> 0.90	Good fit
NFI	0.976	> 0.90	Good fit
RFI	0.968	> 0.90	Good fit
IFI	0.989	> 0.90	Excellent fit
TLI	0.985	> 0.90	Excellent fit
CFI	0.989	> 0.90	Excellent fit
RMSEA	0.048	< 0.08	Good fit

As shown in Table 7, all model fit indicators fall within acceptable or excellent ranges, confirming that the proposed structural model fits the data well and offers a valid explanation of the relationships between the variables. This result can be interpreted in light of the fact that enhancing students' digital and information awareness enables them to interact efficiently with digital resources, cultivate research and critical analysis skills, and engage effectively with digital content within a dynamic educational context. This interpretation is consistent with the findings of Corradini and Nardelli (2021). Furthermore, such awareness empowers students to develop innovative solutions by identifying, locating, evaluating, and utilizing information to meet their academic and personal needs, as demonstrated by Mahmoud (2024). It also equips them to address the challenges of e-learning and mitigates the risks associated with uncritical or uninformed internet use, in line with the conclusions of Alharbi et al. (2021).

In addition, digital and information awareness enhances students' capacity to differentiate between accurate and misleading information, thereby fostering critical thinking and reducing their vulnerability to digital misinformation (Ismaeel, 2025), as well as potential cybersecurity threats (Alhothali & Enezi, 2023). These competencies further contribute to the effective use of digital educational tools, leading to improved academic performance and active engagement in interactive learning environments, as highlighted by Zhu et al. (2021). The impact of these skills is directly reflected in students' quality of educational life, as the ability to balance technological use with meaningful social interaction within the school environment significantly enriches their learning experience (Aksoy & Öztoprak, 2021). Moreover, the safe and intentional use of technology reduces the stress and anxiety associated with educational tasks, enhances productivity, and elevates the overall quality of the educational process. These findings align with those of Çöğmen and Özelçi (2021).

5 Conclusion

This study highlighted the critical role of digital awareness and information literacy in shaping the educational experiences of secondary school students. The findings revealed that students with higher levels of these literacies are better equipped to navigate digital environments, engage meaningfully with online information, and cultivate enriched academic and social experiences. Importantly, digital and information awareness emerged not as isolated competencies, but as interrelated constructs that jointly enhance students' overall quality of educational life. This underscores the need for educational institutions to invest in comprehensive programs that develop these literacies—not merely as technical proficiencies, but as foundational dimensions of personal growth, lifelong learning, and psychological well-being. The implications of this study extend beyond the field of education. They are relevant to information science, psychology, communication studies, and public policy, all of which have a stake in how individuals' access, evaluate, and utilize information in increasingly digital societies. As the Kingdom of Saudi Arabia advances its Vision 2030 agenda and deepens the integration of digital technologies into education, fostering these literacies will be essential in preparing empowered, adaptable learners capable of thriving in a knowledge-driven and interdisciplinary global landscape. Despite the significance of the study results, the study sample was limited in size and scope which affects the generalizability of such results. Moreover, the cross-sectional design limits causal interpretation, and the reliance on self-reported data may introduce bias. Furthermore, further validation for the study is need within the Saudi context .

Declarations

Consent for publication

Not applicable.

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Competing Interests

I would like to confirm that there are no known conflicts of interest associated with this publication and that the study declares no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

Human Ethics and Consent to Participate declarations:

The researchers adhered to established guidelines for studies involving human participants. All protocols were carefully designed to protect participants' rights and welfare. Participants were informed about the objectives of the study, assured of the confidentiality of their data, and explicitly told that their participation was entirely voluntary, with the right to withdraw at any time without any consequences. The aforementioned ethics committee at King Faisal University (Approval No: KFU-REC-2024-DEC- ETHICS2818) thoroughly reviewed and approved the study methodology, ensuring full compliance with ethical standards in educational research. This approval process reflects the researchers' strong commitment to conducting ethically responsible and scientifically sound research.

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