

AN ANALYSIS OF THE COGNITIVE PRESENCE IN ONLINE LEARNING COMMUNITIES IN PAKISTAN

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Abstract

This study evaluates the effectiveness of cognitive presence in Online Learning Communities (OLCs), focusing on their role in enhancing critical thinking and creativity among students. Using a sequential exploratory mixed-methods design, Phase 1 involved 13 staff and administrators based on the Community of Inquiry (CoI) model, while Phase 2 collected survey data from 607 participants (101 paid, 506 unpaid) selected through stratified random sampling across six OLCs, making a total sample of 620 participants. The findings indicate that students demonstrated the ability to apply concepts and engage cognitively in discussions; however, opportunities for deeper knowledge construction were limited. Demographic factors such as age, education level, and gender significantly influenced engagement and presence, with younger individuals, higher-degree holders, and males reporting stronger cognitive presence. The study contributes by contextualizing the CoI framework within Pakistan's online learning environment, addressing the lack of evidence from non-Western settings and highlighting the role of demographic factors. Practically, it suggests training teachers to enhance student engagement and integrating collaborative tools to foster peer interaction through group discussions and projects.

Keywords: Cognitive Presence, Online Learning Communities, Students' Engagement, Critical Thinking, Online Education.

INTRODUCTION

In a community of learners, cognitive presence is characterized by the investigation and creation of knowledge via cooperation and reflection. Collaboration is characterized as a profound and significant method of education that goes beyond the mere acquisition of knowledge and skills. It employs critical and creative thinking via interaction with the material and other students (Garrison, 2016).

Students actively participate in the learning process, critical thinking is encouraged, and learning results are enhanced through this collaborative learning approach. Students are compelled to confront their peers' varying opinions and viewpoints on the subject matter to form their own understanding (Akyol & Garrison, 2011).

Discussion boards and other forms of asynchronous communication can foster knowledge development in online environments. After engaging in the material, students offer their opinions on the discussion boards. Understanding the material being presented is necessary for knowledge sharing, therefore before a student contributes to a discussion, they must gather information, interpret it, and then communicate it (Lin et al., 2013). When students strive to comprehend new concepts and connect them to what they already know and have experienced via conversation and reflection, deep learning takes place. The development of metacognitive knowledge is supported by discussion. To build profound cognitive presence, students need to discuss what they are learning, write about it, connect it to prior knowledge, and use it in their everyday lives (Shea & Bidjerano, 2009).

Community of Inquiry (CoI) researchers characterize cognitive inquiry as four stages: triggering event, investigation, integration, and resolution. The discovery and definition of the issue or problem is a triggering event.

Through the inquiry process, students study 24 potentially enlightening concepts and bits of knowledge. Integration occurs when students make sense of their newly acquired knowledge and share it with others in the community. When students work together to validate solutions to the initial difficulty, resolution occurs. All these levels of cognitive inquiry are included in the cognitive presence component (Aykol & Garrison, 2011).

This study examined the role of cognitive presence in promoting student critical thinking and creativity in online courses. Thus, the research will contribute to the establishment of more structured, interactive, and student-centered online learning environments in line with international standards. This study specifically focuses on the assessment of cognitive presence in OLCs in Pakistan, where the concept is still in its infancy.

Objectives

- To examine the students' cognitive presence in online learning communities (OLCs)
- To find out the effect of demographic variables on stakeholders' cognitive presence

Significance of Study

This study underscores that while students demonstrate the capacity to apply concepts and remain cognitively engaged, limited avenues for deeper knowledge construction persist. The finding contributes to existing scholarship by highlighting the gap between surface-level learning and higher-order thinking, offering empirical support for constructivist and cognitive theories. Practically, it emphasizes the need for instructional strategies that promote inquiry, analysis, and critical reflection. At the policy level, it calls for curriculum and assessment reforms that encourage meaningful knowledge building aligned with 21st-century learning demands.

REVIEW OF LITERATURE

Cognitive presence in online learning communities (OLCs) involves inquiry, reflection, and knowledge construction through collaboration (Garrison, 2016). Students enhance learning outcomes by engaging in critical thinking and interacting with peers' diverse perspectives (Aykol & Garrison, 2011). Asynchronous tools like discussion boards foster knowledge development, requiring learners to interpret and share ideas (Lin et al., 2013). Deep learning emerges when students connect new knowledge with prior experiences through dialogue and reflection (Shea & Bidjerano, 2009).

The Community of Inquiry (CoI) model frames this process in four stages: triggering event, exploration, integration, and resolution (Aykol & Garrison, 2011). Critical thinking enables students to analyze, evaluate, and synthesize information, making it central to cognitive presence in OLCs (Garrison et al., 2001). Activities such as discussions, case studies, and reflective journals encourage deeper engagement and higher-order thinking (Bolliger & Halupa, 2018; Shea, Hayes, & Vickers, 2010). Instructor presence also supports critical thinking by posing open-ended questions, providing feedback, and guiding inquiry (Garrison, 2017). Additionally, interactive technologies like simulations and collaborative tools enhance application of knowledge in real-world contexts, promoting meaningful learning (Bolliger & Halupa, 2018).

Demographics significantly affect OLC engagement. Younger learners tend to interact more actively due to digital familiarity, while older learners may require additional support. Gender differences also influence participation, with women showing more collaborative tendencies. Prior experience with online learning enhances confidence and engagement levels (Richardson & Newby, 2006). Previous studies examined engagement factors in OLCs but overlooked the influence of demographics (Rovai & Jordan, 2004). This study addresses that gap by focusing on variables such as age, gender, qualification, location, and professional status. Further research is needed to explore how these factors interact by designing more inclusive and effective online learning environments.

RESEARCH METHODOLOGY

The study employed a sequential exploratory mixed-methods design. In phase one, qualitative data were collected through semi-structured interviews with admins and teachers, and in phase two, a survey was developed from these findings to gather quantitative data.

Population

The accessible population comprised 4,447 members across six online learning communities: Bhakhar Education Academy, Drop of Change Academy, Zone of Education, Educational Marathon, Zeeshan Umar Educationist, and Quality Education Academy.

Sample and Sampling

For qualitative data, 13 respondents (7 staff and 6 admins) were selected through purposive sampling. For quantitative data, stratified random sampling was used, resulting in 607 valid responses (101 paid and 506 unpaid members).

Research Tools

In phase one, a semi-structured interview protocol based on the Community of Inquiry (CoI) model was developed, comprising 19 open-ended questions exploring teaching, cognitive, and social presence. In phase two, a 40-item questionnaire (35 items on teaching, learning, cognitive, and social presence, plus 5 demographic variables) was used, with reliability confirmed at Cronbach's Alpha = 0.925.

Data Analysis

Qualitative Phase 1: In-depth interviews with 13 participants (7 staff and 6 administrators) were audio-recorded, transcribed, and thematically analysed using inductive coding to identify recurring patterns and themes. Findings informed the development of the survey instrument.

Quantitative Phase 2: A survey was administered to 607 members (101 paid and 506 unpaid) from six OLCs, selected through stratified random sampling. Data were analysed using SPSS with descriptive statistics (Mean, standard deviation, frequencies) and inferential tests (t-tests, MANOVA).

RESULTS

Section I (Qualitative phase)

In section 1, I presented the results from the phase one of data collection activity, in which thirteen in-depth interviews were conducted to collect data from online learning communities' admins and teachers. The purpose of phase one of the data collection activities was to develop in depth an understanding regarding stakeholders' cognitive presence in OLCs. The findings are divided into three sections as follows:

1. Instructional Strategies
2. Critical Thinking
3. Content Credibility

1. Instructional Strategies

Teachers' self-reflection is very necessary for an effective teaching learning process. Teachers can improve themselves by assessing instructional strategies used in classroom. In online learning communities, teachers assess their own teaching methods, learning activities by using different ways. Table 1 presents different ways of assessing instructional strategies used in OLCs.

Table 1 *Teachers' Views on Instructional Strategies in OLCs*

Sub-themes	Evidence/Supported phrases
Students' performance	"The effectiveness of instructional strategies is assessed through students' performance in tests and their feedback. We review the results to determine if the teaching methods and activities are achieving the desired outcomes and adjust as needed" (BEA). "We gauge effectiveness by observing students' confidence and participation in discussions and tests. If students are confident and contribute meaningfully, it indicates they have understood the topic well. Additionally, we assess their understanding through tests and follow-up discussions" (EM).
Formative assessment	"I continuously assess the effectiveness of my teaching methods by seeking feedback from students and evaluating their performance. I adjust my strategies based on their responses and learning outcomes. I also stay updated with new teaching methods and incorporate them as needed to improve the learning experience" (QEA). "To assess the effectiveness of instructional strategies and learning activities, I evaluate students' performance through tests and assignments, providing detailed feedback. This feedback helps students understand their weaknesses and areas for improvement. I also ensure that the content shared is reliable and up-to-date and compare different platforms to understand which one provides the most benefit. Continuous evaluation and feedback help in determining the effectiveness of your instructional strategies" (DOC).

Table 1 presents the teachers' views related to assessing instructional strategies in which teachers used different ways like through assessing students' performance and feedback. If a student showed confidence and participated in discussion session then he understood the concept, but if he is dull and not take interest in discussion then teachers need to diagnose the weakness of student and change own teaching method accordingly. Instructional

strategies also assessed through formative assessment of students in online learning communities which enhance the learning experience of students.

2. Critical Thinking

To examine cognitive presence in online learning communities, the main question is how teachers evaluate critical thinking and problem-solving skills in online learning groups? Teachers' views from interview data highlight the different ways to assess critical thinking and problem-solving skills.

Different ways to assess critical thinking and problem-solving skills are presented in 2.

Table 2 *Teachers' Views on Assessing Critical Thinking in OLCs*

Sub-themes	Evidence/Supported phrases
Interactive activities	"We assess critical thinking and problem-solving skills through interactive Zoom sessions and discussions. During these sessions, we ask situational and cross-questioning exercises that challenge students to think critically and solve problems. This approach allows us to evaluate their ability to apply knowledge and think analytically" (BEA). "We assess critical thinking and problem-solving skills through various activities such as group discussions, presentations, and mock interviews. These activities provide opportunities for students to demonstrate their analytical and problem-solving abilities" (DOC). "Currently, I do not have specific assignments or evaluations for critical thinking and problem-solving. However, I continuously observe students' engagement and responses to assess these skills informally" (EM).
Situational questions	"Critical thinking and problem-solving skills are evaluated through situational questions and creative problem-solving tasks that require students to apply concepts in novel ways. Critical thinking is assessed through assignments and discussions. Students are given tasks that require them to apply their knowledge and demonstrate problem-solving skills. Their responses help evaluate their critical thinking abilities" (QEA). "We use case studies and situational questions to develop critical thinking. For example, we present scenarios and ask students to apply theories or management styles to solve problems, which helps in practical understanding" (DOC).

Teachers' comments generated from interviews highlighted that most of the OLCs assessed students' critical thinking and problem-solving skills through conducting interactive sessions, discussion sessions, question answer sessions and give them situational questions for applying the content in real life scenario. But some communities did not assess critical thinking and problem-solving skills of students because these are closed communities, and no discussion sessions conducted for students. They only assessed students' knowledge through tests and quizzes.

3. Content Credibility

Content credibility is ensured in online learning communities by using several resources, content management, and discussed among staff before posting information in groups. Irrelevant and outdated content is avoided and not shared in groups because participants feel overburdened and difficult for them to manage content. Table 3 presented some excerpts from teachers' interviews regarding content credibility in OLCs.

Table 3 *Teachers' Views Regarding Content Credibility in OLCs*

Sub-themes	Evidence/Supported phrases
Reliable resources	"To evaluate the credibility and quality of shared content, we use reliable sources such as academic books, recent course outlines, and reputable websites. We continually update our materials to ensure they are accurate and relevant. This approach

	ensures that the information provided to students is of high quality and meets their educational needs” (DOC). “I ensured that the information was up-to-date and relevant. For example, if there was a new exam paper or topic, I updated the community with that information. I ensure that the knowledge and information provided are up-to-date and meet students' needs by staying in touch with modern technologies and trends. I also consult reliable sources and books to verify the content I share. If a student has any questions, they can directly message me, and I provide feedback. The credibility and quality of shared content are evaluated by consulting reliable sources, staying updated with current information, and ensuring that the content is well-researched and relevant” (QEA).
Meet the standards	“I ensure the credibility and quality of content by reviewing and updating it based on the latest information and standards. This involves checking for accuracy and relevance to the current exam patterns and educational requirements” (ZOE). “Content credibility is assessed by reviewing the sources, such as foreign and local books, and ensuring they align with the academic standards. However, a formal rubric or checklist is not yet in place” (EM).

Table 3 revealed that teachers ensured content credibility in learning groups by using reliable sources such as academic books, recent course outlines, and reputable websites and continually updating materials to ensure accuracy and relevancy. Latest information, exam patterns and syllabus are followed before shared information in groups. There is no formal rubric or check list used in learning communities for ensuring that either content meets the standards or not.

Descriptive Statistics

Once approximately 15% responses rate was reached, data were downloaded from the question survey platform into the IBM Statistical Package for Social Science (SPSS) version 25 (IBM, 2019) for initial data cleaning and analysis. First, data were scanned to make sure no duplicate records existed in the file and were filtered for only complete survey responses. Only survey responses with every item answered were used. After cleaning the data, descriptive analysis was conducted on the remaining (n=607) survey responses, which included all context types. Table 4 presented descriptive data (frequency and %ages) of participants of study.

Table 4 *Student Response Percentages (%ages) on Cognitive Presence*

Sr#	Statements	SA	A	A+SA	N	DA	SDA	SDA+DA
1	Instructional strategies used in this group effective	40.9	51.7	92.6	5.4	1.8	.2	2
2	Feedback helps in cognitive development	43.7	47.8	91.5	6.7	1.6	.2	1.8
3	Interactive activities challenge to think critically	35.1	52.1	87.2	8.9	3.6	.3	3.9
4	Questions and tasks push to apply knowledge	39.1	51.1	90.2	7.9	1.8	.2	2
5	Content is reinforced by diverse resources	37.1	52.7	89.8	8.2	1.6	.3	1.9
6	Staff participate in discussions	32	54	86	10.2	3.1	.7	3.8

Table 4 indicates students' responses on cognitive presence, most of the students agreed that the instructional strategies used in the group were effective, regular feedback helped them reflect on their cognitive development, interactive activities challenged their critical thinking, content was reinforced by diverse resources, questions and tasks pushed them to apply their knowledge, and reflecting an effective approach for their active learning. Though some disagreed regarding engaging, staff participation in discussions, it was insufficient to ensure content accuracy.

Overall, student responses on cognitive presence indicate strong alignment with effective instructional strategies and cognitive development, with some improvements in staff participation and critical thinking stimulation.

Inferential Statistics

Inferential statistics were used to find one sample t-test for examining the stakeholders' presence and MANOVA to find out the effect of demographic variables, i.e. age, gender, educational background on stakeholders' presence in OLCs.

Table 5 Examine cognitive presence in OLCs

Variables	<i>M</i>	<i>SD</i>	t-value	df	p-value	Mean Difference
Cognitive Presence	1.32	0.40	-225.393	607	0.000	-3.68493

Table 5 indicates that the results of a one-sample t-test examining cognitive presence, $M = 1.32$, $SD = 0.40$, $t\text{-value} = -225.393$, $p = 0.000$, Mean Difference = -3.68493. Overall, it was observed that it found limited opportunities for meaningful knowledge construction through communication.

To achieve the objective "find out the effect of demographic variables on stakeholders' presence", Multivariate analysis of variance is used. The analysis is used to assess the effect of gender (independent variables) on cognitive presence (dependent variable) in the online learning community.

Table 6 Significant Effects for Gender (at $p < .001$ level)

Dependent Variable	<i>df</i>	<i>df</i> error	<i>F</i>	Gender	Means	99.9% Confidence Interval	
						Lower Bound	Upper Bound
Cognitive Presence	1	606	.888	Male	10.7980	11.436	11.436
				Female	10.4637	10.745	10.745

Table 6 presents significant univariate effects for gender at the $p < .001$ level, indicating gender differences across cognitive presence. Cognitive presence, males (10.7980) reported slightly higher means than females (10.4637), the confidence intervals overlap, suggesting only minor differences between genders in terms of cognitive engagement.

Table 7 Significant Effects for Age (at $p < .001$ level)

Dependent Variable	<i>df</i>	<i>df</i> error	<i>F</i>	Age Group	Means	99.9% Confidence Interval	
						Lower Bound	Upper Bound
Cognitive Presence	3	604	1.574	15-25	10.1887	9.573	10.804
				26-35	10.4803	10.175	10.785
				36-45	11.2429	10.486	12.000
				More than 45	11.0000	9.573	10.804

Table 7 presents the significant uni-variate effects for age groups at the level of $p < .001$, showing how different age groups perceive various forms of educational presence.

For cognitive presence, the 36-45 group had the highest means (11.2429), followed closely by the 26-35 group (10.4803). The 15-25 group reported a slightly lower mean (10.1887), and the More than 45 group reported a mean of 11.000. This pattern indicates that cognitive engagement tends to increase with age, but the difference is relatively small compared to other presence factors.

It was revealed that younger age groups generally report higher levels of cognitive presence compared to older age groups, with significant differences observed across all domains. The findings suggest that older individuals tend to perceive these forms of presence less strongly, with notable variability in perceptions within the oldest age group.

Table 8 Significant Effects on Educational Background

Dependent Variable	<i>df</i>	<i>df</i> error	<i>F</i>	Educational Background	Means	99.9% Confidence Interval	
						Lower Bound	Upper Bound
Cognitive Presence	4	603	1.997	B. A/B.SC	9.727	7.821	11.633
				M.A/M.SC/M.Ed.	10.312	9.969	10.655
				M.Phil.	10.927	10.513	11.341

			Ph.D.	10.462	8.708	12.215
			Other	9.091	7.185	10.997

For cognitive presence, the M.Phil. group led with the highest mean (10.927), with M.A./M.Sc./M.Ed. holders (10.312) and Ph.D. holders (10.462) following closely. The B.A./B.Sc. group had a mean of 9.727, while those in the other category had the lowest mean (9.091). Overall, it was revealed that individuals with higher educational qualifications, particularly those holding an M.Phil. and PhD. degrees, reported higher levels of cognitive presence with significant differences across various educational backgrounds.

Table 9 Synthesized Results

Objectives	Theme/Variable	Qualitative results (Phase-I)	Quantitative results (Phase-II)	Integrated results
Examine the students' cognitive presence in online learning communities (OLCs)	Students' cognitive presence	Cognitive presence is reflected in the students' ability to understand, discuss, and apply concepts during interactive and discussion-based sessions.	Cognitive presence shows strong alignment with instructional strategies (student responses), but the t-test shows limited opportunities for knowledge construction.	Students exhibit the ability to apply concepts and engage cognitively; however, there are limited opportunities for deeper knowledge construction.

DISCUSSION

Cognitive presence is reflected in the students' ability to understand, discuss, and apply concepts during interactive and discussion-based sessions. Cognitive presence shows strong alignment with instructional strategies (student responses), but the t-test shows limited opportunities for knowledge construction. The findings indicate that students demonstrated the ability to apply concepts and engage cognitively in discussions. However, there were limited opportunities for deeper knowledge construction. This finding matches Garrison's (2003) concept of cognitive presence, who asserts that higher-order thinking is crucial for knowledge construction. Research by Rutledge (2010) similarly supports the idea that cognitive presence is influenced by structured problem-solving and reflective discourse. On the other hand, the findings of the current study mismatch with the notion of online learning inherently provide opportunities for cognitive engagement (Garrison & Vaughan, 2008).

It was found that Demographic factors such as age, education level, gender significantly influence individuals' engagement and presence in online learning environments. Younger individuals, those with higher education and males report higher levels of teaching, learning, cognitive, and social presence.

The practical implications of the study will be beneficial for the online learning environments of Pakistan. The study suggests that trained the teachers to engage them in the learning process. The university should integrate more collaborative learning tools for encouraging peer interactions through group discussions and projects. These improvements can play the role to bridge the gap between students' participation and engagement in learning activities. This study will also contribute to educators and administrators who aim to create more effective online learning environments.

Institutions may adopt strategies including the use of student-driven discussions and peer collaboration tasks to increase student participation. It was aligned with Bonk and Graham (2012) study, they provided different and interactive learning experiences for boosting student involvement.

It is recommended that educational institutions may revise course designs to incorporate higher-order thinking tasks, such as case studies, problem-solving activities, and project-based learning. As students showed they have had a lack of opportunities for deeper knowledge construction regarding cognitive presence. It was aligned with constructivist teaching strategies that promote critical thinking and deeper cognitive engagement (Piaget, 1973).

CONCLUSION

It was concluded that students exhibit cognitive presence through their ability to understand, discuss, and apply concepts during interactive and discussion-based sessions; however, despite strong alignment with instructional strategies, the t-test results indicate limited opportunities for deeper knowledge construction in online learning communities.

Recommendations

Teachers should provide structured activities such as guided discussions, collaborative tasks, and reflective exercises that enable students to construct deeper knowledge beyond the application of concepts.

Curriculum and assessment policies should emphasize higher order learning outcomes, ensuring that knowledge construction and critical inquiry are integrated into educational frameworks.

Learning materials and instructional design should incorporate inquiry-based learning, problem-solving activities, and opportunities for synthesis to strengthen cognitive engagement and knowledge construction.

Educators should encourage students to connect prior knowledge with new ideas, use open-ended questioning, and facilitate classroom dialogue that promotes critical thinking and deeper understanding.

Institutions should create professional development programs that train faculty in strategies for fostering deeper knowledge construction and critical engagement in classrooms.

Further research should explore effective pedagogical approaches and digital tools that can bridge the gap between cognitive engagement and deeper levels of knowledge construction.

Notes:

1. This article is based on a sequential exploratory mixed methods design, combining qualitative interviews with staff and administrators (Phase 1) and a large-scale survey with students (Phase 2).
2. The Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2001) served as the theoretical foundation, guiding the assessment of cognitive presence in Online Learning Communities (OLCs).
3. Data collection was limited to six online learning communities in Pakistan; findings should therefore be interpreted with consideration of the specific institutional context.
4. Demographic factors such as age, education level, and gender were self-reported by participants, which may introduce response bias.
5. Practical implications suggested in this study (e.g., teacher training, collaborative tools, peer interaction strategies) are intended for higher education institutions in Pakistan but may also inform international contexts with similar challenges.

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