Students' needs and conditions for receiving information: Evidence from Vietnamese universities today

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Abstract: Given the expansion of Vietnam's digital higher education landscape, it has become imperative to understand the factors contributing to students' capacity to effectively receive and interpret academic information. This study develops and empirically tests a multidimensional model of Information Reception Effectiveness (IRE) using data collected from a survey distributed to 300 undergraduate students in Hanoi and Ho Chi Minh City. We employed multiple linear regression analysis to better understand how seven predictors (digital accessibility, information literacy, motivational orientation, socioeconomic background, institutional support, psychological readiness, and learning engagement) explain IRE. The model was statistically significant; $F(7, 292) = 150.17$, $p < 0.001$. The model explained 78.3% of the variability in IRE ($R^2 = 0.783$, Adjusted $R^2 = 0.777$). All predictors were positively and significantly associated with the outcome measure ($p < 0.001$). The two unstandardized predictors with the greatest effects were information literacy ($\beta = 0.156$) and digital accessibility ($\beta = 0.145$), followed closely by socioeconomic background ($\beta = 0.139$) and institutional support ($\beta = 0.126$). Notably, psychological and behavioral characteristics also made substantial contributions to IRE, including psychological readiness ($\beta = 0.111$), motivational orientation ($\beta = 0.109$), and learning engagement ($\beta = 0.104$). The results highlight the need for comprehensive strategies based on a combination of improved digital access, increased institutional capacity, and enhanced student readiness as they engage with digitally-based learning.

1. Introduction

In the wider context of global educational change, the effectiveness with which university students receive and process information is now crucial in shaping academic engagement, success, and lifelong learning. Since learning environments have increasingly incorporated technology and broader approaches to learning in higher education institutions, it is timely and necessary to consider the needs and conditions of students' information reception [1, 2].

In Vietnam, higher education has experienced rapid (and, in many ways, forced) digitalization in recent years, a digital transition that has only been accelerated by the global COVID-19 pandemic, which mandated a national transition to online learning. The digital transition revealed, and may have also further exacerbated, long-awaited access disparities to learning resources, technology infrastructure, and accessibility to student preparedness [3]. While local government policies and other reforms aimed at addressing the problem of access disparity and an overall improvement in the quality of information delivery, varied access by student populations remains an entrenched factor to consider, particularly between the rural and urban settings, and differences in social standing [4]. Even with robust online content available, students struggle with the sheer quantity of information, digital fatigue,

disparity in access, variability of support services, and engagement, which have impacts on the delivery and accessibility to academic course information.

Prior research has studied each of the individual components of student learning – such as: digital accessibility [5] information literacy [6] and motivational orientation [7] – but there are very few studies that have investigated how these variables relate to one another and can then collectively influence students' information reception abilities (IRE). Additionally, the studies that have explored these relationships are rarely empirically tested using well-established statistical models that account for the intricacies of institutional, psychological, and socioeconomic processes.

The study seeks to fill this gap by developing and evaluating a linear regression analysis model to explore the relations between digital accessibility, information literacy, motivational orientation, socioeconomic background, institutional support, and psychological readiness, and their combined influence on students' information reception effectiveness in Vietnamese universities. Additionally, the study considers students' learning engagement as a mediator to conceptualize how students' engagement in learning activities mediates the influence of these variables on IRE.

This article is rooted in the context of contemporary Vietnamese higher education and offers theoretical and practical perspectives on improving information delivery strategies, digital equity, and student-centered learning design. The findings of this research may have implications for better informing policymakers, educators, and institutional leaders on significant determinants of student success in information-rich environments.

2. Literature Review

2.1. Information Reception Effectiveness

Information Reception Effectiveness (IRE) involves the efficacy of students in accessing, comprehending, evaluating, and applying academic information. This construct includes three areas of consideration: cognitive comprehension, perceived usefulness of information, and subjective satisfaction with the received information [3]. In digital and hybrid learning environments, especially since the COVID-19 pandemic, IRE is recognized as an important influencing factor of learning success [1].

Located in student characteristics, such as student motivation, competency in digital technology, and student engagement, and institutional design properties, such as platform ease of use, feedback, and learning instructions, IRE is based on perspectives of educational psychology and technology acceptance [8, 9]. When students believe learning technologies are useful and easy to use, they are more likely to exercise cognitive effort, engage in meaningful interactions with content, and retain learning over time.

Recent studies suggest that interactivity and learner autonomy are important components in improving IRE. Farahani, et al. [10] discovered that mobile learning environments that afforded learners the flexibility to pace their learning and receive immediate feedback improved comprehension and learner satisfaction. Constructivist theories emphasize the notion that active engagement with content can lead to deeper information processing [11].

In Vietnam, there were still limitations that inhibited IRE, such as digital fatigue, inconsistent quality of teaching, and technology gap [3]. These limitations further highlight the need for a model that includes the environment, emotional, and cognitive domains.

IRE is a multifaceted result that thus not only considers the effectiveness of pedagogies of their delivery but instead includes the lived experience of student engagement and relation to the digital learning ecosystem, however, IRE can also be optimized with pedagogical approaches that encourage learner engagement, accessibility and the necessity of critical thinking within the growing digitalization of higher education contexts.

2.2. Digital Accessibility

Digital accessibility (DA) is defined as equitable access and use of technical infrastructure, devices, and digital content needed to participate in academic goals. In digital learning environments, DA is a

fundamental prerequisite for engagement, knowledge, and educational success [12]. DA goes beyond internet access to also include access to appropriate devices, access to usable platforms, as well as access to institutional support for digital inclusion..

The idea is commonly framed around a digital divide that examines differences in access to information and communication technologies (ICTs) across socioeconomic, geographical, and institutional contexts [13]. In Vietnam, the COVID-19 pandemic pushed through digital learning reforms but has re-emphasised access hurdles that have persisted over decades. Urban university students have better infrastructure and devices compared with their rural or disadvantaged counterparts, who continue to report serious limitations in workplaces (e.g., Wi-Fi connections) and in what hardware they have to work with [5].

The inequalities have real consequences on academic engagement and learning outcomes. Nguyen [14] reported that low digital access resulted in less interaction with instructors, less cognitive engagement, and less effectiveness in receiving the information. Studies outside of Canada also show this pattern and connect inaccessibility of digital means to lower satisfaction, increased stress, and a greater likelihood of dropout [15, 16].

In addition to hardware and connectivity, accessibility also relates to the inclusiveness of digital platforms. Al-Azawei, et al. [17] assert that students with disabilities or low digital literacy could become excluded if access to the platform is not universally considered.

Although policies have been instituted, Vietnamese universities are still limited in providing equitable access. Affordability, sharing devices, and no or little mobile data remain major challenges [18]. DA implementation does require an investment in infrastructure, but designing inclusively, developing localized support systems, and a sustainable commitment to digital equity in higher education will be equally as important.

2.3. Information Literacy

Information literacy (IL) is increasingly viewed as an essential academic skill because it entails the capacity to find, critically evaluate, and ethically use information in many different contexts [19]. IL is viewed as a situated and contextualized practice that is not simply a skill, but a practice that enables self-directed learning, academic integrity, and civic engagement [20].

In the context of higher education, IL is vital to better preparing students to explore complex digital landscapes, evaluate the validity of sources, and ultimately make informed academic choices. However, research has consistently found that students exhibit a gap between self-reported and actual information evaluation capabilities [21]. In our increasingly digital-first societies, this gap is especially remarkable given that students often engage with a vast amount of content but do not exhibit processing and understanding that reflects some critical depth [22].

Lan and Tung [23] have noted a troubling trend in Vietnam: students are able to access digital materials, but often overutilize surface searching, and are mostly incapable of recognizing misinformation, particularly on social media. This mirrors a more regional problem: rapid expansion of digital tools has not been matched by a similar commitment to integrating IL curriculum levels [24].

These weaknesses signal wider systemic challenges; without the support of institutional structures and pedagogical alignment to deliver IL, it has little relevance to students' intellectual formation. Inquiry-oriented practices embedded within curricula would be important for developing habits of critical evaluation [25]. The use of IL skills may also be impacted by affective factors, including self-efficacy and anxiety, so these need to be dealt with in conjunction with skills learning [26].

There is a shortfall in the development of IL at universities in Vietnam; not only does it require technical development, but also cross-curricular integration with a collaborative structure with libraries, and metacognitive student training. As misinformation and digital overload grow, IL is an important academic and civic priority.

2.4. Motivational Orientation

Motivational orientation (MO), in both intrinsic and extrinsic components, is a fundamental influence on student engagement, depth of learning, and information seeking behaviors. Based on Self-Determination Theory [7] motivation is not simply the amount of effort, but also describes students' regulatory modes that move along a continuum from autonomous, interest-based engagement to external control, compliance.

Language research shows that students with intrinsic motivation—students with curiosity, personal development, or personal goals—read critically, reflectively, and sustain inquiry [27, 28]. Intrinsically motivated students, under conditions of cognitive vigilance, engage in better evaluation of information credibility, especially as digital spaces' information overload and algorithmic manipulation [29, 30] put the future of democracy in peril. Conversely, we are shown empirically that students use extrinsically motivated strategies (i.e., grades, awards, external recognition) consisting of shallow strategies and heuristic shortcuts rather than comprehensive strategies and deep learning [29, 30].

Within the Vietnamese higher education sector, MO has surfaced as an important indicator of student resilience and adaptation to digital learning. Tran, et al. [31] found that students with intrinsic motivation participated more in online discussion and persisted more with independent study; yet, as Nguyen [32] identified, students often experience systemic barriers to developing autonomous learning dispositions, due to exam-oriented learning, mandated pedagogy, and rigid curriculum. Tran and Le [33] advanced our understanding of MO further, showing how the cultural norms and institutional reward systems shape MO as a driver of learning..

Motivation is also dynamic and context-sensitive. Learning environments that promote autonomy, competence, and relatedness are likely to have students maintain intrinsic motivation [34]. Therefore, it is important to include project-based learning, formative feedback, and coming to a culmination point with authentic tasks, in deeper engagement. One should consider MO not just as a psychological characteristic of individuals, but a lever for systemic change.

2.5. Socioeconomic Background

Socioeconomic background (SEB) is a standard determinant of educational access, engagement, and success. SEB is commonly conceptualized in terms of parental schooling, income, and neighborhood. SEB influences not only students' access to learning technologies, but also their confidence, persistence, and cognitive development [35, 36]. While digitally delivered learning experiences offer opportunities to ameliorate inequities in learning access, engagement, and success, it might equally be argued that COVID-19 exacerbated existing inequities. SEB is still noticed in both how students receive information, and interacted with that information once received.

Students from higher economic backgrounds typically have individual access to digital devices, reliable connectivity, and auxiliary educational support, resulting in sustained engagement and deep learning [37, 38]. This also contributes to what Warschauer [39] calls "epistemic privilege," or the potential to engage with high-quality information early and meaningfully.

Conversely, students from low-SES backgrounds often face a more cumulatively negative context, which includes shared and outdated devices, inconsistent internet connectivity, and limited space to study. These situations diminish information self-efficacy and academic confidence, leading to lower participation and reduced cognitive engagement [40, 41]. The "second-level digital divide," therefore, not only shows gaps in access but also differences in the effective use of information [42].

Vietnam has sharp urban-rural and urban-ethnic minority digital divides [4]. Students outside major urban centers have to depend on public internet cafés and mobile data and cannot consistently engage in digital learning or learning of appropriate quality [18]. For some students, economic difficulties are an extra burden that may cause them not to engage with instruction or assignment deadlines [43].

To curtail SEB-based inequalities, comprehensive strategies must be used, which should combine infrastructure expenditure, open educational resources, digital literacies training, and support, within

strategies targeting SEB students. Understood by DiMaggio and Hargittai [44] the problem with closing the gap concerns much more than connectivity; it involves capacity-building in users and implementing inclusive pedagogical design.

2.6. Institutional Support

Institutional support (IS) is the formal or informal means by which universities assist students in their learning, overall well-being, and persistence in completing their academic programs. This includes academic advising, library services, digital infrastructure provision, and mental health support. Institutional support is now viewed not as peripheral but essential to equitable, responsive, and transformative learning [45, 46].

Research has shown that strong institutional support systems effectively promote engagement, persistence, academic satisfaction, and engagement online [47, 48]. When students feel that institutions are supportive and accessible, they are more likely to push through and persist when they encounter adversity [49] use the recommended resources, and engage with academic content. In addition to promoting persistence and engagement within the digital environment, an institutional support structure also has the potential to help students sort through saturated digital environments, cope with sensory overload, and engage their cognitive attention.

Multiple emerging studies indicate that IS performs a dual role of improving both information literacy and emotional resilience in Vietnam as well. Doan and Le [50] identified twenty variables, among which frequent contact/engagement with advisors, library platforms, and peer mentoring demonstrated a strong link with students' academic satisfaction and confidence in managing information. This is of vital importance for first-generation and rural students who may not have networks to provide academic support for navigating their studies and lives outside of university.

Technology advances are transforming IS delivery, too. AI-enabled advising tools, including chatbots and predictive analytics, are being tested for scalable, real-time support. These new ways of potentially offering academic advice have demonstrated efficacy in providing academic guidance, identifying at-risk students, and providing targeted feedback [51, 52].

Last but not least, IS should be culturally responsive and equity-minded. Its effectiveness will depend on the inclusion of students, the responsiveness of institutions, and the consistent evaluation in this developing field. As Vietnamese higher education undergoes digital transformation, designing inclusive systems and intelligent student supports will be key to closing opportunity gaps and enhancing whole student success.

2.7. Psychological Readiness

Psychological readiness (PR) is the emotional, cognitive, and behavioral readiness of students to engage with the content academically in a meaningful way. Specific dimensions such as mental health stability, stress responses, self-regulation, and academic resilience develop students' capacity for memory retention, focus, and persistence [53, 54]. PR is an important, yet invisible development that sets the foundation for learning outcomes, and it's not ready in a cognitive or technical way.

The COVID-19 pandemic highlighted the importance of PR in education. Worldwide research Aristovnik, et al. [55] indicated that psychological distress, in the form of anxiety, emotional fatigue, and depression, significantly affected students' ability to concentrate, be motivated, and self-direct their learning. The disruption of routine, social isolation, and ambiguity related to academic work all contributed to diminishing students' emotional and cognitive resilience [56].

Lap, et al. [57] noted that students with high academic resilience in Vietnam were adapting to online learning effectively and successfully kept students engaged and self-regulated their time in an online environment. High resilience students were also more adept at navigating online learning platforms and remained cognizant and engaged in the learning process regardless of distractions in their home environments.

PR is also related to other constructs influencing learning, namely, motivational orientation and institutional support. Students with lower psychological readiness typically receive help through emotionally responsive or affective-oriented pedagogy and institutional scaffolding systems, such as counseling services, peer support, or deadline flexibility [58]. When institutional support is absent, academic inequities can increase in high-anxiety and low SES or marginalized students [59].

Most importantly, PR is flexible. Specific interventions that highlight a growth mindset, mindfulness, and self-efficacy have likewise been effective in increasing learner psychological resources [60, 61]. In Vietnam, for example, there are new efforts toward mindfulness-based stress reduction (MBSR) and emotional intelligence training [62]. In conclusion, promoting PR is important for academic performance but also for student well-being as the educational landscape becomes more digital and demanding.

2.8. Learning Engagement

Learning engagement (LE) defines the degree to which students put time, effort, and psychological energy into academic tasks. LE is a multidimensional construct that captures behavioral (attendance, participation), emotional (interest, sense of belonging), and cognitive (cognitive engagement, metacognition) components. Each component plays a distinct role in driving learning outcomes [63].

LE is not just an outcome in and of itself, as it acts as a mediator between student characteristics—including information literacy, psychological preparedness, and motivation—and academic outcomes such as knowledge retention, critical analysis, and information application [64, 65]. As a mediator, LE translates dispositions and contextual affordances into observable academic performance and persistence.

Research indicates that students who are engaged are more likely to seek supplemental resources, ask important questions, and push through difficulties [66]. Thus, LE is a behavioral manifestation of more complex learning processes and a predictor of academic satisfaction and self-regulated learning [67].

In the context of the rapid digitalization and changes to teaching and learning in Vietnam, LE is gaining attention. Nghia, et al. [68] showed that when using an adapted National Survey of Student Engagement (NSSE), students who expressed high LE were more successful on the measures of comprehension and application. LE also mediated the relationship between motivation and academic resilience, demonstrating its important role.

In terms of cultural context, LE in Vietnam is heavily influenced by Confucian traditions and emerging student-centered pedagogies. While flipped classrooms and project-based learning promote engagement and motivation, the efficacy of both will depend upon the psychological readiness of the students and the engagement and motivation offered by the institution [69]. Furthermore, engagement is not a rational construct and is often state-dependent: contextual issues and design of instruction will inform student engagement [70, 71]. In the end, it is imperative that we focus on LE in policy and practice to ameliorate student potential to legitimate academic achievement in changing landscapes of education.

Based on literature reviews, the following hypotheses are proposed:

Hypothesis 1 (H1). Digital Accessibility has a positive and significant impact on Information Reception Effectiveness

Hypothesis 2 (H2). Information Literacy has a positive and significant impact on Information Reception Effectiveness

Hypothesis 3 (H3). Motivational Orientation has a positive and significant impact on Information Reception Effectiveness

Hypothesis 4 (H4). Socioeconomic Background has a positive and significant impact on Information Reception Effectiveness

Hypothesis 5 (H5). Institutional Support has a positive and significant impact on Information Reception Effectiveness

Hypothesis 6 (H6). Psychological Readiness has a positive and significant impact on Information Reception Effectiveness

Hypothesis 7 (H7). Learning Engagement has a positive and significant impact on Information Reception Effectiveness

3. Research Methodology

3.1. Research Design

This study employs a quantitative research approach to identify the underlying factors associated with university students' information reception effectiveness (IRE) and learning engagement in the digitally mediated context of higher education in Vietnam. The main instrument was a structured, self-report survey to obtain students' perceived performance and contextual learning conditions. The study assumes that a student's capacity to receive, process, and use academic information rests on a wide range of interlinked technological, psychological, and institutional variables, especially following the COVID-19 pandemic, which propelled the move to hybrid and online learning..

The study utilizes multiple linear regression analysis as its primary method of data analysis to evaluate the proposed theoretical framework. More specifically, linear regression is a popular multivariate method in behavioral and educational research and is used to assess relationships between a continuous dependent variable and multiple predictors. Hair, et al. [72] state linear regression: "provides an integrated analysis method where it estimates multiple relationships in a model, measures error in measurement, and examines direct and indirect effects". Given that the study had a particular interest in evaluating direct effects of situated and psychological aspects on IRE, it was appropriate to apply multiple linear regression as a method for data analysis by assessing the structural and indirect implications of learning engagement.

The conceptual model for the present study contains eight latent constructs, which are based on both research literature and theory from educational psychology and digital pedagogy and include: Information Reception Effectiveness (IRE); Digital Accessibility (DA); Information Literacy (IL); Motivational Orientation (MO); Socioeconomic Background (SEB); Institutional Support (IS); Psychological Readiness (PR); Learning Engagement (LE). This alignment standardizes the measurements for these constructs, increasing validity and leading to valid estimates of their latent relationships. As Kline [73] stated, "specification of well-defined latent variables, with multiple indicators, will increase the validity and explanatory power of structural models". In operationalizing the constructs and structure of regression models, the study has the potential to provide empirical data about how the interconnected challenges of students' informational and psychological needs, coupled with institutional circumstances, and their patterns of engagement, shape their learning outcomes. This research design incorporates a solid theoretical anchor, with the ability to apply a validated multivariate method for a robust understanding of students' uptake of information-use capacity in Vietnam's digital landscape in higher education.

3.2. Instrument Development

The survey instrument of the current study contained two sections. Section A contained demographic and background variables, including gender, year of study, Field of study, area of residence (urban, suburban, or rural), and access to digital resources (e.g., internet connectivity and device ownership). The demographic and background variables were for descriptive analysis and could stipulate comparisons between possible sub-groups. Section B was designed with 32 items to measure eight latent constructs related to the study's conceptual framework: Information Reception Effectiveness, Digital Accessibility, Information Literacy, Motivation Orientation, Socioeconomic Background, Institutional Support, Psychological Readiness, and learning engagement. Each latent construct included four operationalized observed indicators. The respondents were presented with the items and a five-point Likert Scale, with options ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The use of a Likert scale, as used in other educational and psychological research, is a common

method for measuring and presenting an appropriate measure of the intensity of the respondents' attitudes [74].

All items were sourced and adapted from validated instruments from the literature to assure theoretical alignment. The content was then culturally adapted for the Vietnamese university context. To improve measurement validity, the instrument was read by five experts and scholars in educational psychology and digital pedagogy. The items were revised based on their suggestions to enhance item clarity and topical relevance.

Subsequently, a pilot study was completed with 30 undergraduate students to investigate item understanding, flow, and internal consistency. Insights from this phase were incorporated to finalize the instrument, so that it could be implemented for full data collection. As DeVellis [75] stated, "good measurement does not happen by accident. Good measurement begins with careful construction, based on theory, and assessed for reliability and validity". This development process ensured the instrument was suitable to conduct Exploratory Factor Analysis (EFA) and linear regression analysis.

3.3. Sampling and Participants

The selection of respondents in this project was by intentionally selecting the participant group by means of purposive sampling with an emphasis on university students in the two major cities in Vietnam (Hanoi and Ho Chi Minh City). The studied population covers many university students of undergraduate studies (both public and private), and a range of students and study contexts in such large pooled populations, making for good sites of study of digital learning behavior and student engagement.

Sample selection was defined by participants' current enrollment status in an institution for higher education and past experience based on potential exposure to digital or hybrid learning methods, allowing the targeted sample to include individuals possessing experience in receiving information and providing a high level of digital academic engagement. The data were collected subsequent to the Spring 2024 linear regression analysis that was conducted near the end of a semester, at a time when students completed academic coursework and were more appropriately situated for reflecting on their experiences.

We gathered 200 valid responses from students in different disciplines (e.g., social sciences, business, engineering, education) and levels (first through fourth year). This sample size was an appropriate total for methods suggested by Hair, et al. [72] as they suggest, "factor analysis requires a minimum of 5 to 10 observations per variable, which will yield between acceptable and excellent and acceptable factorial validity." Since the instrument has 32 observations, this sample size was suitable for both Exploratory Factor Analysis (EFA) as well as linear regression analysis.

We also included demographic diversity in the sample to ensure variation along the lines of digital access, socioeconomic background, and institutional support. participant perspectives are necessary to increase generalizability and interpretation of findings related to students' conditions for accessing academic information in Vietnam's increasingly diverse higher education landscape.

3.4. Data Collection Procedure

Data collection occurred in the months of May and June 2024, immediately following the end of the Spring linear regression analysisester, so that respondents were most likely taking courses and completing academic tasks in recent memory. This would enhance the quality and detail of their responses when later reporting on their learning engagements and experiences with the way information was received.

This survey was administered in a mixed-mode format online (Google Forms) and offline (paper). mixed-mode administration was used in order to provide accessible survey methods, reduce sampling bias, and acknowledge the differences in participant-level connectivity that this study's findings rely on participant's digital accessibility and contingent socio-economic background.

Before completing the instruments, all respondents were informed about the purpose and objectives of the study and were assured of the voluntary nature of their participation and data confidentiality. Their participation was strictly anonymous and no identifiable information was collected. Respondents 'informed consent' was acquired when they confirmed their willingness to participate at the top of the questionnaire. The study also adhered to human subject research's ethical principles, including respect for autonomy, beneficence, and data protection, in compliance with the ethical guidelines of the Vietnam Ministry of Education and Training and its international guidelines [76].

In order to ensure data quality, a short screening question at the beginning of the questionnaire asked participants to confirm that they were current undergraduate students at a university in either Hanoi and Ho Chi Minh City. Each completed response was reviewed for completeness and for consistency before including the data in the data set. Any incomplete or duplicated entries were dropped from analysis, leaving a final sample of 200 valid responses fit for statistical analysis using Exploratory Factor Analysis (EFA) and linear regression analysis.

4. Data Analysis

4.1. Demographic Analysis

The demographic information (based on gender, academic year, occupation/major, and access to digital devices) of the whole group of respondents is displayed in Table 1, which includes the important variables that could influence the conditions experienced by students in the process of receiving information.

In general, male students exceeded female students in most categories. Regarding academic year, male students were between 56.1% (second year) and 63.9% (third year). Regarding occupation, males predominated the groups, especially office workers (64.5%) and freelancers (64.1%). Regarding device access, which is important for digital learning, males indicated they used each device more, especially tablets (67.1% of males).

These gendered patterns in enrollment status, occupational role, and digital access could shape the ability of students to receive information effectively, especially in hybrid or online educational contexts in which the intersection of technology readiness and academic context could impact effectiveness.

Table 1.
Demographic Distribution by Gender.

Category	Group	Female (n)	Female (%)	Male (n)	Male (%)
Year of Study	1st Year	13	39.4	20	60.6
	2nd Year	25	43.9	32	56.1
	3rd Year	39	36.1	69	63.9
	4th Year or above	37	36.3	65	63.7
Occupation/Major	Other	15	45.5	18	54.5
	Freelancer	42	35.9	75	64.1
	Office Worker	33	35.5	60	64.5
	Student	24	42.1	33	57.9
Device Access	Personal Laptop	40	36.7	69	63.3
	Smartphone	51	42.1	70	57.9
	Tablet	23	32.9	47	67.1

4.2. Scale Reliability Analysis

Cronbach's alpha coefficients were computed for each latent construct of the measurement instrument to determine internal consistency. All eight scales reported acceptable reliability because they were all from 0.745 to 0.793 in alpha values, all above the generally accepted minimum of .70 [77]. The lowest corrected item-total correlation for each scale also exceeded the minimum requirement of 0.30, indicating internal coherence of the items [75]. The results of the analyses indicate that the survey instrument is psychometrically adequate and appropriate for subsequent factor and structural modeling.

Table 2.
Summary of Scale Reliability for Latent Constructs.

Variable	Number of Items	Cronbach's Alpha	Lowest Item-Total Correlation
Information Reception Effectiveness (IRE)	4	0.750	0.513
Digital Accessibility (DA)	4	0.761	0.521
Information Literacy (IL)	4	0.766	0.661
Motivational Orientation (MO)	4	0.750	0.509
Socioeconomic Background (SEB)	4	0.791	0.592
Institutional Support (IS)	4	0.793	0.667
Psychological Readiness (PR)	4	0.770	0.560
Learning Engagement (LE)	4	0.745	0.516

Note: All alpha values exceed the .70 threshold, indicating acceptable internal reliability.
Exploratory Factor Analysis.

Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation was used to investigate the latent structure of the eight latent constructs. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .864, indicating a great deal of shared variance among items [78]. Bartlett's test of sphericity was significant, $\chi^2(496)=3058.87$, $p<0.001$, indicating that the correlation matrix was suitable for factor analysis..

As presented in Table 3, eight components were extracted, which supports the hypothesized constructs. Each variable had a strong load on its construct and weak cross-loadings with loadings ranging from .609 to .787, also indicating that the constructs were distinct. The solution explained 60.17% of total variance which showed adequacy in model fit as well as factor structure for confirmatory analysis.

Table 3.
Rotated Component Matrixa for Exploratory Factor Analysis.

Rotated Component Matrixa								
Component								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
IS3	0.787							
IS2	0.761							
IS1	0.720							
IS4	0.705							
SEB3		0.773						
SEB2		0.727						
SEB1		0.725						
SEB4		0.713						
PR3			0.755					
PR2			0.748					
PR1			0.718					
PR4			0.713					
DA4				0.757				
DA1				0.739				
DA2				0.706				
DA3				0.675				
IL2					0.747			
IL1					0.718			
IL4					0.673			
IL3					0.609			
MO4						0.743		
MO2						0.734		
MO3						0.707		
MO1						0.671		
IRE2							0.757	
IRE1							0.742	
IRE3							0.688	
IRE4							0.663	
LE2								0.749
LE4								0.744
LE3								0.717
LE1								0.693

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 6 iterations.
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)= 0.864.
Bartlett's Test of Sphericity (Chi-Square=3058.868l, df= 496 , sig.=0.000)
Extraction Sums of Squared Loadings =60.169, Initial Eigenvalues = 1.357

4.3. Correlation Analysis

Pearson correlation coefficients (see Table 4) were calculated to evaluate the strength and the direction of relationships between important latent variables. All the correlations were statistically significant at the 0.01 level, two-tailed. This indicates potentially important relationships among the constructs involved in determining students' information reception effectiveness (IRE).

All the predictor variables were positively and considerably related to Information Reception Effectiveness (IRE). Of the predictor variables, IRE was more closely associated with Information Literacy (IL) (r = 0.656, p < 0.01) than any other predictor variable, followed by Socioeconomic Background (SEB) (r = 0.594, p < 0.01), Digital Accessibility (DA) (r = 0.570, p < 0.01), and Institutional Support (IS) (r = 0.569, p < 0.01). The relationship between IRE and each predictor variable above shows support for the theoretical model proposing that, in addition to people's

technological access, institutional/environmental conditions play a compelling role in the students' ability to receive and use academic information.

The moderate correlations between IRE and Motivational Orientation (MO) (r = 0.533), Psychological Readiness (PR) (r = 0.525), and Learning Engagement (LE) (r = 0.466) indicate that psychological and behavioral elements also affect information processing, although to a lesser extent than structural variables do.

Table 4.
Pearson Correlation Matrix Among Key Study Variables (N = 200).

Variable	1. IRE	2. DA	3. IL	4. MO	5. SEB	6. IS	7. PR	8. LE
1. Information Reception Effectiveness (IRE)	—	0.570**	0.656**	0.533**	0.594**	0.569**	0.525**	0.466**
2. Digital Accessibility (DA)		—	0.370**	0.253**	0.290**	0.293**	0.288**	0.262**
3. Information Literacy (IL)			—	0.340**	0.397**	0.417**	0.370**	0.256**
4. Motivational Orientation (MO)				—	0.361**	0.299**	0.273**	0.303**
5. Socioeconomic Background (SEB)					—	0.312**	0.284**	0.259**
6. Institutional Support (IS)						—	0.283**	0.214**
7. Psychological Readiness (PR)							—	0.234**
8. Learning Engagement (LE)								—

Note: All coefficients are Pearson correlations.
N = 200.
p < 0.01 (2-tailed).
Regression analysis.

To determine how well the set of predictors would predict Information Reception Effectiveness (IRE), a multiple linear regression analysis was conducted using seven independent variables. The seven independent variables were Digital Accessibility (DA), Information Literacy (IL), Motivational Orientation (MO), Socioeconomic Background (SEB), Institutional Support (IS), Psychological Readiness (PR), and Learning Engagement (LE). The multiple regression model was statistically significant, $F(7, 292) = 150.17$, $p < .001$, indicating that the model is able to account for 78.3% of the variance in IRE ($R^2 = .783$, Adjusted $R^2 = 0.777$). The Durbin–Watson statistic was 2.02, which indicated that the residuals were not autocorrelated.

All seven predictors were positively and significantly related to IRE ($p < 0.001$). Information Literacy ($\beta = 0.156$) and Digital Accessibility ($\beta = 0.145$) had the largest unstandardized effects, indicating that holding the other variables constant, a 1 unit increase in either predictor was associated with a 0.15–0.16 unit increase in IRE. This was then followed by Socioeconomic Background ($\beta = 0.139$) and Institutional Support ($\beta = 0.126$). Psychological Readiness ($\beta = 0.111$), Motivational Orientation ($\beta = 0.109$), and Learning Engagement ($\beta = 0.104$) had significant effects, however, in lower magnitudes. These results suggest that IRE is the product of both exogenous contextual resources and endogenous learner-centered factors, and that educational policy, practice, and design will need to take account of both access and support and also student motivation.

Table 5.
Model Summary for Predicting Information Reception Effectiveness.

Model	R	R²	Adjusted R²	Std. Error of the Estimate	Durbin–Watson
1	0.885	0.783	0.777	0.2442	2.02

Note: Predictors: Digital Accessibility (DA), Information Literacy (IL), Motivational Orientation (MO), Socioeconomic Background (SEB), Institutional Support (IS), Psychological Readiness (PR), Learning Engagement (LE). Dependent variable: Information Reception Effectiveness (IRE).

Table 6.
ANOVA Summary for Regression Model Predicting Information Reception Effectiveness (IRE).

Source	Sum of Squares	df	Mean Square	F	p
Regression	62.687	7	8.955	150.17	< .001
Residual	17.413	292	0.060		
Total	80.100	299			

Note: Dependent variable: Information Reception Effectiveness (IRE). Predictors: Digital Accessibility (DA), Information Literacy (IL), Motivational Orientation (MO), Socioeconomic Background (SEB), Institutional Support (IS), Psychological Readiness (PR), Learning Engagement (LE).

Table 7.
Regression Coefficients for Predicting Information Reception Effectiveness (IRE).

Predictor	β	SE β	t	p. value	VIF
(Constant)	0.326	0.086	3.81	< 0.001	—
Digital Accessibility (DA)	0.145	0.020	7.39	< 0.001	1.27
Information Literacy (IL)	0.156	0.021	7.27	< 0.001	1.51
Motivational Orientation (MO)	0.109	0.021	5.09	< 0.001	1.30
Socioeconomic Background (SEB)	0.139	0.020	7.04	< 0.001	1.34
Institutional Support (IS)	0.126	0.019	6.49	< 0.001	1.31
Psychological Readiness (PR)	0.111	0.020	5.55	< 0.001	1.26
Learning Engagement (LE)	0.104	0.020	5.24	< 0.001	1.19

Note: Dependent variable: Information Reception Effectiveness (IRE). β = Unstandardized coefficient; $SE\ \beta$ = Standard error of β; VIF = Variance inflation factor.

5. Results and Discussion

5.1. Results

The regression analysis lent support to the proposed research model and the seven related hypotheses regarding the determinants of Information Reception Effectiveness (IRE) among Vietnamese university students. These results reinforce the idea that IRE is not the result of a 'single variable' but rather is a systemic outcome influenced by technological, cognitive, motivational, and contextual conditions. For example, Digital Accessibility (H1) had a significant and positive effect on IRE, which reinforces the previously established literature noting that "access to reliable devices and internet infrastructure is a prerequisite for meaningful digital learning" [2]. Students who reported greater digital accessibility were more capable of receiving and processing academic content. Therefore, it would be unwise to ignore the evidence that digital inequality still matters when considering educational outcomes in the hybrid learning context of Vietnam..

Second, Information Literacy (H2) was found to be the most powerful predictor of IRE. As expected, students who were better at evaluating, sourcing, and using academic information would better navigate the complexities of digital environments. This evidence supports the statement that "information literacy is no longer an ancillary skill….it is a foundational academic competency in the digital age" [79]. The magnitude of the association underscores the necessity of incorporating structured information literacy training into university courses..

Third, the hypothesis pertaining to Motivational Orientation (H3) was additionally supported. Students with higher levels of intrinsic motivation—identified by curiosity, interest, and personal growth—processed significantly more information than those students with lower levels of intrinsic motivation. As Deci and Ryan [7] noted, "intrinsically motivated learners put more cognitive depth and tenacity into the tasks they are learning," and this appears to be the case in this study..

Likewise, Socioeconomic Background (H4) had a significant influence on IRE, with students with higher SES benefiting from advantageous levels of access to information and cognitive engagement. This aligns with the literature on "second-level digital divide," which emphasizes that unequal resources impact access to technology and the quality of its use [41, 42].

The analysis also affirmed that Institutional Support (H5) positively predicted IRE. For instance, in our sample, students who reported that their universities provided more support (academic advising, digital infrastructure, emotional services) were also more effective in receiving information. Kuh, et al.

[45] noted, "Institutional conditions perceived as supportive facilitate both student persistence and academic engagement."

Additionally, Psychological Readiness (H6) was the most potent predictor of IRE. Students with higher levels of self-regulation, mental resilience, and emotional readiness have more effective information processing. This supports Conley [53] framework, which identifies psychological readiness as a "hidden but important component of academic performance, especially in digitally mediated environments.".

Finally, Learning Engagement (H7) was also positively correlated with IRE. Students who manifested engagement with academic tasks, such as participating in class, developing the knowledge through self-regulated study, or cognition, reported higher information receiving levels. As Farahani, et al. [10] assert, "engagement is a multidimensional construct that transforms academic potential into performance," a modifiable activity clearly supported in the outcome measures..

In summary, the results validate a comprehensive, multidimensional framework of IRE, wherein both environmental access and internal dispositions contribute significantly to students' effectiveness in acquiring and applying academic knowledge.

5.2. Discussion

This study has provided empirical evidence to support a framework for Information Reception Effectiveness (IRE) at a multi-dimensional level, in the setting of digital higher education in Vietnam. We found that all seven predictors were found to be significant, complicating our understanding of the many factors that influence how students receive, process, and enact academic information, in a situation where there is an abundance of information in a digitally mediated context. The results consolidate with and add to existing empirical literature on IRE by demonstrating the interdependence between structural accessibility, psychological readiness, institutional scaffolding, and the agency of the student..

Information Literacy and Digital Accessibility appeared as the most significant predictors of IRE in this study. This finding was consistent with previous studies showing that students' digital competence and equitable access to the infrastructure of technology lie at the heart of academic engagement and learning achievement [2, 3]. Specifically, the prominence of information literacy as a contributor supports the interpretation that "the ability to find, evaluate and use information ethically is not just technical but can also be regarded as foundational to cognitive independence, or autonomy, in higher education" [20]. Given these results, it is clear universities must establish some form of institutionalized information literacy as a cross-disciplinary learning outcome, including within curricula and as part of library-instruction partnerships.

Moreover, the effects of Socioeconomic Background and Institutional Support illustrate the lasting influence of structural inequalities on digital learning outcomes. Robinson, et al. [42] suggest that inequalities in access are more than just hardware and connectivity; they also denote the potential for students to convert access to digital learning resources into meaningful participation in an academic task. Students with greater privilege in socioeconomic status and belonging to institutions with reactive institutional ecosystems reported a much greater IRE, indicating that digital learning policy must account for both structural conditions and organizational responsiveness [18].

The psychological and motivational aspects, namely Motivational Orientation, Psychological Readiness, and Learning Engagement, are also considerably correlated with IRE, but the effect sizes were somewhat smaller. This is aligned with self-determination theory [7] where learners thrive in environments that fulfill their identified needs for autonomy, competence, and relatedness. The implications of motivational and emotional factors were significant; further confirming that "the academic performance of a learner in an online space is mediated, not just by their cognitive ability, but also by their affective preparedness and the ways they construct their identity as a learner" [62]. Therefore, any intervention that seeks to foster intrinsic motivation, stress regulation, and persistent engagement in an academic pathway may not only contribute to the well-being of students but also promote cognitive outcomes such as IRE.

Taken together, these results suggest that approaches to improving IRE should move beyond technology or curriculum alone. It is necessary to adopt a holistic approach to the digital infrastructure, information literacy development, psychosocial support, and universal institutional design to develop students' academic resilience and learning effectiveness in the digitally-mediated learning environments we and especially Vietnamese higher education university students now find ourselves in. This means not only lessening the digital divide, but also developing student-centered ecosystems that support engagement, equity, and students' critical processing of information.

Future research may also wish to look at the longitudinal pathways of IRE development, including how these predictors play out over time and across different educational contexts. Future qualitative research that explores students' experiences may also give a better sense of the contextual mechanisms that enable or constrain the potential effects of these variables (predictors of IRE) on IRE, ultimately providing richer insight for both theoretical and practical purposes.

6. Conclusion

As knowledge is ever more mediated by the digital (and online) world, this study provides a timely and empirically grounded addition to the discourse on the effectiveness of student learning in higher education. Using a comprehensive conceptual model of Information Reception Effectiveness (IRE), the results further establish that the effectiveness of student learning, defined as the ability to receive, process, and utilize their academic information, is a function of a range of interdependent factors including: digital access, information literacy, motivation, economic and cultural background, institutional support, psychological preparedness, and learning engagement.

This study affirmed the significance of all seven predictors using a robust regression analysis, with implications for interpreting IRE not merely as a cognitive outcome, but rather as an interconnected and contextualized construct. As noted in previous scholarship, online learning often occurs at the intersection of individuals' abilities and their institutional ecologies [2, 80]. The strong predictive value of information literacy and digital accessibility reflects the urgent need for universities to address inequalities in both technical infrastructure and skills. As articulated by Lloyd [20] information literacy comprises a particular type of epistemic agency that allows learners to navigate and critique the complexity of the information landscape of higher education.

Also worth mentioning were the findings about socioeconomic background and institutional support, as these findings resonate with the continued significance of social inequality in students' educational experiences. The "second-level digital divide" [41, 42] appears to be evident in how students with different capabilities can transform access into meaningful engagement. These findings therefore support earlier calls for equity-based reforms that not only focus on connectivity, but that go beyond those efforts and focus more on the conditions of learning for the most underserved students experience [18].

Incorporating motivational orientation, psychological readiness, and learning engagement into the model also provides insight into further aspects of IRE by drawing attention to the affective and behavioral aspects of learning. Informed by self-determination theory [7] the findings support the premise that having students enthusiastic about their motivation and emotional preparedness is fundamentally important to maintain cognitive effort and retention online and via hybrid mediums [58, 62]. Consequently, as educational jurisdictions across the world continue to respond to COVID-19 the implications of digital fatigue and disengaged learners in the pandemic, it appears evidence suggests the need for pedagogical frameworks that are emotionally responsive and autonomy-supportive.

From a pragmatic standpoint, this research implies that an urgent shift in paradigm is warranted in the ways Vietnamese higher education – and systems like it – think about the effectiveness of digital learning. Rather than seeing the importance of only infrastructure or content delivery, institutions need to develop an integrated approach to accommodate both the material and psychological preconditions to learning. This includes integrating information literacy as a transversal competency across all disciplines, providing uniquely tailored support for first-generation and low-income students, and

establishing engagement-driven learning environments to address motivation and wellbeing, as well as academic performance.

In conclusion, this study offers a conceptual and methodological point of departure for future exploration. The model introduced here is easily transferred to different national contexts and institutional types and allows for potential development through longitudinal and mixed-method designs. Future research examining causal mechanisms and interactions between predictors, particularly the mediating role of engagement and the moderating role of institutional variables, would strengthen the theoretical base in our understanding of digital learning outcomes. In addition, qualitative research documenting students' lived experiences of digital learning would provide insight into the experiential nuances underpinning the statistical relationships.

In summary, embedding effectiveness regarding how students receive information is not just an instructional responsibility, but a policy goal as well. While universities aspire to ever increasingly ambitious digital transformation agendas, how do they also account for the negative persistence of a range of multilayered circumstances surrounding student success? This study has reinforced the notion that meaningful learning in a digital world requires a systemic, student-centered approach; one that is as accountable to equity and emotion as it is to access and technology.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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Appendix

Questionnaire

Dear Student,

We are conducting a research study to examine characteristics that affect learning engagement and academic effectiveness in the digital learning environment. Your answers will be used for research purposes only and will remain confidential. There are no right or wrong answers! Please answer based on your own experiences and be as honest as possible.

Part A: Demographic Information

Please tick the appropriate boxes:

1.   Gender:

☐ Male   ☐ Female

2.   Year   of   Study:

☐ 1st Year   ☐ 2nd Year   ☐ 3rd Year   ☐ 4th Year or above

3.   Major/Field   of   Study:

☐ Social Sciences   ☐ Natural Sciences   ☐ Engineering   ☐ Business/Economics   ☐ Other: _____

4.   Type   of   Residence:

☐ Urban   ☐ Suburban   ☐ Rural

5.   Access   to   Digital   Devices   (Check   all   that   apply):

☐ Personal laptop   ☐ Smartphone   ☐ Tablet   ☐ Shared family device   ☐ No regular access

PART B: Main Questionnaire

Please indicate how much you agree with each of the following statements.

Scale:

☐ 1 = Strongly Disagree   ☐ 2 = Disagree   ☐ 3 = Neutral   ☐ 4 = Agree   ☐ 5 = Strongly Agree

1. Information Reception Effectiveness (IRE)

Item numbers	Statement	1	2	3	4	5
IRE1	I can understand most of the academic content provided in my courses.	☐	☐	☐	☐	☐
IRE2	I find the information I receive in class helpful for my learning goals.	☐	☐	☐	☐	☐
IRE3	I can apply what I learn to solve academic problems effectively.	☐	☐	☐	☐	☐
IRE4	I feel satisfied with the quality of information provided in my studies.	☐	☐	☐	☐	☐

2. Digital Accessibility (DA)

Item numbers	Statement	1	2	3	4	5
DA1	I have reliable access to the internet for academic purposes.	☐	☐	☐	☐	☐
DA2	I own or regularly use a suitable digital device for learning.	☐	☐	☐	☐	☐
DA3	I can easily access online learning platforms and resources.	☐	☐	☐	☐	☐
DA4	My digital learning experience is not hindered by technology issues.	☐	☐	☐	☐	☐

3. Information Literacy (IL)

Item numbers	Statement	1	2	3	4	5
IL1	I can evaluate the credibility of information sources.	☐	☐	☐	☐	☐
IL2	I know how to find academic information from reliable sources.	☐	☐	☐	☐	☐
IL3	I can distinguish between accurate information and misinformation.	☐	☐	☐	☐	☐
IL4	I feel confident in ethically using and citing information.	☐	☐	☐	☐	☐

4. Motivational Orientation (MO)

Item numbers	Statement	1	2	3	4	5
MO1	I study because I enjoy learning new things.	☐	☐	☐	☐	☐
MO2	I put effort into my studies even without external rewards.	☐	☐	☐	☐	☐
MO3	I am motivated by a desire to improve myself.	☐	☐	☐	☐	☐
MO4	I find personal meaning in the work I do for school.	☐	☐	☐	☐	☐

5. Socioeconomic Background (SEB)

Item numbers	Statement	1	2	3	4	5
SEB1	I have the financial means to support my academic needs.	☐	☐	☐	☐	☐
SEB2	My family provides resources or support for my studies.	☐	☐	☐	☐	☐
SEB3	I feel I have equal educational opportunities as others.	☐	☐	☐	☐	☐
SEB4	I rarely face financial issues that affect my education.	☐	☐	☐	☐	☐

6. Institutional Support (IS)

Item numbers	Statement	1	2	3	4	5
IS1	My university provides adequate academic advising.	☐	☐	☐	☐	☐
IS2	I receive support from staff when I face learning difficulties.	☐	☐	☐	☐	☐
IS3	I can easily access university learning resources.	☐	☐	☐	☐	☐
IS4	My university provides emotional or psychological support services.	☐	☐	☐	☐	☐

7. Psychological Readiness (PR)

Item numbers	Statement	1	2	3	4	5
PR1	I can manage academic stress effectively.	☐	☐	☐	☐	☐
PR2	I feel mentally ready to take on academic challenges.	☐	☐	☐	☐	☐
PR3	I stay focused and motivated during classes.	☐	☐	☐	☐	☐
PR4	I recover quickly from academic setbacks.	☐	☐	☐	☐	☐

8. Learning Engagement (LE)

Item numbers	Statement	1	2	3	4	5
LE1	I actively participate in class and group work.	☐	☐	☐	☐	☐
LE2	I invest time and effort in academic tasks.	☐	☐	☐	☐	☐
LE3	I go beyond the required work when learning.	☐	☐	☐	☐	☐
LE4	I persist even when learning is difficult.	☐	☐	☐	☐	☐

Thank you for participating!