

Online Learning Motivation and ChatGPT: A Self-Determination Theory Perspective

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ABSTRACT

Growing use of generative AI technologies like ChatGPT has changed online learning and increased student motivation. This study explores online learning motivation and ChatGPT using Self-Determination Theory (SDT) to examine competence, autonomy, and relatedness in online learners. 189 academics from various fields participated in a quantitative survey. A five-point Likert scale-based 52-item questionnaire was derived from Ryan and Deci (2000), Fowler (2018), and Youssef et al. (2024). Competence, autonomy, and relatedness were not gender-specific across academic groupings. In the descriptive study, students rated the AI system's function in critical thinking, academic accomplishment, engagement, and learning motivation positively. The greatest competency item was students' practice of cross-checking ChatGPT knowledge with independent study ($M = 4.06$), whereas the most autonomous item was achieving good grades ($M = 4.59$). Relatedness was strong in social engagement and teacher support. They liked class discussions ($M = 4.00$) and found course materials meaningful ($M = 4.28$). Positive correlations were found between competence, autonomy ($r = .550, p < .001$), and competence and relatedness ($r = .551, p < .001$). The results support the Self-Determination Theory as a valid framework for online learning motivation and show that ChatGPT can promote learners' competence, autonomy, and relatedness if responsibly integrated into online learning settings. The work has major theoretical, pedagogical, and practical consequences for higher education AI-assisted learning.

Keywords: Online Learning Motivation, ChatGPT, Self-Determination Theory (SDT), Student Engagement, Higher Education

INTRODUCTION

Background of Study

Online learning has become a central feature of higher education, and student motivation remains an important condition for persistence and achievement in these settings (Hartnett, 2015; Shank, Tang, & Morris, 2024). From a self-determination theory (SDT) perspective, motivation is shaped by the extent to which the learning environment supports autonomy, competence, and relatedness. Hartnett (2015) showed that high workload, assessment pressure, unclear guidelines, insufficient feedback, and communication problems can undermine these needs in an online context. In contrast, Shank et al. (2024) reported that an SDT-based online mathematics intervention was associated with increased competence and relatedness, although autonomy showed only limited improvement in the quantitative results. A review of SDT and online learning in university also concluded that current research has not extensively integrated other theories and models, suggesting that the field still needs more context-sensitive work (Rosli et al., 2022).

ChatGPT adds a new dimension to this issue because it may change how students experience online learning. The retrieved studies suggest that ChatGPT use can be associated with perceived autonomy, competence,

relatedness, and intrinsic motivation (Annamalai et al., 2025; Shah et al., 2024). Shah et al. (2024) reported that ChatGPT usage impacted students' perceived autonomy, competence, and relatedness and enhanced intrinsic motivation, while Annamalai et al. (2025) found that autonomy and relatedness predicted motivation for continued ChatGPT use and that the SDT model explained 70.8% of the variance in that outcome. Hmoud et al. (2024) also found that students' motivational experience with ChatGPT included task enjoyment, effort, perceived relevance, and interaction.

Statement of Problem

The problem addressed in this study is how ChatGPT relates to student motivation in online learning when viewed through SDT. The evidence retrieved here shows that online learning can support autonomy yet still leave competence and relatedness vulnerable and that ChatGPT may influence those needs in ways that are not yet fully clear (Hartnett, 2015; Shank et al., 2024; Annamalai et al., 2025). The issue, therefore, is not whether online learning matters or whether ChatGPT exists, but how ChatGPT functions within the motivational structure of online learning.

The research gap lies in the need to examine ChatGPT specifically through an SDT lens in an online learning context. The studies retrieved here are recent, context-specific, and varied in design, so the motivational role of ChatGPT in online learning still needs to be examined more directly. The review by Rosli et al. (2022) supports this direction by noting that SDT research in university online learning does not extensively integrate other theories and models. In the ChatGPT studies, the emphasis has often been on adoption, general perceptions, or continued use rather than a focused explanation of motivational processes in online learning (Afkarin & Asmara, 2024; Annamalai et al., 2025; Hmoud et al., 2024; Shah et al., 2024).

Accordingly, this study examines online learning motivation and ChatGPT from a self-determination theory perspective in order to clarify how ChatGPT use relates to autonomy, competence, relatedness, and overall motivation in online learning.

Objective of the Study and Research Questions

This study is done to explore online motivation and ChatGPT using SDT. Specifically, this study is done to answer the following questions:

- Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across clusters?

H₀₁: There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across clusters

- Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender?

H₀₁: There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender

- How do learners perceive competence as motivation in online learning?
- How do learners perceive autonomy in online learning?
- How do learners perceive relatedness as motivation in online learning?
- Is there a significant relationship between competence and autonomy for online motivation?

H₀₃: There is no significant relationship between competence and autonomy for online motivation

- Is there a significant relationship between competence and relatedness for online motivation?

H₀₄: There is no significant relationship between competence and relatedness for online motivation

LITERATURE REVIEW

Theoretical Framework of the Study

- Self-Determination Theory (SDT) and Motivation to Learn Online

Self-Determination Theory (SDT) for online education is a fundamental concept to grasp how learners become engaged in learning. It assumes that the motivation for autonomous learning is, a lot, a result of satisfying three basic psychological needs: autonomy, competence, and relatedness (Daher et al., 2026; Harder, 2026). The inherent flexibility of online environments satisfies the need for autonomy by giving learners control over their learning pace and schedule (Daher, 2026). Then again, virtual settings may cause a decrease in motivation due to a lack of physical interaction. As a result, the need for relatedness is often thwarted, and the learners end up feeling isolated (Chiu, 2024). In a way, artificial intelligence (AI) tools, such as ChatGPT, have been increasingly being used, not only for the completion of tasks but also as motivating partners who support these very needs of learners in a direct manner (Harder, 2026). If used properly, ChatGPT can foster a learner's feeling of competence by dissecting challenging ideas into simpler parts and giving learners feedback that is immediate and tailored to their needs. This, in turn, helps learners move from a place of being unmotivated to one where they are actively, intrinsically engaged in learning (Chiu, 2024; Du & Alm, 2024; Harder, 2026). Still, the effect of ChatGPT on a learner's motivation is much influenced by their basic drive for motivation, since depending too much on or improperly using the tool often means metacognitive laziness and, in the end, hampers genuine mastery of skills (Harder, 2026).

- ChatGPT: Advantages & Disadvantages

Current academic discourse frequently examines ChatGPT due to its significant utility in tutoring, drafting, and writing within the healthcare and educational sectors; however, researchers consistently underscore persistent challenges regarding governance and reliability. In educational contexts, systematic reviews suggest that this technology can enhance writing proficiency, efficiency, and creativity while fostering personalised learning and reducing instructor workloads through automated assessment and feedback (Alsaedi, 2024; Al-khresheh, 2024; Samala et al., 2024;). Furthermore, empirical studies indicate that ChatGPT encourages learner autonomy, engagement, and idea generation while offering instantaneous feedback, translation, and summarisation, particularly for language learners (Albadarin et al., 2024; Dos, 2025).

Nevertheless, educational drawbacks are equally prominent in recent reviews, which frequently cite concerns regarding student overreliance, diminished motivation, academic dishonesty, learning loss, systemic bias, privacy vulnerabilities, and unequal technological access (Alsaedi, 2024; Al-khresheh, 2024; Lee et al., 2025). Moreover, since ChatGPT is less effective at cultivating speaking, listening, and complex creative problem-solving skills, researchers argue it should supplement rather than replace human instructors (Dimeli & Kostas, 2025; Natya et al., 2024). A comparable dynamic exists in healthcare literature; systematic reviews demonstrate that AI can alleviate language barriers for non-native English speakers and assist with clinical notes, scientific writing, literature reviews, patient communication, and decision support (Fatima et al., 2024; Garg et al., 2023; Neha et al., 2024). Even so, medical researchers strongly emphasise the platform's limitations, including its lack of emotional sensitivity, tendencies toward bias, plagiarism, and hallucination, alongside the critical necessity for real-time data and human supervision (Fatima et al., 2024; Garg et al., 2023; Iqbal et al., 2025).

This reliability deficit is clearly demonstrated in an empirical study by Athaluri et al. (2023), which revealed that ChatGPT frequently generated unverified references and missing DOIs, proving that algorithmic hallucination can compromise even straightforward academic tasks. This evidence reinforces the broader consensus in the literature that ChatGPT is best utilised as an assistive drafting and explanatory tool, rather than an authoritative source for factual data or high-stakes clinical and academic choices (Athaluri et al., 2023; Fatima et al., 2024). Ultimately, while current research affirms that ChatGPT yields genuine advantages for personalization and productivity in medical and educational writing, these breakthroughs remain balanced by persistent threats regarding bias, data privacy, accuracy, and ethical misuse (Alsaedi, 2024; Fatima et al., 2024).

Because the current literature is largely restricted to short-term empirical data and systematic reviews, the vital unanswered question moving forward is whether these immediate benefits can be sustained over time without inducing user dependency, compounding misinformation, or escalating ethical concerns.

Past Studies

Studies have shown that the use of generative AI such as ChatGPT brings greater impacts on students' learning. For instance, a study done by Mo et al. (2026) analyses the influence of ChatGPT on undergraduates' academic performance in higher education via a meta-analysis of current empirical research. Instead of gathering primary data from a singular cohort, the researchers amalgamated results. This review is based on 66 studies published between January 2023 and May 2025, which involved a total of 5,708 undergraduates from diverse countries and academic fields. The research utilised a meta-analytic strategy, employing effect sizes (Hedges' g) derived from the selected studies as the principal analytical tool. Data were collected from nine academic databases, yielding 129 effect sizes that were evaluated utilising a random-effects model and Robust Variance Estimation (RVE). The results indicated that ChatGPT significantly improved undergraduates' learning outcomes (Hedges' $g = 1.14$, $SE = 0.185$, $p < .01$), demonstrating that its utilisation markedly boosts academic performance in various educational settings. The moderator analysis revealed that prior experience with ChatGPT substantially affected learning results, with novice users exhibiting the most significant learning improvements, whereas study style, academic discipline, and the availability of guidance did not notably vary the overall effect. The findings indicate that ChatGPT can function as an effective educational instrument for enhancing learning outcomes when suitably integrated into teaching and learning methodologies. The study's implications are substantial for educators, administrators, and politicians, as they demonstrate the potential for AI-driven tools to improve student learning, facilitate personalised education, and promote academic success. The research underscores the necessity of offering organised and supervised exposure to ChatGPT, fostering AI literacy among students and educators, and enacting institutional regulations that guarantee the appropriate and effective incorporation of AI technologies in higher education.

Another study, which was carried out by Stratton-Maher and Kelly (2026), investigated the engagement of first-year nursing students with ChatGPT during an assessment task and analysed their experiences, obstacles, and perceptions concerning its application in academic work. The study engaged a total of 48 first-year undergraduate nursing students from an Australian university through focus group discussions. The researchers utilised a qualitative descriptive research approach, employing semi-structured focus group interviews as the primary method of data collection. The gathered data were examined using Braun and Clarke's reflexive thematic analysis, with Microsoft CoPilot facilitating the coding process and improving analytical rigour. The results identified six principal themes: initial perplexity, skill development, reliability assessment, academic integrity negotiation, future benefit recognition, and support valuation. Students indicated that ChatGPT enhanced their writing clarity, linguistic competency, idea development, comprehension of complicated subjects, and critical assessment skills. They articulated apprehensions around misinformation, excessive dependence on AI, academic integrity, and conflicting institutional directives concerning AI use. The research suggests that the systematic and ethical incorporation of ChatGPT can improve students' critical literacy, digital fluency, and profound learning. It underscores the necessity for universities to formulate explicit AI policies, integrate AI literacy into courses, offer educator training, and develop assessments that promote student engagement with AI rather than reliance on it. These approaches can equip graduates to interact responsibly and effectively with AI technologies in academic and professional settings. Hence, the findings of both studies demonstrate that the effective and ethical integration of generative AI tools such as ChatGPT can significantly enhance students' learning outcomes, critical thinking, digital literacy, and academic performance, provided that adequate guidance, AI literacy training, and institutional support are in place.

In addition, numerous studies have demonstrated substantial effects on students' motivation for online learning. For example, research carried out by Mehrvarz et al. (2025) examines the impact of students' views of ChatGPT on their online learning engagement and academic achievement, considering online learning engagement as a mediating variable. The researchers specifically investigated how students' awareness of ChatGPT, their readiness to utilise it, and their apprehensions regarding the technology influence their participation in online learning and, consequently, their academic performance. The participants consisted of 305 graduate students

(Master's and PhD candidates) from Shiraz University, Iran, chosen using stratified sampling during the 2024–2025 academic year. The research utilised a structured questionnaire featuring a five-point Likert scale, comprising three instruments: a ChatGPT Perception Scale adapted from Chan and Hu (2023), an Online Learning Engagement Scale adapted from Kuo et al. (2021), and an Academic Performance Scale adapted from Yu et al. (2010). Data were evaluated with Partial Least Squares Structural Equation Modelling (PLS-SEM). The results indicated that students' perceptions of ChatGPT had a significant positive impact on online learning engagement ($\beta = 0.438$, $p < .001$) and academic performance ($\beta = 0.268$, $p < .001$), while online learning engagement also significantly predicted academic performance ($\beta = 0.470$, $p < .001$). Moreover, online learning engagement partially moderated the association between ChatGPT perception and academic achievement, representing 43.4% of the overall effect. The findings indicate that students with favourable views of ChatGPT are more inclined to participate actively in online learning, thereby improving their academic achievement. The findings suggest that higher education institutions should advocate for the informed and responsible use of AI tools, such as ChatGPT, to enhance student engagement and optimise learning outcomes, while also developing learning activities that seamlessly incorporate AI technologies into the educational framework.

In another instance, Mahande et al. (2026) examines the influence of ChatGPT on students' self-efficacy, anxiety, motivation, and academic achievement in blended learning contexts. The researchers specifically investigated the impact of psychological aspects on students' academic performance and if ChatGPT moderates the links among self-efficacy, anxiety, motivation, and learning performance. The participants comprised 293 scientific and engineering students from two public universities in South Sulawesi, Indonesia: Universitas Negeri Makassar and Universitas Islam Negeri Alauddin Makassar. Data were gathered by an online questionnaire that included assessments of self-efficacy, anxiety, motivation, ChatGPT utilisation, and learning performance, and were analysed using Structural Equation Modelling (SEM) with SmartPLS. The results indicated that self-efficacy ($\beta = 0.260$, $p < .001$), motivation ($\beta = 0.325$, $p < .001$), and ChatGPT usage ($\beta = 0.177$, $p < .001$) had a significant and beneficial impact on learning performance. ChatGPT also enhanced the correlation between self-efficacy and academic performance. Nonetheless, anxiety and its combination with ChatGPT showed favourable, albeit statistically negligible impacts on learning performance. The moderating effect of ChatGPT on motivation was notably substantial but negative, indicating that overdependence on ChatGPT may diminish the beneficial impact of motivation on performance. The research suggests that educational institutions ought to judiciously incorporate ChatGPT into blended learning settings to bolster students' confidence, engagement, and performance, while mitigating excessive reliance on AI tools. Educators are urged to create learning activities that foster self-efficacy, critical thinking, and autonomous learning, utilising ChatGPT as a supplementary rather than a replacement educational tool.

In conclusion, the current study indicates that ChatGPT possesses significant potential to improve students' online learning motivation, engagement, and academic achievement when judiciously incorporated into educational environments. From the perspective of Self-Determination Theory (SDT), ChatGPT can fulfil learners' psychological needs for autonomy, competence, and relatedness by enabling personalised learning experiences, enhancing self-efficacy, and promoting active engagement in online and blended learning contexts. The research conducted by Mo et al. (2026), Stratton-Maher and Kelly (2026), Mehrvarz et al. (2025), and Mahande et al. (2026) cumulatively demonstrates that favourable perceptions and effective utilisation of ChatGPT foster increased learner engagement, superior learning results, and heightened motivation. Nevertheless, the findings warn that overreliance on AI tools could diminish intrinsic motivation and autonomous learning, underscoring the necessity for ethical application, critical assessment, and balanced incorporation of AI technologies. Consequently, higher education institutions ought to implement pedagogical strategies that utilise ChatGPT as an auxiliary learning partner instead of a replacement for human endeavour, thereby cultivating enduring online learning motivation and encouraging autonomous learning among students.

Conceptual Framework of the Study

Online learning can be challenging for learners in several ways. They strive to stay engaged and focused (Rahmat, 2025). When engagement is lacking in the session, students may struggle to follow along. Engagement comes in many forms: with the instructor, with the peers, and with the lesson. The advance in technology has added one more form of engagement: with ChatGPT. According to Youssef et.al. (2024), ChatGPT also provides learners with critical thinking abilities, academic achievement, and engagement.

This study is anchored in the theory of self-determination by Ryan & Deci (2000). This theory suggests that to stay motivated, learners need autonomy, relatedness, and competence. The components in the theory can be correlated with the online motivation variables by Fowler (2018). With reference to Figure 1 below, autonomy can be achieved by online learners through the variable expectancy and value. Expectancy is measured by (i) self-efficacy and (ii) control of learning beliefs. Next, value is measured by (i) intrinsic goal orientation, (ii) extrinsic goal orientation, and (iii) task value. Relatedness is measured by social support (social engagement & Instructor support). Lastly, competence is measured by ChatGPT (critical thinking abilities, academic achievement, ChatGPT usage, and student engagement).

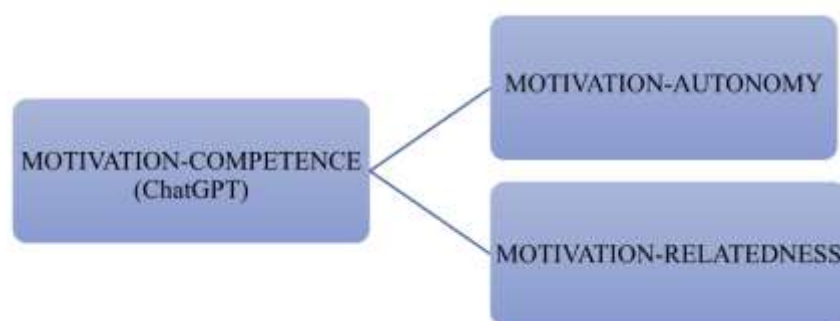


Figure 1 Conceptual Framework of the Study Online motivation and ChatGPT using SDT

METHODOLOGY

This quantitative study is done to explore online motivation and ChatGPT using SDT. A convenient sample of 189 participants responded to the survey. The instrument used is a 5 Likert-scale survey and is rooted from Ryan and Deci (2000), Fowler (2018) and Youssef et.al. (2024) to reveal the variables in table 2 below. Table 1 below shows the categories used for the Likert scale; 1 is for Strongly Disagree, 2 is for Disagree, 3 is for Undecided, 4 is for Agree and 5 is for Strongly Agree.

Table 1 Likert Scale Use

Never
rarely
Sometimes
Often
Always

Table 2 Distribution of Items in the Survey

Section	Variable		No of items	Tot	Cronbach alpha
B	Autonomy (expectance & value)	Self-efficacy	7	25	.932
		Control of learning beliefs	4		
		Intrinsic goal orientation	4		
		Extrinsic goal orientation	4		
		Task value	6		

C	Relatedness (social support)	Social engagement	5	12	.847
		Instructor support	7		
D	Competence	Critical thinking abilities	4	15	.930
		Academic achievement	4		
		Chatgpt usage	4		
		Student engagement	3		
				52	.957

Table 2 shows the distribution of items in the survey. Section B has 25 items on autonomy. Section C has 12 items on Relatedness and Section D has 15 items on competence.

Table 3 Reliability Levels, Cronbach's Alpha Ranges, and Their Interpretations

Reliability Level	Cronbach's Alpha range	Interpretation
Excellent	0.9 and above	Indicates very high internal consistency
Good	0.80-0.89	Reflects strong internal consistency
Acceptable	0.70-0.79	Indicates acceptable internal consistency
Questionable	0.60-0.69	Reflects questionable internal consistency
Poor	Below 0.6	Indicates poor internal consistency

In order to determine the internal reliability of the instrument, reliability analysis is conducted. . Table 3 above shows the distribution and interpretation of Cronbach Alpha range. According to Ahmad,et.al. (2024), Cronbach Alpha scores between 0.7 to 0.9 is considered acceptable to excellent.

Table 2 also shows the reliability of the survey. The analysis is based on the information in Table 3, which reveals the reliability levels by Ahmad,et.al (2024). The analysis shows a Cronbach alpha of .932 for autonomy, .847 for relatedness, and .930 for competence. The overall Cronbach alpha for all 52 items is .957; thus, revealing a good reliability of the instrument chosen/used. Further analysis using SPSS is done to present findings to answer the research questions for this study.

FINDINGS AND DISCUSSION

Demographic Analysis

According to Zienefuss, et.al (2021), researchers report demographic data in percentages to establish sample representatives, and allow for generalizability to a larger population. The reporting also provides an overview of participants' characteristics. Percentages offer a clear and understandable picture of the sample makeup.

Table 4 Percentage for Demographic Profile

Question	Demographic Profile	Categories	Percentage (%)
1	Cluster	Science & Technology	36%

		Social Sciences & Humanities	64%
2	Gender	Male	35%
		Female	65%

Based on the demographic profile presented in Table 4, the Social Sciences and Humanities cluster constitutes the majority of the sample at 64%, while the Science and Technology cluster accounts for 36%, reflecting a larger representation of participants from non-technical academic backgrounds. Furthermore, the gender distribution reveals a predominately female cohort, with 65% of respondents being female and 35% being male. In summary, the sample makeup is primarily female and more likely to be situated within the humanities and social sciences sectors.

Inferential Statistics

According to Shah (2024), there are three main functions of a T-test. Firstly, T-tests are done to compare means. This test is also done to determine if the average scores (mean) or values of two groups, or one group against a known value, are different enough to be considered statistically meaningful and are not just due to random chance. Secondly, a t-test is done to test hypotheses. Researchers use t-tests to test hypotheses about means, such as whether a new treatment significantly impacts a variable or if there's a difference in performance between two distinct groups. Lastly, a t-test is done to identify significant differences. The output of a t-test provides a p-value (significance value). If this p-value is below a predetermined threshold (often 0.05), it indicates a statistically significant difference, allowing researchers to conclude the populations from which their samples were drawn.

However, a one-way ANOVA (Analysis of Variance) is a statistical method used to compare the means of three or more independent (unrelated) groups to determine if there is a statistically significant difference between them. It is a parametric test that evaluates the effect of a single independent variable (the factor) on a dependent variable.

Findings for Clusters

This section presents data to answer research question 1: Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across clusters?

H₀₁: There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across clusters

Table 5: T-Test for Clusters

Group Statistics											
Q1 CLUSTER	N	Mean	Std. Deviation	Std. Error Mean							
AUTONOMY	ST	68	3.8476	.87244	.03729						
	SS.H.B	121	3.8761	.51507	.04682						
RELATEDNESS	ST	68	3.9277	.46429	.01610						
	SS.H.B	121	3.9180	.50180	.04580						
COMPETENCE	ST	68	3.7049	.57306	.06949						
	SS.H.B	121	3.7163	.64382	.05854						

Independent Samples Test											
Levene's Test for Equality of Variances				t-test for Equality of Means							
		F	Sig.	t	df	Significance	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
						One-Sided p	Two-Sided p		Lower	Upper	
AUTONOMY	Equal variances assumed	.468	.491	-.376	187	.354	.707	-.02850	.07581	-.17805	.12104
	Equal variances not assumed			-.385	149.229	.350	.701	-.02850	.07399	-.17471	.12771
RELATEDNESS	Equal variances assumed	.318	.573	.139	187	.448	.897	.00965	.07427	-.13696	.15628
	Equal variances not assumed			.133	148.661	.447	.894	.00965	.07258	-.13377	.15307
COMPETENCE	Equal variances assumed	1.977	.161	-.120	187	.452	.804	-.01135	.09389	-.19656	.17386
	Equal variances not assumed			-.125	152.847	.450	.801	-.01135	.09086	-.19386	.16828

A two-sample t-test was performed to between (a) competence, (b) autonomy, and (c) relatedness across clusters.

There were no significant difference between (a) competence ($p=0.904$), (b) autonomy ($p=.707$), and (c) relatedness ($p=.897$).

Findings for Gender

This section presents data to answer research question 2: Is there a significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender?

H_{01} : There is no significant relationship between (a) competence, (b) autonomy, and (c) relatedness across gender

Table 6 T-Test for Gender

Group Statistics					
	Q1:GENDER	N	Mean	Std. Deviation	Std. Error Mean
AUTONOMY	Male	86	3.8758	.53492	.06584
	Female	123	3.8606	.48093	.04336
RELATEDNESS	Male	86	3.9306	.52919	.06514
	Female	123	3.9167	.46777	.04238
COMPETENCE	Male	86	3.7384	.81080	.07518
	Female	123	3.6981	.62372	.05624

Independent Samples Test										
Levene's Test for Equality of Variances					t-test for Equality of Means					
		f	Sig.	t	df	Significance One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
AUTONOMY	Equal variances assumed	.451	.503	.199	187	.421	.843	.01516	.07635	-.13545 .16177
	Equal variances not assumed			.182	121.443	.424	.848	.01516	.07884	-.14092 .17124
RELATEDNESS	Equal variances assumed	.876	.341	.186	187	.426	.853	.01389	.07476	-.13360 .16138
	Equal variances not assumed			.179	118.717	.429	.858	.01389	.07760	-.13976 .16754
COMPETENCE	Equal variances assumed	.313	.575	.426	187	.335	.670	.04028	.09448	-.14610 .22666
	Equal variances not assumed			.429	135.527	.334	.669	.04028	.09387	-.14536 .22592

A two-sample t-test was performed to between (a) competence, (b) autonomy, and (c) relatedness across gender.

There were no significant difference between (a) competence ($p=0.670$), (b) autonomy ($p=.843$), and (c) relatedness ($p=.853$).

Descriptive Statistics

Why is there a need to report the mean and standard deviation? According to Vetter (2017), Mean (M) represents the average, or centre of a data set. Standard deviation (SD) indicates the typical distance of individual observations from the mean which shows the data's variability or spread. A low SD means the data points are clustered close to the mean while a high SD indicates they are more spread out. It is good to have a high SD.

Findings for Competence in Online learning

This section presents data to answer research question 3: How do learners perceive competence as motivation in online learning? In the context of this study, this is measured by (i) critical thinking abilities, (ii) academic achievements, (iii) ChatGPT usage, and (iv) student engagement.

Table 7 Mean (M) and Standard Deviation (SD) for Critical Thinking Abilities (CT)

Item	M	SD
CTQ1 I usually need clarification on the precision and reliability of information provided by ChatGPT, which enhances my critical thinking skills.	3.85	0.85
CTQ2 ChatGPT's responses made me doubt their validity, leading me to seek further clarification or evidence.	3.91	0.81

CTQ3 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	4.01	0.81
CTQ4I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently.	4.06	0.78

Table 7 reveals that learners generally perceive ChatGPT's use as positively contributing to their critical thinking abilities, as evidenced by the consistently high mean scores (M) across all items, ranging from 3.85 to 4.06. The strongest agreement (M=4.06, SD=0.78) is for the item CTQ4: I need clarification about the accuracy of ChatGPT's output, which often encourages me to evaluate the information and conduct additional research independently. This indicates that the perceived need to verify AI's output is the most significant driver for independent research and evaluation. The lowest mean score (M=3.85, SD=0.85) is for CTQ1: I usually need clarification on the precision and reliability of information provided by ChatGPT, which enhances my critical thinking skills. The result still indicates that respondents generally agreed that verifying the precision and reliability of information provided by ChatGPT contributes to the development of their critical thinking skills. The low standard deviation values (SD=0.78 to 0.85) across all items suggest a high degree of consensus among respondents regarding the role of ChatGPT in prompting critical thinking and verification efforts.

Table 8 Mean (M) and Standard Deviation (SD) for Academic Achievements (AA)

Item	M	SD
AAQ1 I actively explore alternative viewpoints or sources of information when using ChatGPT to ensure a comprehensive understanding of the topic.	3.9	0.80
AAQ2 ChatGPT brings innovative ideas that are ready to be shared with students.	3.67	0.86
AAQ3 Students can anticipate robust writing guidance from ChatGPT.	3.55	0.85
AAQ4 ChatGPT has improved my academic performance.	3.58	0.89

Table 8 illustrates that respondents generally agree on the positive impact of ChatGPT on academic achievements, as all mean scores were above 3.5 on a 5-point scale. The highest mean score was recorded for AAQ1 (M=3.90, SD=0.80), where students actively explore alternative viewpoints or sources of information when using ChatGPT, suggesting that the tool encourages broader academic inquiry and independent learning. Meanwhile, the lowest mean score was observed for AAQ3 (M=3.55, SD=0.85), related to the anticipation of effective writing guidance from the AI. Furthermore, the relatively low standard deviations, ranging from 0.80 to 0.89, indicate a consistent level of agreement among respondents regarding ChatGPT's various contributions to their academic success.

Table 9 Mean (M) and Standard Deviation (SD) for ChatGPT Usage (CU)

Item	M	SD
CUQ1 ChatGPT is a state-of-the-art writing model that is favorably used today.	3.61	0.93
CUQ2 Students seek help from ChatGPT's assistance in composing essays and articles.	3.70	0.84
CUQ4 Employing ChatGPT significantly improves human productivity.	3.40	0.95
CUQ5 The advent of ChatGPT marks a groundbreaking transformation in Natural Language Processing capabilities.	3.52	0.90

Table 9 reveals that respondents hold generally positive perceptions regarding ChatGPT usage (CU), with mean ratings ranging from 3.40 to 3.70 and low standard deviations reflecting consistent feedback. Specifically, CUQ2 recorded the highest mean ($M=3.70$, $SD=0.84$), which indicates that students frequently leverage ChatGPT for assistance in composing essays and articles. Furthermore, findings for CUQ1 ($M=3.61$, $SD=0.93$) and CUQ4 ($M=3.40$, $SD=0.95$) suggest moderate agreement that the platform serves as a widely utilized state-of-the-art model that enhances productivity. Respondents also acknowledged the revolutionary impact of the technology on Natural Language Processing capabilities, as evidenced by CUQ5 ($M=3.52$, $SD=0.90$). In summary, these results demonstrate that learners have favorably and consistently embraced the integration of ChatGPT into their academic tasks.

Table 10 Mean (M) and Standard Deviation (SD) for Student Engagement (SE)

ITEM	M	SD
SEQ1 ChatGPT is more interactive, human-like, and engaging for the students.	3.43	0.97
SEQ2 ChatGPT increases confidence in my ability to conduct research/to search for materials	3.52	0.91
SEQ3 ChatGPT is easy to use and more engaging for me	3.79	0.87

Table 10 shows that respondents hold generally positive perceptions regarding student engagement (SE), with mean ratings ranging from 3.43 to 3.79 and low standard deviations reflecting consistent feedback. Specifically, SEQ3 recorded the highest mean ($M=3.79$, $SD=0.87$), which indicates that students significantly perceive ChatGPT as an easy-to-use and engaging tool. Furthermore, findings for SEQ2 ($M=3.52$, $SD=0.91$) suggest moderate agreement that the platform increases learner confidence in conducting research and material searches. Respondents also acknowledged the interactive and human-like qualities of the technology, as evidenced by SEQ1 ($M=3.43$, $SD=0.97$). In summary, these results demonstrate that learners have favorably and consistently embraced the integration of ChatGPT as a practical and accessible learning aid.

Findings for Autonomy in Online Learning

This section presents data to answer research question 4: How do learners perceive autonomy in online learning? In the context of this study, this is measured by (i) self-efficacy, (ii) control of learning beliefs, (iii) intrinsic goal orientation, (ii) extrinsic goal orientation, and (iii) task value.

Table 11 Mean (M) and Standard Deviation (SD) for Self- Efficacy (ESE)

Statement	M	SD
ESEQ 1 I believe I'll receive excellent grades in my classes.	3.52	0.80
ESEQ2 I'm certain I can understand the most difficult material presented in the readings.	3.34	0.83
ESEQ3 I'm confident I can learn the basic concepts that are being taught.	3.98	0.75
ESEQ4 I'm confident I can understand the most complex material presented by the instructor online.	3.34	0.86
ESEQ5 I'm confident I can do an excellent job on assessments online	3.67	0.78
ESEQ6 I'm certain I can master the skills being taught online.	3.49	0.80
ESEQ7 Although online classes can be challenging, I think I can do well.	3.63	0.84

Table 11 shows descriptive statistics for the self-efficacy of learners in online learning (ESE). Most of the learners feel quite comfortable about their learning abilities. This can be seen from their average scores being comfortably above the middle point of a normal 5-point Likert scale. The area that the learners were most confident about was their basic learning ability, i.e., understanding the basic concepts that are being taught: ESEQ3 M=3.98, SD=0.75. Next in the order of confidence were their expectation to perform well in online assessments (ESEQ5: M=3.67, SD=0.78) and their belief that they can overcome the challenges of online learning to succeed in the course (ESEQ7: M=3.63, SD=0.84). It is also true that learners have slightly lowered their level of certainty (though still not low) for advanced academic requirements. The lowest mean scores were in their confidence to grasp the most difficult reading materials (ESEQ2: M=3.34, SD=0.83) and their confidence in understanding the most complicated material presented by the instructor in the online class (ESEQ4: M=3.34, SD=0.86). One interesting and quite important aspect which can be drawn out of the results is that the scores indicating confidence in understanding the most complex material presented by the online instructor (ESEQ4) have the highest variability, i.e., there is somewhat the greatest disagreement among learners about their ability to grasp complex online instruction. It is a natural occurrence that students, who may initially possess high confidence in their ability to master fundamental principles and navigate digital learning spaces, experience a decline in self-efficacy when confronted with instructional content characterised by significant density and complexity.

Table 12 Mean (M) and Standard Deviation (SD) for Control Of Learning Beliefs (ECB)

Statement	M	SD
ECBQ1 If I study in appropriate ways, then I'll be able to learn the material.	3.98	0.78
ECBQ2 It's my own fault if I don't learn the material taught.	3.95	0.89
ECBQ3 If I try hard enough, then I'll understand the material presented.	4.14	0.71
ECBQ4 If I don't understand the material presented, it's because I didn't try hard enough.	3.79	0.89

According to the data in Table 12, the summary statistics of Control of Learning Beliefs (ECB) indicate a very internal orientation of control among the students, as all average scores were positioned well above the neutral point. The students agreed most highly that there is a direct link between effort and understanding. They were very sure that if they put in enough effort, they would grasp the content presented (ECBQ3: M=4.14, SD=0.71). This is also tied to a realisation of wise efforts, as the learners strongly agreed that studying in the right ways will make them learn the material proficiently (ECBQ1: M=3.98, SD=0.78). Looking at the ramifications of not learning well, the learners showed a very high mean when indicating their personal responsibility, admitting that it is their own fault if they fail to understand the taught material (ECBQ2: M=3.95, SD=0.89). Then again, the smallest relative agreement – though still very high – was in the idea that not understanding is solely because they did not try hard enough (ECBQ4: M=3.79, SD=0.89). Notably, ECBQ2 and ECBQ4 had the highest standard deviation together, (SD=0.89), suggesting that although the learners mostly hold themselves responsible for learning, there are more diverse views among them when it comes to blaming oneself or judging the lack of effort. In sum, these results reveal that learners enrolled online have a strong sense of academic agency, as they are very much linking their success or failure in education to their own actions and methods instead of to outside factors.

Table 13 Mean (M) and Standard Deviation (SD) for Intrinsic Goal Orientation (VI)

Statement	M	SD
VIQ1I prefer online material that really challenges me, so I can learn new things.	3.28	0.93
VIQ2I prefer online material that arouses my curiosity, even if it's difficult to learn.	3.53	0.87

VIQ3 The most satisfying thing for me is trying to understand the online content as thoroughly as possible.	3.69	0.84
VIQ4I choose assignments that I can learn from even if they don't guarantee a good grade.	3.48	0.89

The statistics shown in Table 13 outline the level of Intrinsic Goal Orientation (VI). Mainly, it shows that students internally at moderated-to-high levels are motivated online, all the mean scores being above the neutral midpoint. For the internal desire for mastery, the students showed a strong agreement, and the highest satisfaction can be obtained from understanding the online content as much as possible (VEQ3: M=3.69, SD=0.84). This internal motivation is also reflected by their enjoyment of online materials that make them want to know more, even if the topics are tough to figure out (VEQ2: M=3.53, SD=0.87) and a bit less by their readiness to do assignments that provide learning opportunities rather than those guaranteeing a good grade (VEQ4: M=3.48, SD=0.89). However, compared to the other items, students gave the least agreement for the purchasing of difficult material for learning new things only (VEQ1: M=3.28, SD=0.93). Interestingly, the highest SD, which was 0.93 also corresponded to VEQ1. So, it's clear through this one that student views are the most scattered on their active preference of overly challenging course content. In short, it may be that online learners are motivated mainly through thorough understanding and academic curiosity but that their intrinsic motivation is somewhat less in their voluntary acceptance of extreme academic challenges.

Table 14 Mean (M) and Standard Deviation (SD) for Extrinsic Goal Orientation(VE)

Statement	M	SD
VEQ1 Getting a good grade is the most satisfying thing for me.	4.59	0.71
VEQ2 I want to do well in my classes so that I can get awards and recognition.	4.11	0.94
VEQ3I want to get better grades than most of the other students in my classes.	4.05	0.97
VEQ4I want to do well in my classes because it's important to show my ability to my family, friends, employer, or others.	4.32	0.77

Table 14 displays the mean (M) and standard deviation (SD) values for the Extrinsic Goal Orientation (VE) construct. The results demonstrate that participants predominantly displayed a significant degree of extrinsic motivation, evidenced by mean scores between 4.05 and 4.59. The item with the highest rating was VEQ1 (M = 4.59, SD = 0.71), indicating that achieving good grades is the primary external source of satisfaction for the respondents. Subsequently, VEQ4 (M = 4.32, SD = 0.77) revealed that students are motivated to excel in order to showcase their competencies to important figures, including family, friends, and employers. Concurrently, VEQ2 (M = 4.11, SD = 0.94) and VEQ3 (M = 4.05, SD = 0.97) garnered relatively lower mean scores; however, they nonetheless indicate a favourable consensus for the aspiration for acknowledgement, incentives, and academic rivalry. The standard deviation values, spanning from 0.71 to 0.97, indicate a significant degree of variability in respondents' perceptions, with increased diversity of opinions seen for reasons connected to recognition and competition. The findings indicate that students are predominantly influenced by external variables, especially academic success and social recognition, which significantly shape their learning objectives and performance.

Table 15 Mean (M) and Standard Deviation (SD) for Task Value (VT)

Statement	M	SD
VTQ1 I think I will be able to use what I learn in this course in other courses.	4.08	0.70
VTQ2 It is important for me to learn the course material in this class.	4.22	0.67

VTQ3 I am very interested in the content area of this course.	4.04	0.70
VTQ4 I think the course material in this class is useful for me to learn.	4.12	0.73
VTQ5 I like the subject matter of this course.	4.06	0.74
VTQ6 Understanding the subject matter of this course is very important to me.	4.24	0.71

Table 15 reveals that respondents hold generally positive perceptions regarding task value (VT), with mean ratings ranging from 4.04 to 4.24 and low standard deviations reflecting consistent feedback. Specifically, VTQ6 recorded the highest mean ($M=4.24$, $SD=0.71$), which indicates that students significantly perceive the comprehension of course material as personally important. Furthermore, findings for VTQ4 ($M=4.12$, $SD=0.73$) and VTQ1 ($M=4.08$, $SD=0.70$) suggest strong agreement that the material is useful for learning and applicable to other courses. Respondents also acknowledged their enjoyment of the subject matter, as evidenced by VTQ5 ($M=4.06$, $SD=0.74$). In summary, these results demonstrate that learners have favorably and consistently embraced the perceived utility and importance of the course content. Findings for VTQ3 ($M=4.04$, $SD=0.70$) indicate that respondents maintain a sustained interest in the subject matter of the course. Furthermore, findings for VTQ2 ($M=4.22$, $SD=0.67$) suggest strong agreement that the comprehension of course material remains personally crucial. In summary, these results demonstrate that learners have favorably and consistently embraced the perceived importance, utility, and relevance of the course content.

Findings for Relatedness in Online learning

This section presents data to answer research question 5: How do learners perceive relatedness as motivation in online learning? In the context of this study, this is measured by (i) social engagement and (ii) instructor support.

Table 16 Mean (M) and Standard Deviation (SD) for Social Engagement (SSE)

Statement	M	SD
SSEQ1 feel "disconnected" from my teacher and fellow students in classes.	2.57	1.13
SSEQ2 I pay attention in classes.	3.96	0.77
SSEQ3 I enjoy class discussions.	4.00	0.79
SSEQ4 I feel like I can freely communicate with other students in classes.	3.87	0.89
SSEQ5 I have strong relationships with fellow students in this course.	3.78	0.94

Table 16 reveals that respondents hold generally positive perceptions regarding social engagement (SSE), with mean ratings ranging from 2.57 to 4.00 and low standard deviations reflecting consistent feedback. Specifically, SSEQ3 recorded the highest mean ($M=4.00$, $SD=0.79$), which indicates that students significantly perceive class discussions as enjoyable. Furthermore, findings for SSEQ2 ($M=3.96$, $SD=0.77$) and SSEQ4 ($M=3.87$, $SD=0.89$) suggest strong agreement that learners maintain focus during sessions and feel free to communicate with their peers. Furthermore, findings for SSEQ5 ($M=3.78$, $SD=0.94$) suggest moderate agreement that learners maintain strong relationships with their fellow students in this course. Conversely, SSEQ1 recorded a lower mean ($M=2.57$, $SD=1.13$), which indicates that respondents generally disagree with feeling disconnected from their teachers and peers, thereby affirming a predominantly cohesive learning environment. In summary, these results demonstrate that learners have favourably and consistently embraced high levels of social engagement, particularly through active participation, open communication, and robust peer connections.

Table 17 Mean (M) and Standard Deviation (SD) for Instructor Support (SIS)

Statement	M	SD
SISQ1I feel like I can freely communicate with the instructor in this class.	3.86	0.78
SISQ2 The instructor responds to questions, clearly, completely, and in a timely manner.	4.26	0.70
SISQ3 The instructor's expectations for me in this class are clear.	4.10	0.72
SISQ4 The instructor provides the guidance I need to be successful in this class.	4.23	0.68
SISQ5 The instructor presents the material in a way that makes it relevant to me.	4.28	0.67
SISQ6 In this course, I have the freedom to guide my own learning	4.00	0.75
SISQ7 The instructor provides regular feedback that helps me gauge my performance in this class.	4.14	0.70

Table 17 displays the mean (M) and standard deviation (SD) values for the Instructor Support (SIS) construct. The results demonstrate that participants recognised a substantial degree of instructor support, with mean values varying from 3.86 to 4.28. The item with the highest rating was SISQ5 (M = 4.28, SD = 0.67), indicating that students strongly concurred that the instructor delivers course materials in a manner pertinent to them. SISQ2 (M = 4.26, SD = 0.70) and SISQ4 (M = 4.23, SD = 0.68) closely followed, reflecting favourable evaluations of the instructor's responsiveness and guidance. Conversely, SISQ1 exhibited the lowest mean score (M = 3.86, SD = 0.78), indicating that students perceived a marginally reduced confidence in their ability to communicate openly with the instructor relative to other support dimensions. The comparatively low standard deviation values for all items (0.67–0.78) indicate a uniform level of consensus among respondents. The results indicate that instructors are predominantly perceived as supportive, responsive, and proficient in promoting student learning and success.

Exploratory Statistics

According to He (2024), correlation is a statistical technique that shows how strongly two variables are related to each other or the degree of association between the two. It's a common tool for describing simple relationships without making a statement about cause and effect. This section presents data to answer the research question on correlation.

According to He (2024), coefficient is significant at the .05 level and positive correlation is measured on a 0.1 to 1.0 scale. Weak positive correlation would be in the range of 0.1 to 0.3, moderate positive correlation from 0.3 to 0.5, and strong positive correlation from 0.5 to 1.0.

To determine if there is a significant association in the mean scores between competence and autonomy and relatedness data is analysed using SPSS for correlations. Results are presented separately in Table 18 below.

Table 18 Correlation between Competence and Autonomy and Relatedness

		Autonomy	Relatedness
Competence	Pearson (Correlation)	.550**	.551**
	Sig (2-tailed)	<.000	<.000
	N	189	189

**Correlation is significant at the 0.01 level (2-tailed)

Findings for the Relationship between Competence and Autonomy

This section presents data to answer research question 6: Is there a significant relationship between competence and autonomy for online motivation? H_{03} : There is no significant relationship between competence and autonomy for online motivation. Table 18 shows there is a high significant relationship between competence and autonomy ($r=.550^{**}$) and ($p<.000$). Null hypothesis is rejected for H_{03} .

Findings for relationship between competence and relatedness

This section presents data to answer research question 7: Is there a significant relationship between competence and relatedness for online motivation? H_{04} : There is no significant relationship between competence and relatedness for online motivation. Also, based on Table 18, there is a high significant relationship between competence and relatedness ($r=.551^{**}$) and ($p<.000$). Null hypothesis is rejected for H_{04} .

Table 18 shows there is an association between competence and autonomy and relatedness. Correlation analysis shows that there is a high significant association between social support and expectancy components ($r=.714^{**}$) and ($p=.000$). This means that there is also a strong positive relationship between social support and expectancy components.

CONCLUSION

Summary of Findings and Discussions

This study investigated online learning motivation and ChatGPT through the lens of Self-Determination Theory (SDT), emphasising the elements of competence, autonomy, and relatedness. The results indicated no substantial differences in competence, autonomy, and relatedness between academic clusters and gender, suggesting that students generally held comparable perceptions irrespective of their academic background or gender. Regarding competence, respondents indicated the strongest consensus on the necessity to validate ChatGPT's output for more independent research (CTQ4, $M = 4.06$) and the weakest consensus on expecting substantial writing guidance from ChatGPT (AAQ3, $M = 3.55$). The highest score for autonomy was noted in extrinsic goal orientation, particularly the gratification from achieving excellent grades (VEQ1, $M = 4.59$), whereas the lowest score pertained to students' inclination towards highly challenging online materials (VIQ1, $M = 3.28$). Concerning relatedness, students expressed the highest agreement regarding their enjoyment of class discussions (SSEQ3, $M = 4.00$) and their perception of instructors presenting materials in pertinent manners (SISQ5, $M = 4.28$). Conversely, the lowest score pertained to feelings of disconnection from teachers and peers (SSEQ1, $M = 2.57$), indicating that respondents typically did not experience social isolation within their online learning environment. Furthermore, correlation analysis demonstrated significant positive associations between competence and autonomy ($r = .550$, $p < .001$) and between competence and relatedness ($r = .551$, $p < .001$), suggesting that enhancements in competence correlate with increased autonomy and relatedness in online learning.

The results regarding competency align with prior research that emphasises the beneficial instructional function of ChatGPT. The respondents asserted that ChatGPT promotes critical assessment and autonomous validation of information, corroborating the findings of Stratton-Maher and Kelly (2026), who noted that students cultivated critical thinking, digital literacy, and enhanced learning through their interaction with ChatGPT. Likewise, the favourable views on ChatGPT's impact on academic success and student involvement corroborate the conclusions of Mo et al. (2026), whose meta-analysis revealed that ChatGPT markedly enhances learning outcomes in higher education contexts. Moreover, the substantial correlation between competence and autonomy corroborates the findings of Mehrvarz et al. (2025), who discovered that favourable perceptions of ChatGPT improved online learning engagement and academic achievement. The results align with Mahande et al. (2026), who indicated that ChatGPT enhances self-efficacy and learning performance when effectively incorporated into educational settings. Consequently, the current study substantiates the idea that ChatGPT can function as a proficient learning ally, augmenting students' competence and confidence in online educational settings.

The results regarding autonomy and relatedness corroborate the tenets of Self-Determination Theory and align significantly with existing literature. Students exhibited significant extrinsic motivation driven by their aspiration for excellent marks and acknowledgement, while simultaneously regarding the course content as exceptionally meaningful and relevant. These findings corroborate the research of Annamalai et al. (2025), which showed that autonomy and relatedness are major predictors of students' motivation to persist in utilising ChatGPT. The favourable views on teacher assistance and social interaction align with Shah et al. (2024), who indicated that the use of ChatGPT positively affects learners' feelings of autonomy, competence, and relatedness. Furthermore, the notable correlation between competence and relatedness identified in this study aligns with the observations of Shank et al. (2024), who noted that helpful online learning settings bolster learners' perception of competence and connectivity. Despite exhibiting modest intrinsic drive, students' comparatively diminished inclination towards very hard learning materials indicates a continued dependence on external rewards and organised help to maintain motivation. The findings empirically substantiate Self-Determination Theory (SDT) by illustrating that competence, autonomy, and relatedness are interrelated factors that enhance students' motivation in online learning and that ChatGPT can significantly support these psychological needs when utilised responsibly and intentionally.

Implications and Suggestions for Future Research

Theoretical and Conceptual Implications

This study's findings have significant theoretical and conceptual implications for Self-Determination Theory (SDT) in the realm of online learning and the use of ChatGPT. Section 2.1 outlines that Self-Determination Theory (SDT) asserts that learners' motivation is affected by the satisfaction of three essential psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). The current data substantiate this theoretical assertion by revealing strong positive correlations between competence and autonomy ($r = .550$, $p < .001$) and between competence and relatedness ($r = .551$, $p < .001$). Students expressed favourable views of ChatGPT's impact on critical thinking, academic performance, and engagement, indicating that AI technologies may enhance learners' sense of competence. Simultaneously, robust perceptions of task value, beliefs in learning control, social engagement, and instructor support suggest that learners attain enhanced autonomy and relatedness when immersed in meaningful learning contexts. These findings thus corroborate the fundamental tenets of Self-Determination Theory, indicating that motivation is enhanced when learners perceive themselves as competent, autonomous, and socially integrated.

The findings substantiate the theory presented in Section 2.3, which delineates competence, autonomy, and relatedness as interrelated facets of online learning motivation. The conceptual model posited that competence may be cultivated through ChatGPT-related factors including critical thinking skills, academic performance, ChatGPT utilisation, and student engagement, while autonomy is indicated by self-efficacy, learning beliefs, goal orientations, and task value, and relatedness is denoted by social engagement and instructor support. The results indicated that participants predominantly expressed favourable opinions in all three domains, especially regarding extrinsic goal orientation, task value, teacher support, and critical thinking skills. This indicates that ChatGPT can serve as a motivational support tool that not only improves competence but also indirectly fosters autonomy and relatedness. Thus, the study broadens the applicability of Self-Determination Theory by illustrating that generative AI tools like ChatGPT can act as a significant contextual element that facilitates the fulfilment of learners' psychological requirements and enhances enduring motivation in online learning settings.

Pedagogical Implications

The results of this study indicate numerous significant pedagogical implications for online education. Given that students have expressed favourable views regarding ChatGPT's role in improving critical thinking, academic performance, engagement, and motivation, instructors ought to contemplate incorporating ChatGPT as an auxiliary learning resource to bolster students' competence, autonomy, and connectedness. Learning activities can be structured to promote students' use of ChatGPT for idea production, information validation, reflective learning, and autonomous inquiry, rather than solely for answer acquisition. The substantial levels of instructor

support and social engagement identified in the study demonstrate the ongoing importance of meaningful teacher presence, prompt feedback, and collaborative learning possibilities in online settings. Consequently, educators ought to implement a balanced pedagogical strategy that integrates the advantages of AI-driven tools with human oversight, critical assessment tasks, and interactive learning opportunities to promote enduring motivation, self-directed learning, and responsible AI use among students.

Suggestions for Future Research

Subsequent studies should examine the influence of ChatGPT on online learning motivation by utilising a broader range of samples from other institutions, fields, educational levels, and cultural contexts to improve the generalisability of the results. This study employed a quantitative survey methodology; thus, future research could utilise mixed-methods or qualitative approaches to obtain a more profound understanding of learners' experiences of competence, autonomy, and relatedness when utilising AI-powered tools. Researchers might further investigate supplementary variables such as intrinsic motivation, self-regulated learning, digital literacy, academic integrity, and AI reliance to enhance the existing conceptual framework. Longitudinal research would be especially beneficial in assessing if the motivating advantages of ChatGPT can be maintained over time or if excessive dependence on AI can adversely impact learners' autonomy and critical thinking abilities. Moreover, subsequent studies could analyse various generative AI platforms to ascertain how particular AI attributes influence students' motivation, engagement, and academic achievement in online learning contexts. Future researchers can utilise a longitudinal or experimental research design to more effectively evaluate the causal influence of ChatGPT on learning motivation and academic performance over time. Future study should use objective learning markers, including grades, assessment results, or critical thinking metrics, in conjunction with self-reported perceptions and broaden the sample to include various universities and nations would enhance the generalisability of the results.

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