Effect of Role-Play in Online Discussions on Student Engagement and Critical Thinking

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Abstract
Without a strategy in place, online discussions in asynchronous courses rarely rise above the level of information sharing. As a result, it is important to design discussion strategies that push students further in their interactions with both the content and each other. In this case study, the role-play strategy was examined to determine whether it fosters critical thinking and student engagement. Student discussion transcripts were examined from an online, self-paced human biology course using both Garrison et al.'s four-phase model of cognitive presence and Gunawardena et al.'s five-stage model of knowledge construction to look for evidence of higher-order thinking. Furthermore, the transcripts were examined qualitatively for phrasing that signified evidence of student engagement. The findings indicate that the role-play instructional strategy, when used in online discussions, does support student engagement and critical thinking. This strategy places students in authentic, real-world contexts and enables them to explore different perspectives while engaging with the content to discover new knowledge and construct new meaning. The research presented here also supports evidence that written reflection should be incorporated when employing the role-play strategy. Based on the insights from this study, the researchers have developed a framework for students to achieve deeper, more engaging online discussions. This framework is called the "Framework for Student Engagement and Critical Thinking in Online Discussions."

Keywords: Online discussions, student engagement, critical thinking, role-play strategy

Discussions are a widely used technique in online courses to support learning and encourage engagement (Gao, 2014). However, when overused or designed solely to mimic the face-to-face environment, discussions become stagnant and student engagement dwindles (Acolatse, 2016). Students may find little to no value in participating in discussions because they feel doing so is busywork that is merely meant to satisfy a requirement (Buelow et al., 2018; Martin & Bollinger, 2018). Because of this preconception among students, discussions rarely go beyond knowledge and information sharing to reach knowledge construction and application (Brokensha & Greyling, 2015; Domakin, 2013; Gao, 2014; Jarosewich et al., 2010). In response to the prescribed read-write-post pattern that is often used in many online courses, the researchers recommend using instructional strategy alternatives (such as role-play, debate, and images) to enliven or add "zest" to an online course (Berry & Kowal, 2019). Berry and Kowal (2019) claim that utilizing active learning strategies can make student discussions more enjoyable and meaningful. Jarosewich et al. (2010) suggest that adjusting the traditional elements of design offers students an opportunity to apply the constructivist approach, which enables them to reach deeper levels of learning.

Garrison et al. (2000) argue that cognitive presence, the extent to which students apply higher-order critical thinking skills, is crucial for students to be able to engage with content in online discussions. When students interact with content in ways that allow them to construct new meaning from their learning, they continue to build on their prior knowledge, forming a deeper connection to the content itself, and are able to interact more meaningfully with others (Brokensha & Greyling, 2015; Galikyan & Admiraal, 2019; Jarosewich et al., 2010; Wang & Chen, 2008).

Previous research shows the need for instructional strategies that push students beyond information sharing into knowledge construction (Brokensha & Greyling, 2015; Darabi et al., 2011; Domakin, 2013; Gao, 2014; Jarosewich et al., 2010). The purpose of this study is to examine role-play as an online discussion instructional strategy and to determine whether it fosters critical thinking and student engagement. The analysis of this question builds on prior research and the body of research that stems from it.

Review of Relevant Literature

Critical Thinking and Student Engagement

Researchers have used models such as the four-phased cognitive presence component of the Community of Inquiry (COI) model developed by Garrison, Anderson, and Archer (Galikyan & Admiraal, 2019; Garrison et al., 2000) to measure the impact of different instructional strategies on critical thinking in online discussions for over a decade. According to Garrison et al. (2000), cognitive presence develops and progresses through four phases: triggering event, exploration, integration, and resolution. The integration phase of the cognitive presence model is indicative of higher-order thinking (Galikyan & Admiraal, 2019). Discussions reaching this phase show evidence that learners are thinking critically about the content while engaging with others to inform and construct new meaning (Brokensha & Greyling, 2015; Galikyan & Admiraal, 2019; Jarosewich et al., 2010; Wang & Chen, 2008). Research by Wang and Chen (2008) showed that when discussions reach the integration phase, students move from sharing and comparing information to debating ideas at a much deeper level, often supporting their arguments with evidence. However, when using this model as a measure of cognitive presence, it, unfortunately, shows too often that online discussions fail to develop beyond the exploration

phase (Darabi et al*.,* 2011). This finding calls for a reimagining of instructional strategies on discussion forums to achieve higher-level thinking, as most discussions do not naturally lead to critical thinking or knowledge construction (Brokensha & Greyling, 2015; Domakin, 2013; Jarosewich et al*.,* 2010), or ensure cognitive engagement (Brokensha & Greyling, 2015). Providing students with alternative discussion formats empowers them to become active learners, form deeper connections to the content, and engage more meaningfully with their peers.

While online discussions without a well-executed strategy are not proven to lead to higher-order thinking, they are still used with the expectation that students will collaborate with each other and show evidence of knowledge construction (Galikyan & Admiraal*,* 2019). Unfortunately, as Gao (2014) uncovered, this expectation does not come automatically, and when it does, students often fail to interact beyond the surface level of social exchange or apply newly acquired information. It has become evident that in order for students to move toward achieving deeper learning, there needs to be interaction between the student and the activity itself. Instructors need to recognize the discussion board as a flexible tool that can be used for more than discussion (Meyer, 2014) and as a medium to increase student-to-content engagement.

Gunawardena et al. (1998) developed a five-stage model to measure critical thinking in online student discussions and found little evidence that students moved beyond the information-sharing stage. Domakin (2013) believes a limitation of this model is that it assumes that discussions will progress linearly as students analyze materials and construct new meaning. Domakin (2013) also argues that Gunawardena et al.'s five-stage model of knowledge construction misses key components that should be considered when analyzing discussion transcripts—for example, emotion and the organic nature of discussions themselves. Jarosewich et al. (2010) also looked for evidence of critical thinking in online discussions and found that students did not push beyond the initial discussion question and challenge each other into higher-level thinking.

Discussions Used for Authentic Learning

Research measuring how alternative discussion strategies can help achieve higher-level thinking has been conducted. Martin and Bollinger (2018) claim one way to achieve learner-to-content engagement and develop critical thinking skills is to design real-world, authentic activities that allow students to examine different perspectives and utilize a variety of resources and information. They argue that creating such activities enables learners to explore and discover new knowledge that is key to constructing new meaning. Work by Chan et al. (2016) indicates that designing discussions that expose learners to real-life problems is a key component to achieving knowledge construction. Darabi et al. (2011) examined four alternative discussion strategies and concluded that putting students in authentic contexts, such as role-play, facilitated critical thinking and moved students through each of the four phases of Garrison et al.'s four-phase model of cognitive presence.

Role-Play Strategy

Research conducted by Darabi et al. (2011) showed that when learners are provided with a realistic situation and assume a given role or perspective, they engage in critical thinking and knowledge construction. The Darabi et al. study indicates that with debate and role-play strategies, learners display evidence of reaching the integration phase of Garrison et al.'s four-phase model of cognitive presence at 41.3% and nearly half (49.3%) respectively, as compared to the non-role specific discussion strategies of structured (36.6%) and scaffolded (35.6%)...

These findings suggest that learners make and justify decisions made through a given role. Darabi et al. claim that a strong characteristic of the role-play strategy is its ability to present learners with relevant and authentic learning scenarios that expose them to multiple perspectives and enable them to broaden their knowledge and exercise problem-solving and critical-thinking skills, resulting in higher levels of cognitive presence.

Similarly, Richardson and Ice's study (as cited in Meyer, 2014) shows that when using case-based discussions and online debates (i.e., authentic applications), 78% and 77% of the student posts, respectively, reached the integration phase of Garrison et al.'s four-phase model of cognitive presence. On the other hand, only 60% of open-ended discussions were able to reach this level. Meyer (2014) states that using active learning strategies in online classrooms, such as project work and experiential learning, engages students in their learning similarly to a face-to-face format. Thus, when students are motivated, they display more engagement (Chan et al., 2016).

Both studies show that students should be provided with realistic situations that they can relate to and that allow them to consider perspectives other than their own. In addition, these situations may introduce students to discourse or controversial topics. Incorporating such elements into online discussions can be critical to students' engagement with both the course content and their peers and their ability to construct new knowledge and meaning from the materials.

Schindler and Burkholder (2014) report that research into the effectiveness of role-play has been mixed. Their findings indicate that in one study by Kalelioğlu and Gűlbahar (as cited in Schindler & Burkholder, 2014), when students were assigned roles in an educational professional setting, results showed a low level of critical thinking. However, in other studies with discipline-specific roles, education and engineering students showed higher levels of critical thinking (as cited in Schindler & Burkholder, 2014). Schindler and Burkholder (2014) also found that when students were allowed to choose their roles, they reported higher levels of critical thinking; the authors posited that students might choose roles that they were already familiar with or felt most passionate about and thus reported higher levels of student-to-student and student-to-content engagement. In a 2012 research study by Dracup, students who were assigned a specific role perspective in the case study activity felt safer to experiment within their role because of the distance the online asynchronous format offered. Students felt a sense of anonymity because their discussion post was viewed by their peers through their role's perspective rather than their own; therefore, students were able to dig deeper into their assigned role, which deepened their knowledge and broadened their perspective. Even though these studies showed mixed results on critical thinking, evidence indicates that assigning students specific roles in online discussions may be beneficial in certain disciplines or when students are asked to explore divisive topics.

While the studies conducted by Richardson and Ice (as cited in Meyer, 2014), Darabi et al. (2011), and Dracup (2012) support the use of the role-play instructional strategy in online discussions, the findings are more than a decade old. Since then, the learning environment, educational technologies, and educational techniques have advanced (Dye, 2022). In addition, there has been a seismic shift in the college student population toward the non-traditional student (Hittepole, 2019; Pelletier, 2010). Non-traditional students want to actively apply their knowledge to their personal or professional experiences (Pelletier, 2010). Therefore, it is important to retest these former claims to verify the validity of the results. It is also important to test the existing claims using role-play in a self-paced asynchronous discussion forum where students are not expected to interact with each other. Having current data in this area will benefit

institutions of higher education, such as colleges and universities, as there has been an enormous increase in online course and degree offerings. In addition, new research will provide both instructors and instructional designers with tools to create authentic, real-world experiences and content application in student coursework. The research question this study sets out to examine is if role-play, as an online discussion instructional strategy, fosters critical thinking and student engagement.

Method

This study used the case-study qualitative research method to examine existing information. This process included content analysis to transform qualitative data markings into quantitative data to make comparisons. Cohen's kappa statistical coefficient was used to calculate the inter-rater reliability score.

Population

A concluded self-paced online human biology course, which ran from December 2017 to January 2019, was chosen for the case study because it contained two role-play discussion activities. This course was part of an independent learning array that was offered for credit transfer through a large university in the Upper Midwest. During this time, 17 undergraduate students were enrolled in the course. All undergraduate student discussion board transcripts and written reflection Word documents were analyzed for evidence of critical thinking and student engagement. All subject data personal identifiers (such as subject names, gender reference, course or program names, and/or locations) were removed by someone outside of the research team before the transcripts and written reflections were analyzed. In addition, any words, language, or phrases that could be identified, characterized, or traced to an individual student were removed to retain the confidentiality of the subjects.

Data Collection and Procedure

Each role-play discussion activity was split into two parts. In part 1, the initial discussion post, the instructor assigned students to a particular role based on the first letter of their last name (see Table 1).

Table 1
Assigned Roles for Each Role-play Activity

Role-play Activity 1: Organ Donation	
Role	First Letter of Last Name
Donor	A-E
Recipient	F-J
Family member of donor	K-O
Family member of recipient	P-T
Doctor performing transplant	U-Z

Role-play Activity 2: Vaccines	
Role	First Letter of Last Name
Parent of child with healthy immune system	A-E
College student living on campus	F-J
Doctor	K-O
Community member	P-T
Parent of an immunodeficient child	U-Z

Students were then instructed to conduct research based on their assigned role and to post their position to the discussion board, summarizing what they learned. Replying to peers was not a requirement, though several students chose to respond to others. Students could only begin part 2, the written reflection, after they had made their initial post. For part 2 of the assignment, students were instructed to review the other role perspectives and write a reflection paper based on the information from all of the roles and reflections.

After reviewing the literature on critical thinking and student engagement for online discussions, two existing models were used to measure and identify evidence of critical thinking and student engagement within the role-play discussion activities. The two models used were Garrison et al.'s four-phase model of cognitive presence and Gunawardena et al.'s five-stage model of knowledge construction for online learning. These two models were used in multiple studies and therefore would provide reproducible results to look for evidence of critical thinking. It was also valuable to use more than one model, so possible overlaps could be identified to support and confirm the findings.

The role-play discussion activities in each course were reviewed separately. Furthermore, parts 1 and 2 of the discussions were analyzed and evaluated separately across each of the two models looking for evidence of critical thinking and student engagement. Any student replies for part 1 were examined and included as part of the discussion transcript. Each model was marked independently by the two researchers. Rather than coding the individual transcripts to look for patterns, the models' categories and/or associated indicators were marked with the sentence or phrase as proof of whether the individual transcript displayed direct evidence. This enabled the researchers to analyze the models holistically and categorically for results and patterns.

Content from the discussion transcripts was also coded into three categories determined by the researchers: critical thinking, knowledge construction, and student engagement. This qualitative data is a collection of key words and phrases that support the markings in the two models.

Researcher Agreement

Once each segment of the discussion transcripts was marked for each model, if a marking between the two researchers showed an overall agreement of less than 73.3% with Garrison et al.'s four-phase model of cognitive presence or less than 60% with Gunawardena et al.'s five-stage model of knowledge construction, the individual markings were reviewed and discussed. This process resulted in a percent agreement between the researchers of 89.7% for Garrison et al.'s four-phase model of cognitive presence, 88.7% for Gunawardena et al.'s five-stage model of knowledge construction, and an overall average agreement of 89.2%. This information is displayed in Table 2.

The inter-rater reliability coefficient score was also calculated using Cohen's kappa statistical equation to indicate the level of reliability between the researchers. This value was calculated to be 0.703 for Garrison et al.'s four-phase model of cognitive presence and 0.843 for Gunawardena et al.'s five-stage model of knowledge construction. These values were averaged to produce an overall inter-rater reliability score of 0.773 (see Table 2). According to Cohen's kappa statistic, this value falls within the range of 0.61–0.80, which indicates substantial agreement between the researchers.

Table 2
Researcher Agreement

Model	Overall percent (%) agreement	Cohen's kappa
Garrison et al.'s four-phase model of cognitive presence	89.7	0.703
Gunawardena et al.'s model for online learning	88.7	0.843
Overall average	89.2	0.773
Standard deviation	0.74	0.10

Results

Each discussion part—the initial discussion post (part 1) and the written reflection (part 2)—was analyzed and evaluated separately across each model.

Knowledge Construction for Online Learning Using the Gunawardena Model

Within the Gunawardena et al. five-stage model of knowledge construction for online learning, stages 2–5 were identified as indicators for students showing evidence of critical thinking. More specifically, stage 3 (construction of knowledge) was identified by the researchers to be the strongest indicator and measurement of critical thinking. Stage 2 of Gunawardena et al.'s five-stage model of knowledge construction was marked with an average frequency of 83.5%; stage 3 was marked with an average frequency of 48.1%. The higher stages of knowledge construction were marked less frequently (only a 3.0% average frequency of transcripts were marked for stage 4 and 1.6% were marked for stage 5). Previous research by Domakin (2013) found little evidence of online discussions reaching all five stages of knowledge construction and more often found that discussions remained in stage 1, sharing and comparing information. With that, the results reported here are assuring as they indicate that the role-play discussion strategy encouraged students to think critically about the topic or concepts and construct new knowledge and meaning from the materials. It was also found that the reflection transcripts (part 2) had a higher frequency of stage 3 markings [75.6%] compared with the initial discussion post transcripts (part 1) [20.6%] (see Table 3). The researchers speculate, based on what was often found in the review of the transcripts, that students had a harder time achieving the higher stages of critical thinking on their own; however, once students could see their peers' role perspectives, they were able to broaden their own perspectives, constructing new knowledge and thinking critically about their own personal perspectives and/or biases.

Table 3
Results Using Gunawardena et al.'s Five-Stage Model for Online Learning

Stage	Average percent (%) frequency overall	Average percent (%) frequency discussion posts (part 1)	Average percent (%) frequency reflections (part 2)
1. Sharing/comparing information	100.0	100.0	100.0
2. Discussion of concepts and ideas focusing on differences	83.5	79.4	87.5
3. Construction of knowledge arising from this	48.1	20.6	75.6
4. Testing these ideas	3.0	0	6.1
5. Agreement about the knowledge arising from this	1.6	0	3.1

Garrison's Cognitive Presence Model and Critical Thinking

The results of the Garrison et al. four-phase model of cognitive presence were examined both holistically by phase and by the individual indicator. When the researchers reviewed the individual transcripts, they noticed that this particular model was more descriptive and specific when viewed via the indicators. As a result, three indicators within the exploration phase— 1) suggestions or consideration, 2) brainstorming, and 3) leaps to conclusion—and all five indicators within the integration phase—1) convergence, among group members (reference to previous messages), 2) convergence, among group members (building on, adding to other's ideas), 3) convergence, within a single message, 4) connecting ideas/synthesis, and 5) creating solutions—were determined to be specific areas that indicate evidence of student engagement and critical thinking. With this approach, the exploration phase was found to have an overall frequency of markings of 100%, but the indicators that were singled out had a frequency of markings of 16.5%, 37.3%, and 86.5%, respectively. The integration phase was found to have an overall frequency of markings of 89.5%, and the individual indicators had a frequency of markings of 25.8%, 36.3%, 58.4%, 74.5%, and 43.5%, respectively (see Table 4).

Table 4

Average of Markings per Phase vs. Indicator Using Garrison et al.'s Four-Phase Model of Cognitive Presence

Phase	Indicators	Average percent (%) frequency per indicator	Average percent (%) frequency per phase
Triggering event	Recognizing the problem	26.7	34.0
	Sense of puzzlement	17.8	
Exploration	Divergence - within the online community	10.7	100.0
	Divergence - within a single message	73.1	
	Information exchange	95.5	
	Suggestions for consideration	16.5	
	Brainstorming	37.3	
	Leaps to conclusion	86.5	
Integration	Convergence - among group members (reference to previous messages, e.g., "I agree because…")	25.8	89.5
	Convergence - among group members (building on, adding to others' ideas)	36.3	
	Convergence - within a single message	58.4	
	Connecting ideas, synthesis	74.5	
	Creating solutions	43.5	
Resolution	Vicarious application to real world	93.9	93.9
	Testing solutions	1.6	
	Defending solutions	16.5	

When the discussion post transcripts (part 1) and reflection transcripts (part 2) were analyzed separately, a similar pattern to what was uncovered using Gunawardena et al.'s five-stage model of knowledge construction was not found. However, when data from the eight identified indicators was analyzed, discussion post transcripts (part 1) showed 15% or higher frequency of markings compared to the reflection transcripts (part 2) for the following indicators: brainstorming [31.2%], leaps to conclusion [21.2%], and connecting ideas/synthesis [15.7%]. In turn, it was found that the reflection transcripts (part 2) displayed a 10% or higher frequency of markings for the following indicators: suggestions for consideration [21.3%], convergence -

among group members (reference to previous messages) [34.0%], convergence - among group members (building on, adding to other's ideas) [43.2%], convergence - within a single message [16.7%], and creating solutions [10.5%] (see Table 5). Based on these results, the conclusion was drawn that part 1 scored more strongly in the exploration phase because students are just beginning to understand the role assigned to them; part 2 showed more evidence of students making connections after they had encountered more information. The researchers thought this model was more complex than Gunawardena et al.'s five-stage model of knowledge construction, and this difference in approach accounts for uncovering different patterns based on the model.

Table 5

Analysis of Part 1 and Part 2 Discussion Transcripts Using Garrison et al.'s Four-Phase Model of Cognitive Presence

Phase	Indicators	Average percent (%) frequency per indicator discussion posts (part 1)	Average percent (%) frequency per indicator reflections (part 2)
Triggering event	Recognizing the problem	38.2	15.1
	Sense of puzzlement	8.8	26.8
Exploration	Divergence - within the online community	2.9	18.4
	Divergence - within a single message	76.5	69.7
	Information exchange	97.1	93.9
	Suggestions for consideration	5.9	27.2
	Brainstorming	52.9	21.7
	Leaps to conclusion	97.1	75.9
Integration	Convergence - among group members (reference to previous messages, e.g., "I agree because…")	8.8	42.8
	Convergence - among group members (building on, adding to others' ideas)	14.7	57.9
	Convergence - within a single message	50.0	66.7
	Connecting ideas, synthesis	82.4	66.7
	Creating solutions	38.2	48.7
Resolution	Vicarious application to real world	94.1	93.8
	Testing solutions	0.0	3.1
	Defending solutions	14.7	18.2

Qualitative Indicators

During the review, content from the discussion transcripts was analyzed to identify key words and phrases that could be used as qualitative evidence to support the findings. These findings were then coded into three categories: critical thinking, knowledge construction, and student engagement. These findings aligned with the researchers' markings to the specific indicators of Garrison et al.'s four-phase model of cognitive presence and Gunawardena et al.'s five-stage model of knowledge construction. Table 6 shows several of these identified key words and phrases.

Table 6
Qualitative Indicator Key Words and Phrases

Indicator category	Key words and phrases
Critical thinking	"It seems…"
	"It makes me wonder…"
	"I like to think…"
	"Think about it, …"
	"I suspect…"
Knowledge construction	"I hadn't initially thought of…"
	"After learning that…"
	"I feel more informed…"
	"It never occurred to me…"
	"Struck by the idea…"
	"But after doing research…"
Student engagement	"I read [the doctor's] perspective and learned some interesting facts."
	"I enjoyed reading the community perspective."
	"I thought [student] made a good point."

Discussion

Previous research asserts the need for discussion strategies that elevate discussions from the sharing and comparing information phase to the higher levels of knowledge construction (Darabi et al., 2011). Darabi et al.'s work (2011) is one of the foundational studies this research is based on and calls for discussion strategies to be developed, examined, and recommended if found to be sound.

Evidence of Critical Thinking Makes Role-Play a Sound Strategy

This study sought to determine whether the role-play discussion strategy is a sound strategy for fostering critical thinking and student engagement. When students interact with content in ways that allow them to construct new meaning, they form a deeper connection to the content itself and are able to interact more meaningfully with others (Brokensha & Greyling, 2015; Galikyan & Admiraal, 2019; Jarosewich et al., 2010; Wang & Chen, 2008). In examining student posts, the researchers found that students did, in fact, form these deeper connections to the content due to the role-play strategy. These findings stand out compared with other findings because most discussions do not naturally lead to critical thinking (Brokensha & Greyling, 2015; Domakin 2013; Jarosewich et al. 2010). The role-play strategy used in this study was part of a self-paced course, without as much involvement from the facilitator or other students (as in a semester-based course). In this context, student-to-content interaction is emphasized. Therefore,

the evidence is strong that the strategy itself is sound as it facilitates critical thinking and student engagement because students are first forming a deeper connection to the content.

Interpretations of Evidence of Critical Thinking

One interpretation of this evidence of critical thinking can be explained by the real-world application of the role-play strategy; application to the real world leads to higher-order thinking (Darabi et al., 2011). Ninety percent of student posts were marked in the application to the real-world phase indicator in the Garrison et al. four-phase model of cognitive presence. In addition, brainstorming, leaping to conclusions, and connecting ideas (synthesis) were also observed to be strong indicators of critical thinking.

Another interpretation of the data that indicates role-play leads to critical thinking is that the strategy easily invites students to think about other perspectives. Using the role-play strategy enables students to think critically and achieve levels of knowledge construction they might not achieve if they were solely focused on their own perspective. In many online discussions, students might not encounter another viewpoint until the discussion has progressed beyond the initial post. A strength of the role-play strategy, therefore, is that students begin the activity by considering a viewpoint that may be different from their own. This strength has been confirmed in research by Buelow et al. (2018) showing that students enjoy being able to hear from different perspectives and imagining different scenarios.

The Written Reflection: A Key Component

While the research by Darabi et al. (2011) advocates for discussion strategies such as role-play or debate, a key difference in this study is that the role-play activity also included a written reflection (part 2). The researchers observed the strongest evidence of critical thinking and knowledge construction in the written reflections. Scores were consistently higher across the entire Garrison et al.'s four-phase model of cognitive presence integration category in part 2, with a smaller range of 42.8%–66.7% versus a larger range of 8.8%–82.4% from part 1, the initial post. The findings show similar results in Gunawardena et al.'s five-stage model of knowledge construction. In this model, part 2 scored higher in the knowledge construction stage (75.6% versus 20.6% from part 1). In part 1, before students read and/or replied to the postings from others, evidence of knowledge construction was 20.6%. In part 2, once students interacted with others' posts, the evidence of knowledge construction increased to 75.6%.

There are two explanations for the difference between part 1 and part 2. First, students may have been pushed further by taking in new information and points of view from other students; the role-play strategy is a strong facilitator of introducing other points of view. Second, the nature of writing a reflection allows students to communicate their thought processes. From the data gathered, it can be concluded that including a written reflection is an effective method to push students into knowledge construction and beyond.

Interpretations of Evidence of Student Engagement

While the research shows strong evidence of critical thinking, it also shows evidence of student engagement. As students dig deeper and construct new knowledge and meaning, the process commands a level of attention that signifies student engagement (Galikyan & Admiraal, 2019). Additional evidence that the role-play strategy promotes student engagement was found in the key words and phrases listed in Table 6. These words, taken directly from the discussion transcripts, indicate that the students were engaged with the content. Finally, there is evidence of

engagement in how the students displayed creativity in writing their posts from their assigned role. One student posted from the point of view of a pig, and another student's perspective was so convincing that the other students in the discussion could not tell if the post was from the portrayed role or personal experience. The researchers conclude that knowledge construction, key words and phrases, and displayed creativity indicate students were engaged in the role-play discussion.

Beware of the Information Dump: A Weakness of Role-Play

While the role-play discussion strategy has inherent strengths, it also has an inherent weakness that must be addressed. When students are exploring their roles, they have a natural tendency to only include details and information related to their specific role rather than their own personal thoughts or ideas. The term "information dump" was used to refer to any post that stayed within stage 1 (sharing/comparing information) of Gunawardena et al.'s model of knowledge construction; as Domakin (2013) found, this stage is where most discussion posts tend to stop. When reviewing student posts using Garrison et al.'s four-phase model of cognitive presence, these types of posts also lacked markings in the categories identified as signifiers of critical thinking.

It is worth discussing the relationship between post length and what was considered to be an "information dump." When reviewing the transcripts, the researchers came across several discussion posts that initially looked as though they would be rich examples of knowledge construction. However, after examination, these posts did not move beyond the exploration phase in Garrison et al.'s four-phase model of cognitive presence. Without Gunawardena et al.'s five-stage model of knowledge construction and Garrison et al.'s four-phase model of cognitive presence as guides, it might be assumed that students who made longer and more detailed posts were digging deeper into the discussion topic. In cases like these, using both models was helpful to remain objective in the search for evidence of critical thinking.

Limitations

The nature of two independent researchers examining student transcripts was a limitation of this study. While the researchers' markings were examined rigorously and areas of disagreement were discussed, these markings cannot be completely free from personal bias. Looking for evidence of critical thinking includes the unavoidable process of deciphering meaning and subtext. To minimize the effects of these limitations, two models were used to identify overlaps. Another limitation of the study was the number of discussion prompts and the amount of student-to-student interaction since the students were in a self-paced course. When using these findings across contexts, for example, in an asynchronous course, the format of the self-paced course should be considered.

Implications for Practice

Brokensha and Greyling (2015) cite a criticism of using online discussions in that it is often assumed that students already know, without further instruction or guidance, how to generate meaningful and engaging discussions. Researchers in the field claim that following a framework will not only enable one to think about what a successful discussion might look like but also provide the structure to make it happen (Brokensha & Greyling, 2015; Jarosewich et al., 2010). Based on the insights from this study, the researchers have developed a framework for students to achieve deeper, more engaging online discussions. This framework is called the

"Framework for Student Engagement and Critical Thinking in Online Discussions" and is described in more detail in Table 7 below.

Table 7
Framework for Student Engagement and Critical Thinking in Online Discussions

Framework component	Description
Detailed instructions and clear expectations	Provide detailed instructions and clear expectations for students to know how to approach the discussion assignment.
Share thought process	Invite students to share their thought process for all to see; similar to a think-aloud process.
Prompt discussion with questions	Students pose questions in their post to invite more discussion with peers.
Weave evidence into post	Students weave in research or found evidence into the body of the discussion.
Reflection	Include a reflection at the end of the discussion post.

Detailed Instructions and Clear Expectations

One recommendation is to provide detailed instructions and clear expectations, so students know how to approach the discussion assignment. The instructions should also be complete and informative. Though, as pointed out in Brokensha and Greyling (2015), having detailed instructions does not guarantee cognitive levels of engagement but rather shapes and guides the instruction. The findings in this study support Gao et al. (2009), who found that when guidelines are in place, students reach higher levels of learning.

Share Thought Process

In synchronous discussions, the instructor can probe further into a student's thought process by asking questions. But the question remains how to build this feature into asynchronous environments. The recommendation is to ask students to share their thought processes for all to see (similar to a think-aloud process). Using this process benefits students because they can see how their peers approached the learning and, in turn, respond with insights from their own learning (Cowan, 2019). This approach invites students into deeper discussion and helps them avoid the "information dump" described earlier. Additionally, this approach challenges students to be more thoughtful and thorough (Jarosewich et al., 2010).

Prompt Discussion With Questions

Another recommendation, as also suggested by Gao et al. (2009), is to have students pose questions in their posts to invite more discussion with their classmates. An example might be, "I wonder what others think about . . .?" Having such questions may automatically invite students to think and engage with each other.

Weave Evidence into Post

A fourth recommendation is to have students weave in research or evidence into the body of the discussion to support their claims (Gao et al., 2009) instead of generalizing and including a link at the bottom of the post. When the researchers reviewed the transcripts, they often wondered whether students were integrating their found sources into the discussion body. Several instances were noted where students merely posted a link at the bottom of their discussion without referencing it in the discussion body. Jarosewich et al. (2010) indicate that most discussion prompts do not ask students to refer to materials to support their answers. As an instructor, it may prove more beneficial to have students specifically incorporate this knowledge into their posts.

Reflection

The final recommendation is to include a reflection at the end of the discussion activity. This is similar to what Gao et al. (2009) recommend as part of the Productive Discussion Model. The written reflection is where the strongest evidence of knowledge construction, the strongest indicator of critical thinking and engagement, was found in this study. While incorporating a reflection will take more time for students to write and instructors to grade, the task gives students the opportunity to synthesize not only their own thoughts but also the thoughts and insights of others. An example of the *Framework for Student Engagement and Critical Thinking in Online Discussions* used in discussion instructions can be seen in Figure 1.

Figure 1
Example of Framework Used for Online Discussion

Purpose

This is a research activity with a twist - you will be conducting research about vaccines from an assigned role (or point of view). Your goal in this activity is to communicate clearly and effectively with others about your research and to demonstrate your ability to think critically.

Instructions

Part 1: Discussion

Consider vaccinations from the role assigned to you by the first letter of your last name. Conduct research based upon your assigned role and summarize what you learn. Include your view of vaccines in your role. In your post, include:

- Title, author (list the organization or agency if a specific name is not included), published date, and hyperlink for each source.
- Whether each source is "pro-vaccine", "anti-vaccine", neutral, or any other observations about potential biases.

Part 2: Reflection

After posting to the discussion topic, review the other perspectives; replies are not required. Then, write up your reflection based upon information from all roles. Your reflection should be at least half a page (single spaced). Please note that the first few posts are from students in a previous version of the course.

Criteria For Success

Your answer will be evaluated using the criteria in the attached rubric.

- You can show evidence of critical thinking by going beyond information sharing in your post. For example, you can post an opinion/solution from your point of view and weave in evidence from your research to support it.
- You can show evidence of critical thinking in your reflection by sharing your thought process in doing the activity. Did you learn anything new? Did you change your mind about anything? Why or why not?
- You can ask questions of others, or even in your own post or reflection something you may be struggling with or thinking about.

Implications for Future Research

Further research is called for the same research methods to be applied to other discussion strategies such as, but not limited to, debates, group problem-solving, fishbowl, hypothetical situations, external discussion and reflections, and "bad design." In addition, further research should be considered on the effectiveness of the *Framework for Student Engagement and Critical Thinking in Online Discussions.*

Conclusion

Based on the findings of this study, the role-play strategy is a sound recommendation for fostering critical thinking and student engagement in online discussions. This strategy is best suited for exploring different viewpoints and constructing knowledge within a real-world context. In addition, the researchers recommend including a written reflection with this strategy, as the most significant evidence of knowledge construction was found in the reflection. Finally, to further elevate discussions, the researchers recommend crafting discussion prompts using the *Framework for Student Engagement and Critical Thinking in Online Discussions*. More research is recommended on the effectiveness of this framework in different contexts, such as with other discussion strategies.

Declarations

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