

University Students' Interactions with ChatGPT: An Investigation in terms of CoI, Motivation, and Learning Strategies

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Article Info

Article History

Received:
5 August 2025

Revised:
28 November 2025

Accepted:
28 December 2025

Published:
20 February 2026

Abstract

The research aims to investigate the effects of ChatGPT in the context of the Community of Inquiry framework, Motivation, and Students' learning strategies. In the study, there are two instructional methods. One group was included in open inquiry + lecturing, and the other was included in ChatGPT as a teaching assistant method. Both groups participated in a four-week instruction process consisting of two hours each. According to CoI index measurements, there is a significant difference in favor of males, but there is no differentiation in Motivation and Learning strategies measurements according to gender. There is a difference in favor of ChatGPT as a teaching assistant method regarding teaching presence, cognitive presence, and CoI index total score. There is a difference in favor of the ChatGPT as a teaching assistant method in terms of motivation. However, there is no differentiation in terms of learning strategies used by students.

Keywords

Chatbot
Community of Inquiry
Motivation
Students' learning
strategies

Citation: Gunbatar, M. S. & Gokcearslan, S. (2026). University students' interactions with ChatGPT: An investigation in terms of CoI, motivation, and learning strategies. *International Journal of Technology in Education (IJTE)*, 9(2), 343-360. <https://doi.org/10.46328/ijte.5419>



ISSN: 2689-2758 / © International Journal of Technology in Education (IJTE).
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Introduction

We can think of Artificial Intelligence (AI) technology as imitating human mental processes with computer software. Humans use their cognitive processes to learn new things, make decisions, and solve problems. Similarly, artificial intelligence updates itself, makes decisions, and can produce appropriate solutions to problems. Today, there are AI applications that imitate the human voice, process photographs, edit video recordings, produce text, correct spelling mistakes, etc., and their working logic is to give the commands that people previously gave to computers to computers (Günbatar, 2024). Chatbots are AI applications that create texts as if they were human. chatGPT and Gemini are the most typical examples of this as the pioneers of chatbots (Bewersdorff et al., 2025). In particular, chatGPT, which became freely available in November 2022, impressed people with its response performance to prompts and became very popular (King & chatGPT, 2023). However, AI applications have been around for a long time. The Turing test, which is considered one of the pioneering studies on this subject and applied in 1950, tested whether computers can behave like humans. If the person who asks questions without knowing whether the other person is a computer or a human thinks that the computer is human due to the answers they receive, the computer passes this test (Turing, 2009). AI, which produced outputs from step-by-step algorithms in the early days, operates much more complex processes today by optimizing itself through machine learning and can produce human-specific products. Today, as a result of their interaction with chatGPT, students can easily access the information they need in a short time.

Conceptual Framework

Community Of Inquiry (CoI) Model

It is a frequently used model for defining and evaluating the effectiveness of learning situations in online and blended learning environments (Garrison, Cleveland-Innes & Fung, 2010; Kovanović et al., 2019). It has three components: *cognitive presence*, *social presence*, and *teaching presence*. It assumes that learning occurs through the community formed by interacting with these three core components (cognitive presence, social presence, and teaching presence) (Garrison, Anderson & Archer, 1999). CoI provides a robust conceptual framework that can be used to evaluate the effectiveness of online learning with chatGPT. However, there are few empirical studies on AI-human interactions considering CoI (Wang et al., 2023). The conceptual framework of the model is visualized in Figure 1.

1. *Cognitive presence*. It is defined as exploring, constructing, analyzing, and verifying understanding through collaboration and reflection within CoI. It is related to the learner's construction of meanings through ongoing communication as part of CoI (Garrison, Anderson & Archer, 1999). The most fundamental element for the success variable within the construct is cognitive presence. It has a vital meaning for the critical thinking process and critical thinking skills, which are frequently expressed and emphasized in higher education. Critical thinking includes creativity, problem-solving, intuition, and comprehension. It is defined by the practical inquiry cycle (Garrison, 2007). In the practical inquiry cycle, participants understand the problem or situation by following the steps of investigation, integration, and application in a planned way (Garrison, Cleveland-Innes & Fung, 2010).

2. *Social presence* is the ability to plan oneself and establish personal and logical relationships (Garrison, 2007). It has three categories: *emotional expression*, *Open communication*, and *Group cohesion* (Garrison, Anderson & Archer, 1999). Social presence reflects the supporting conditions within these three categories to construct meaning.

3. *Teaching presence*. It is defined as the instructor's responsibility (Stenbom, 2018). An analogy can be made for this component, such as conducting an orchestra in an online environment. It has three independent indicators: *Instructional management*, *Building understanding*, and *Direct instruction* (Garrison, 2007; Garrison, Anderson & Archer, 1999).

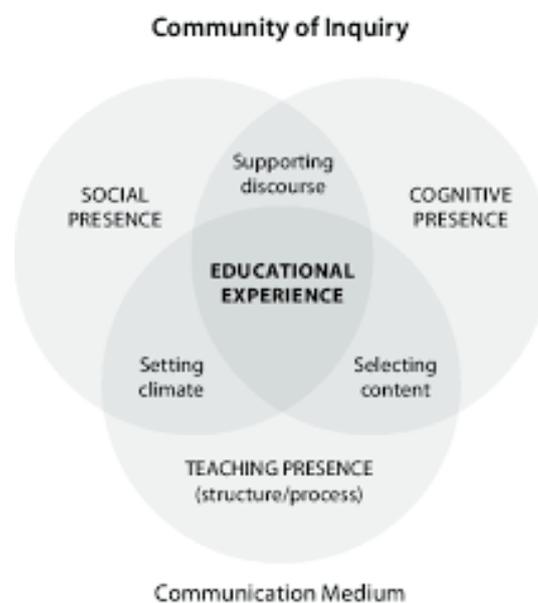


Figure 1. Elements of an Educational Experience (Garrison, Anderson & Archer, 1999).

Instruction Method on Motivation

It is known that effective teaching methods and learning opportunities can increase students' motivation to learn with the potential to provide an engaging learning experience (Lestari, 2023). ChatGPT's strengths include enhanced language comprehension, instant feedback, an extensive knowledge repository, and individualized tutorial support, which make it a valuable tool for inquiry-based learning. Engaging students in a reflective interaction, encouraging them to analyze and discuss problems, develops higher-order thinking skills and generates ideas (Li et al., 2025). Integrating ChatGPT into the learning process can address motivational strategies by providing personalized learning experiences that meet individual student needs, thereby increasing student engagement and motivation (Chaves, 2022). In the context of this research, it is in line with the CoI framework that establishing a supportive learning community can lead to increased motivation by enhancing cognitive and social presence (Zhang, 2023). ChatGPT is an effective platform for reflective support in inquiry-based learning environments by leveraging conversation history to encourage deeper reflection on students' learning journeys (Loos et al., 2023; Li et al., 2025). It also provides individualized learning experiences, enabling students to acquire knowledge and develop self-directed learning skills (Esiyok et al., 2024) and sustained motivation, thereby

improving learning outcomes (Li et al., 2025).

ChatGPT can assist learning by providing individualized feedback and suggestions tailored to students' needs and prior knowledge. It can encourage social interaction in a natural learning environment by providing a conversational interface where students can collaborate (Punar Özçelik et al., 2024). This support allows students to understand abstract concepts better while enabling greater engagement in the learning process through social interaction and customized guidance (Kotsis, 2024). The integration of ChatGPT as a teaching assistant in physics education has provided the potential to increase students' motivation through personalized feedback and adaptive dialogue systems targeting individual learning gaps (Kotsis, 2024). In the context of language learning, it is emphasized that ChatGPT, as a learning assistant, increases motivation and supports independent study opportunities through individualized feedback and customized guidance (Slamet, 2024). Research has highlighted the potential of ChatGPT to increase motivation through students' identification of learning goals and interactive engagement (Rudolph et al., 2023; Zhai & Center, 2023). However, in particular, students who are highly motivated for academic achievement find ChatGPT more useful and intend to continue using this tool in their learning process (Chien-Liang et al., 2024).

Students' Learning Strategies

The literature has different classifications of learning strategies (Neroni et al., 2019). One of these classifications, which is widely used, was put forward by McKeachie et al. (1986). According to this classification, learning strategies can be examined under three categories: *cognitive strategies*, *metacognitive strategies*, and *resource management strategies*. The explanations of these strategies used by students can be summarized as follows according to Pintrich (1991):

Cognitive and Metacognitive strategies include *Basic rehearsal strategies*, *Elaboration*, *Organization*, *Critical thinking* and *Meta-cognition*.

✓ *Basic rehearsal strategies* involve reading or naming items to be learned from a list. These strategies are used for simple tasks and to activate information in working memory rather than to acquire new information in long-term memory. They are hypothesized to influence attention and encoding processes.

✓ *Elaboration strategies* help students store information in long-term memory by making internal connections between items to be learned. These strategies include paraphrasing, summarizing, creating analogies, and productive note-taking. They help the learner integrate and connect new information with prior knowledge.

✓ *Organization strategies* help the learner select appropriate information and connect the information to be learned. Examples of organizational strategies include clustering, outlining, and selecting the main idea in reading passages.

✓ *Critical thinking* refers to the degree to which students apply their prior knowledge to new situations to solve problems, make decisions, or make critical evaluations against standards of excellence.

✓ *Meta-cognition* refers to the awareness, knowledge, and control of cognition. Here, we have focused on the control and self-regulation aspects of cognition. Three general processes comprise meta-cognitive self-

regulation activities: planning, monitoring, and organizing. Planning activities, such as goal setting and task analysis, help to activate or prepare relevant aspects of prior knowledge that facilitate organizing and understanding the material. Monitoring activities involve watching one's attention while reading and self-testing and questioning: these help the learner to understand the material and integrate it with prior knowledge. Regulation refers to the fine-tuning and continuous adjustment of one's cognitive activities. Regulation activities are assumed to improve performance by helping learners control and correct their behavior as they proceed with a task.

Within Resource Management Strategies, the dimensions of *Time and Study Environment*, *Self-regulation*, *Peer Learning*, and *Help-seeking* are considered.

✓ *Time and Study Environment*: Besides cognitive self-regulation, students should be able to manage and organize their time and study environment. Time management involves planning and managing one's study time. This includes setting aside time to study, using that time effectively, and setting realistic goals.

✓ *Self-regulation* also includes students' ability to control their effort and attention in the face of distractions and uninteresting tasks. Effort management is self-management and reflects one's commitment to completing study goals despite difficulties or distractions. Effort management is important for academic success because it expresses goal commitment and regulates the sustained use of learning strategies.

✓ *Peer Learning*: Collaborating with peers has been found to positively affect achievement. Dialogue with peers can help students clarify course material and gain insights they may not have achieved independently.

✓ *Help-seeking*: Another aspect of the environment that the student must learn to manage is the support of others. This includes both peers and instructors. Good students know when they do not know something and can identify someone to help them. Much research shows that peer help, peer guidance, and individual teacher support facilitate student achievement.

Problem Statement

The rapid development of GenAI technologies has signaled a transformation in education, and AI-enabled tools such as ChatGPT have become leading facilitators of learning in the educational technology arena. ChatGPT, a large language model, has the potential to enhance learning experiences by providing personalized feedback, encouraging reflective thinking, and supporting inquiry-based learning approaches (Li et al., 2025; Slamet, 2024). Researchers are interested in the extent to which ChatGPT can align with established educational frameworks such as the Community of Inquiry (CoI) model (Garrison et al., 1999; Zhang, 2023), which emphasizes cognitive, social, and teaching presences as essential elements of meaningful learning. Although research has highlighted the capacity of ChatGPT to motivate students through personalized learning experiences and social engagement (Chaves, 2022; Punar Özçelik & Yangın Ekşi, 2024), the influence of learning strategies and motivation within a structured framework needs to be supported by further research. While studies suggest that students with high academic motivation are more likely to benefit from the capabilities of ChatGPT (Chien-Liang et al., 2024), revealing which variables affect the interaction with ChatGPT will contribute to the literature. This study aims to address this research gap by investigating the effects of ChatGPT in the context of motivation, learning strategies, and the CoI framework and by contributing to teachers' integration of AI in education.

Method

Research Model

This study used quantitative data collection tools and an experimental research method. In experimental research, something is systematically observed (Fraenkel & Wallen, 2009). The predictive variable in the research is an instructional method (i.e., open inquiry + lecturing & ChatGPT as a teaching assistant), while predicted variables are CoI, Motivation, and Students' Learning strategies.

Participants

Two hundred thirty-three undergraduate students from two different state universities in Türkiye participated in the study. Of these, 142 were female, and 91 were male. 143 of the participants were studying at the Faculty of Education, and 90 of them were studying at the Faculty of Sport Sciences. The open inquiry + lecturing method involved 86 students, and ChatGPT as a teaching assistant method involved 147 students. Descriptive data about the participants are given in Table 1.

Table 1. Participants' Demographic Characteristics

Variables	Categories	N	%
Method	Open inquiry + lecturing	86	36.9
	ChatGPT as a teaching assistant	147	63.1
Faculty	Education	143	61.4
	Sport Sciences	90	38.6
Gender	Female	142	60.9
	Male	91	39.1
Total		233	100.0

Data Collection

All data were collected online within the scope of the research. Data were collected in the fifth week of the instruction activities.

The Community of Inquiry Index (CoI index) was used to obtain information about students' interactions with chatGPT and learning content. The Cronbach's Alpha internal consistency coefficient of the sub-dimensions of the scale is 0.92 for teaching presence, 0.88 for Social presence, and 0.75 for cognitive presence. The Cronbach Alpha internal consistency coefficient for the whole scale is 0.97. According to the results of Confirmatory Factor Analysis; $\chi^2=996.25$ (sd=524; $p<0.001$); $\chi^2/sd =1.90$; SRMR=0.072; GFI=0.70; AGFI=0.66; RMSEA=0.081; CFI=0.81; and NNFI=0.80 (Öztürk, 2012).

The 31-item Motivation subscale of the Motivated Strategies for Learning Questionnaire (MSLQ) was used to measure the student's motivation levels at the end of the instruction process. The subscales of the motivation scale

are *Control Belief*, *Intrinsic Goal Orientation*, *Extrinsic Goal Orientation*, *Self-efficacy*, *Task Value*, and *Test Anxiety*. According to the results of the Confirmatory Factor Analysis; $\chi^2=1866.55$; $N=852$; $sd=417$ $p=0.0005$; $\chi^2/sd=4.47$; $RMSEA=0.06$; $GFI=0.88$; $AGFI=0.85$; $CFI=0.82$; $NNFI=0.80$; $RMR=0.18$ and $SRMR=0.06$. Based on these data, the structural model of the motivation scale, which consists of six factors, is compatible. The corrected item-total correlations of the scale ranged between 0.67 and 0.20. For each factor and item, the difference in mean values between the upper 27% and lower 27% groups was significant ($p<0.01$). Cronbach alpha values of the sub-factors of the scale ranged between 0.86 and 0.52 (Büyüköztürk et al., 2004).

The 50-item Learning Strategies scale of the MSLQ inventory was used to determine the learning strategies used by the students at the point of information processing during the learning process. The scale comprises nine sub-dimensions: *Rehearsal*, *Elaboration*, *Organization*, *Critical Thinking*, *Metacognitive self-regulation*, *Time and Study Environment*, *Effort Regulation*, *Peer Learning*, and *Help seeking*. According to the confirmatory factor analysis conducted to evaluate the fit of the model, $\chi^2=4.73$; $N=852$; $sd=417$ $p=0.0005$; $RMSEA=0.066$; $GFI=0.80$; $AGFI=0.77$; $NNFI=0.97$; $RMR=0.22$ and $SRMR=0.06$. The t-test results between the item mean scores of the upper 27% and lower 27% groups showed that the differences were significant for all items and subscale total scores. The Cronbach alpha values of the scale subscales ranged between 0.75 and 0.41. These findings show that all items and subscales in the scale are discriminative. Confirmatory factor analysis results show that the Learning Strategies Scale has an acceptable level of construct validity (Büyüköztürk et al., 2004).

Instruction Process

The instructional activities were conducted for four weeks in October 2023, two hours per week. They took place in the classroom, and students could interact with the instructors. Students used the chatGPT chatbot as a source of information.

Open Inquiry + Lecturing

This method was used with second-year students of the Faculty of Education in the Instructional Technologies course. In the first hour of the course, students were given the topics to be covered. Students were instructed to create prompts and interact with chatGPT to obtain information. In the second hour of the lesson, the instructor presented the lesson interactively with the students. The aim was to prepare the students cognitively for the lesson and carry out the teaching process interactively.

ChatGPT as a Teaching Assistant

Using ChatGPT as a teaching assistant is an approach that makes the teaching process more interactive and personal. In this method, while the students learn the course content through the question-answer method with ChatGPT, the instructor guides the process by determining the weekly course topics. Students reinforce what they have learned with ChatGPT by studying the course topics determined each week at their own pace.

In this process, students can get instant feedback by asking questions or expressing their difficulties with the lesson, and they can ask for extra explanations or examples when needed. Thus, students' learning processes are supported. On the other hand, the instructor guides the students, ensures that they use the information provided by ChatGPT correctly, and encourages students' active participation in the course by directing in-class discussions or group work when necessary.

Findings

According to the Kolmogorov-Smirnov test, it was determined that all three CoI, Motivation, and Learning Strategies measurements were normally distributed ($p>0.05$). Therefore, parametric statistics were used.

Findings Related to CoI

According to the findings in Table 2, the mean CoI score of those who used the "ChatGPT as a teaching assistant" method ($\bar{X}=3.27$) was higher than the "Open inquiry + lecturing" method ($\bar{X}=3.11$). The mean score of male students ($\bar{X}=3.26$) was higher than that of female students ($\bar{X}=3.18$).

Table 2. Descriptive Statistics of CoI Index Measurements according to Instruction Method and Gender

Method	Female			Male			Total		
	N	\bar{X}	Sd	N	\bar{X}	Sd	N	\bar{X}	Sd
Open inquiry + lecturing	61	3.09	0.46	25	3.14	0.41	86	3.11	0.44
ChatGPT as a teaching assistant	81	3.24	0.56	66	3.31	0.47	147	3.27	0.52
Total	142	3.18	0.52	91	3.26	0.46	233	3.21	0.50

According to Table 3, although no significant difference was found in methods ($p=0.423$), a significant difference was observed in the gender variable ($p=0.031$). However, the effect of the interaction of method and gender was not significant ($p=0.871$).

Table 3. ANOVA Results of CoI Index Measurements according to Instruction Method and Gender

Source of the variance	Some of Squares	df	Mean Square	F	p
Method	0.159	1	0.159	0.645	0.423
Gender	1.164	1	1.164	4.730	0.031*
Method * Gender	0.007	1	0.007	0.027	0.871
Error	56.343	229	0.246		
Total	2458.535	233			

* $p<0.05$

According to Table 4, significant differences were found in teaching ($p=0.04$), social ($p=0.01$), and general CoI scores ($p=0.02$). There is no significant difference in the cognitive presence dimension ($p=0.06$). These differences are in favor of the "ChatGPT as a teaching assistant" method.

Table 4. MANOVA Results of CoI Survey and Sub-dimensions according to Instruction Method

		N	\bar{X}	Sd	df	F	p
Teaching presence	Open inquiry + lecturing	86	3.27	0.47	1	4.19	0.04*
	ChatGPT as a teaching assistant	147	3.42	0.54			
Social presence	Open inquiry + lecturing	86	2.91	0.55	1	6.70	0.01*
	ChatGPT as a teaching assistant	147	3.13	0.63			
Cognitive presence	Open inquiry + lecturing	86	3.07	0.50	1	3.60	0.06
	ChatGPT as a teaching assistant	147	3.22	0.60			
CoI	Open inquiry + lecturing	86	3.11	0.44			
	ChatGPT as a teaching assistant	147	3.27	0.52	1	5.84	0.02*

*p<0.05

Findings Related to Motivation

According to Table 5, the mean motivation of the participants in the "ChatGPT as a teaching assistant" method (\bar{X} =4.89) was higher than that of the participants in the "Open inquiry + lecturing" method (\bar{X} =4.66). Male participants showed higher motivation than female participants in both methods.

Table 5. Descriptive Statistics of Motivation Measurements according to Instruction Method and Gender

Method	Female			Male			Total		
	N	\bar{X}	Sd	N	\bar{X}	Sd	N	\bar{X}	Sd
Open inquiry + lecturing	61	4.61	0.66	24	4.79	0.48	85	4.66	0.62
ChatGPT as a teaching assistant	78	4.85	0.63	62	4.94	0.77	140	4.89	0.69
Total	139	4.75	0.65	86	4.90	0.70	225	4.80	0.67

According to the ANOVA results in Table 6, a significant difference was found between the motivation methods ($p=0.04$). However, no significant difference was found in gender variable and method * gender interaction ($p>0.05$).

Table 6. ANOVA Results of Motivation Measurements according to Instruction Method and Gender

Source of the variance	Some of Squares	df	Mean Square	F	p
Method	1.732	1	1.732	3.897	0.04
Gender	0.835	1	0.835	1.878	0.172
Method * Gender	0.108	1	0.108	0.243	0.622
Error	98.239	221	0.445		
Total	5294.524	225			

According to the findings in Table 7, a significant difference was observed in the sub-dimensions of the "ChatGPT as a teaching assistant" method, extrinsic goal orientation ($p=0.003$), control of learning beliefs ($p=0.002$), and task value component ($p=0.022$). No significant differences were observed in other sub-dimensions.

Table 7. MANOVA Results of Motivation, Sub-dimensions, and Component Measurements according to Instruction Method

Measurement	Instruction method	N	\bar{X}	Sd	df	F	p
Intrinsic Goal Orientation	Open inquiry + lecturing	87	5.06	0.10	1	0.001	0.971
	ChatGPT as a teaching assistant	140	5.06	1.03			
Extrinsic Goal Orientation	Open inquiry + lecturing	87	4.73	1.22	1	9.34	0.003*
	ChatGPT as a teaching assistant	140	5.19	1.03			
Task Value	Open inquiry + lecturing	87	4.93	1.09	1	3.61	0.059
	ChatGPT as a teaching assistant	140	5.21	1.07			
Control of Learning Beliefs	Open inquiry + lecturing	87	4.76	0.89	1	10.22	0.002*
	ChatGPT as a teaching assistant	140	5.16	0.92			
Self Efficacy for learning and Performance	Open inquiry + lecturing	87	4.68	0.98	1	0.76	0.385
	ChatGPT as a teaching assistant	140	4.80	1.08			
Test Anxiety	Open inquiry + lecturing	87	3.77	1.22	1	2.91	0.090
	ChatGPT as a teaching assistant	140	4.06	1.24			
Task Value	Open inquiry + lecturing	87	4.91	0.78	1	5.30	0.022*
	ChatGPT as a teaching assistant	140	5.16	0.82			
Expectancy components	Open inquiry + lecturing	87	4.71	0.80	1	3.42	0.066
	ChatGPT as a teaching assistant	140	4.92	0.88			
Affective components	Open inquiry + lecturing	87	3.77	1.22	1	2.91	0.090
	ChatGPT as a teaching assistant	140	4.06	1.24			
Motivation total	Open inquiry + lecturing	87	4.65	0.62	1	7.16	0.008
	ChatGPT as a teaching assistant	140	4.89	0.69			

Findings Related to Students' Learning Strategies

According to Table 8, the participants who used the "ChatGPT as a teaching assistant" method ($\bar{X}=4.84$) had higher learning strategies mean scores than the participants who used the "Open inquiry + lecturing" method ($\bar{X}=4.65$). Female participants had higher mean scores than male participants in both methods.

Table 8. Descriptive Statistics of Learning Strategies Measurements according to Instruction Method and Gender

Method	Female			Male			Total		
	N	\bar{X}	Sd	N	\bar{X}	Sd	N	\bar{X}	Sd
Open inquiry + lecturing	61	4.70	0.96	24	4.51	0.79	85	4.65	0.91
ChatGPT as a teaching assistant	78	4.89	0.76	62	4.78	0.95	140	4.84	0.85
Total	139	4.81	0.85	86	4.71	0.91	225	4.77	0.88

According to the ANOVA results in Table 9, no significant difference existed between the methods used in learning strategies ($p=0.073$). Gender variable and method * gender interaction was also insignificant ($p>0.05$).

Table 9. ANOVA Results of Learning Strategies Measurements according to Instruction Method and Gender

Source of the variance	Sum of Squares	df	Mean Square	F	p
Method	2.480	1	2.480	3.244	0.073
Gender	1.037	1	1.037	1.357	0.245
Method * Gender	0.065	1	0.065	0.086	0.770
Error	168.918	221	0.764		
Total	5291.095	225			

Table 10 shows significant differences between the methods in the sub-dimensions of help-seeking ($p=0.000$) and resource management component ($p=0.021$).

Table 10. MANOVA Results of Learning Strategies, Sub-dimensions, and Components Measurements according to the Instruction Method

Measurement	Instruction method	N	\bar{X}	Sd	df	F	p																																																																																																																																
Rehearsal	Open inquiry + lecturing	87	4.71	1.34	1	0.097	0.756																																																																																																																																
	ChatGPT as a teaching assistant	140	4.76	1.18				Elaboration	Open inquiry + lecturing	87	4.90	1.05	1	0.284	0.595	ChatGPT as a teaching assistant	140	4.98	1.09	Organization	Open inquiry + lecturing	87	4.74	1.18	1	0.026	0.873	ChatGPT as a teaching assistant	140	4.71	1.19	Critical thinking	Open inquiry + lecturing	87	4.55	1.03	1	1.934	0.166	ChatGPT as a teaching assistant	140	4.75	1.11	Metacognitive self regulation	Open inquiry + lecturing	87	4.66	0.94	1	1.370	0.243	ChatGPT as a teaching assistant	140	4.80	0.83	Time and study environment	Open inquiry + lecturing	87	4.66	0.89	1	0.331	0.565	ChatGPT as a teaching assistant	140	4.73	0.81	Effort regulation	Open inquiry + lecturing	87	4.55	1.02	1	2.423	0.121	ChatGPT as a teaching assistant	140	4.75	0.95	Peer learning	Open inquiry + lecturing	87	3.62	1.37	1	2.376	0.125	ChatGPT as a teaching assistant	140	3.90	1.31	Help seeking	Open inquiry + lecturing	87	4.38	1.19	1	12.834	0.000*	ChatGPT as a teaching assistant	140	4.89	0.96	Cognitive & Metacognitive Strategies component	Open inquiry + lecturing	87	4.71	0.95	1	0.739	0.391	ChatGPT as a teaching assistant	140	4.81	0.87	Resource management component	Open inquiry + lecturing	87	4.41	0.80	1	5.395	0.021*	ChatGPT as a teaching assistant	140	4.64	0.65	Learning strategies total	Open inquiry + lecturing	87	4.65	0.90	1	2.792	0.096
Elaboration	Open inquiry + lecturing	87	4.90	1.05	1	0.284	0.595																																																																																																																																
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The "ChatGPT as a teaching assistant" method showed more positive results than the "Open inquiry + lecturing" method in these two sub-dimensions. No significant differences were observed in other sub-dimensions and total scale.

Discussion

Gender Variable

There is no differentiation in Motivation and Learning strategies measurements according to gender. However, CoI index measurements differ in favor of males regarding the gender variable. This differentiation is independent of the instructional method applied. Because there is no differentiation in terms of the method variable and the interaction of the method variable with gender, to put it differently, regardless of the instructional method, men's CoI index measurements are higher than women's. Regarding AI, different findings can be found in the literature on the gender variable. For example, men have higher AI attitudes than women (Gnambs & Appel, 2019; Yu et al., 2024; Saklaki & Gardikiotis, 2024). Women have higher AI attitudes than men (Sun & Zhou, 2024). There is no significant difference in beliefs about AI on gender (Cabellos et al., 2024), and the attitudes of men and women towards AI are similar (Hajam & Gahir, 2024). There is no difference in AI readiness by gender (Wang et al., 2023). The AI readiness of men is higher than that of women (Alshorman, 2024). A consensus is likely to emerge in the future. However, regarding AI, the gender variable remains a variable to be considered.

CoI

When the CoI index and its sub-dimensions are compared in terms of the applied instructional method, there is a difference in favor of ChatGPT as a teaching assistant method regarding teaching presence, cognitive presence, and CoI index total score. There is no differentiation in terms of cognitive presence. In ChatGPT as a teaching assistant method, students were given documents related to the subject. ChatGPT summarized the information in these documents and refinedly presented it to the students. Student interaction with ChatGPT took place in this framework with clear content boundaries. In the open inquiry + lecturing method, on the other hand, within the scope of the topics given before the lesson, there is a situation in which students generate their prompts and reach differentiated content. This situation brings to mind open and guided inquiry approaches. Although it is more evident in younger age groups, university students also need guidance in their learning and research processes (Günbatar & Güyer, 2017). In guided inquiry, the teacher takes more responsibility than open inquiry (Duban, 2008) and guides students (Lim, 2001). Open inquiry is a completely student-centered inquiry (Duban, 2008). In the ChatGPT as a teaching assistant method, chatGPT takes on the role of a teacher and operates a feedback mechanism based on the source documents. This may have created a more controlled and guided sense of inquiry in students. As a result, it may have contributed to their perception of teaching presence. The group involved in ChatGPT as a teaching assistant method differed in Social presence because they were involved in a more controlled process. Collaborative work can form social presence (Peter & Bidjerano, 2012). Social presence expressed as the ability to progress planned and establish logical relationships in parallel (Garrison, 2007). University students who conduct their studies according to specific rules are more successful in forming and conducting a research community than those who conduct open-ended discussions (Zydney et al., 2012).

Regarding the CoI total score, ChatGPT as a teaching assistant method may have produced different results than the Open inquiry + lecturing method. The two groups do not differ in terms of cognitive presence. Cognitive presence in this study can be related to constructing meanings (Garrison, Anderson & Archer, 1999) during communication with ChatGPT. In both teaching processes, students are active and try to construct knowledge. In the words of Açıkgöz (2006), students carried the responsibility of the learning process, had the opportunity to make decisions and self-regulate, and used their mental abilities (Açıkgöz, 2006). They were involved in the process of Active Learning (Spronken-Smith et al., 2008), which includes the methods of the Structured Approach such as Inquiry-Based Learning and Problem-Based Learning. From this point of view, it is logical to conclude that both groups have similar cognitive presences because they were active in the process.

Motivation

It has been concluded that ChatGPT makes a difference in motivation among effective teaching methods. The students who participated in the "ChatGPT as a teaching assistant" approach were more motivated than those who participated in the "Open inquiry + lecturing" method. According to other literature with similar studies, the use of the ChatGPT learning assistant as motivation has increased (Kotsis, 2024; Slamet, 2024). On the other hand, male students showed higher motivation than female students in both methods. A study on university students shows that male students think more positively about GenAI than female students (Daher & Hussein, 2024). Besides, the research pointed out that both males and females take part in the process almost equally and develop positive emotions similarly in AI-supported foreign language learning (Liu et al., 2024).

Furthermore, gender variable and method interaction together are not significantly different. As one of the motivation's sub-factors, using the "ChatGPT as a teaching assistant" resulted in significant differences in the external regulation, the control of learning beliefs, and the value component. The students had to interact with ChatGPT and express their objectives, find the content, and finally know the key learning points in their journey, which is the first stage of learning. Thus, a self-regulatory cycle leads to students' responsibility for their learning, influencing their learning beliefs and value components. Lai et al. (2023) found that intrinsic motivation is the primary side of the motivational effect that the student brings to their involvement in the learning process. Thus, ChatGPT's role as a teaching assistant was a successful means of motivation. There were no significant differences between internal regulation and other sub-dimensions retained by the students of the two gender groups.

Learning Strategies

The groups have no difference regarding the cognitive and metacognitive strategies subscale of the Learning strategies measures. Cognitive and metacognitive strategies focus on students' mental processes. It includes activating information in memory, perceiving information, encoding information into long-term memory, establishing relationships with previous learning, thinking critically about them, and organizing cognitive processes (Pintrich, 1991). Considering these features, it emphasizes similar situations with cognitive presence. In cognitive presence, research and understanding the content are done by following a planned path (Garrison, Cleveland-Innes & Fung, 2010). Within the scope of this study, the fact that the groups did not differ in terms of

cognitive Presence and cognitive and metacognitive strategies variables reveals that the data obtained in terms of these variables support each other. This situation is considered valuable in terms of the reliability of the results. Regarding the Resource Management subscale measurement, the ChatGPT as a teaching assistant method is significantly higher. There is differentiation according to the Help-seeking dimension of this measurement. Resource Management consists of *Time and Study Environment*, *Self-regulation*, *Peer Learning*, and *Help-seeking* (Pintrich, 1991). It covers the features related to the interaction in the teaching process. CoI measurements, which occur due to the interaction in the teaching process, also emphasize interaction. Considering these features, the differentiation in the CoI index total score and the differentiation observed in the measurement of the Resource management subscale support each other and are important in terms of the reliability of the measurements.

Help-seeking is about getting the support of others in the learning process. It includes support from other students and teachers (Pintrich, 1991). Similarly, the Social presence and Instructional presence dimensions of the CoI index emphasize interaction with peers and the teacher (Garrison, Anderson & Archer, 1999; Stenbom, 2018). Within this study's scope, ChatGPT's differentiation as a teaching assistant method from the open inquiry + lecturing method in terms of Help-seeking, Social presence, and Instructional presence is a result of the variables emphasizing parallel situations supporting each other.

Conclusion, Limitation, and Future Research

The study's findings show that the "ChatGPT as a Teaching Assistant" method scores significantly higher than the "Open Inquiry + Lecturing" method, especially regarding teaching and social presence. The quantitative analyses determined that the "ChatGPT as a Teaching Assistant" method had significant positive effects on sub-dimensions such as extrinsic goal orientation, control of learning beliefs, and value components regarding motivation, Help-seeking, and resource management. However, no significant difference was found between the two methods regarding cognitive presence. This situation reveals that AI-supported learning processes such as ChatGPT strengthen individual knowledge acquisition but may be limited in social interaction and discussion. Especially in cases where teacher guidance and peer interaction are limited, students' critical thinking processes may not develop sufficiently. In this context, to increase student interaction, it may be recommended to use ChatGPT not as an individual learning tool but as a component that supports teacher guidance and group work. In particular, implementing AI-supported collaborative environments and blended instructional models can provide a more balanced learning process by supporting individual learning and social interaction.

Based on the findings and limitations of this study, several suggestions for future research can be put forward. In future studies, the long-term effects of ChatGPT on student motivation, learning strategies, and the Learning community model should be investigated through longitudinal studies. Therefore, future studies should investigate how ChatGPT can be integrated into learning processes that support social interaction and develop models that combine AI-supported group work with teacher guidance. Longitudinal research can make important contributions to assessing the impact of ChatGPT on long-term learning outcomes. More qualitative research is needed to explore student experiences with ChatGPT in more detail. This could include interviews, focus groups, or case studies to understand better how ChatGPT affects their learning processes and social interactions. Future

research could compare the effectiveness of ChatGPT with other AI-based tools or traditional teaching methods. The study could be replicated in different educational settings and with diverse student populations to examine the generalizability of the findings. Analyzing learners' interactions with ChatGPT can provide insights into how it affects their motivation, learning strategies, and learning community.

Statements and Declarations

Ethical Statements: The manuscript complies to the Ethical Rules applicable for this journal. The authors of the manuscript has fulfilled his ethical responsibilities for the study. The whole study was reported in the manuscript and was not split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time. Research results were presented clearly, honestly, and without fabrication, falsification or inappropriate data manipulation. Author adhered to discipline-specific rules for acquiring, selecting and processing data. No data, text, or theories by others were presented as if they were the author's own. Author is sure to respect third parties rights such as copyright and/or moral rights.

Acknowledgments/Notes: During the preparation of this work the author(s) used Grammarly AI assisted tool in order to proofreading.

Conflicts of Interest: The author declares that he has no conflict of interest

Funding: The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Completing Interest: The author has no relevant financial or non-financial interests to disclose.

Author Contributions: The authors realized all steps of the study.

Data availability: Not applicable

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