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# Beyond content delivery: harnessing emotional intelligence for community building in fully online digital spaces

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**Abstract**
The onset of the pandemic catalyzed a paradigm shift in educational methodologies, bringing various forms, such as hybrid, distance, and fully online models, into focus. The following study explores the affective domain in online learning, focusing on how emotions, facial expressions, and body language influence engagement and support community building in fully online learning environments. This research explores the role of emotional intelligence in Fully Online Learning Communities (FOLC) and examines the impact of positive and negative emotions on interpersonal engagement and participation. Findings indicate positive emotions to be closely linked to increased engagement and active participation. The study also highlights the importance of exploring body language in digital learning environments and addresses challenges posed by technological barriers in fully online learning spaces. Emotional intelligence is pivotal in online learning and community building, emphasizing the need to understand how to create emotionally supportive digital learning environments. Outcomes indicate a need for future research to focus on understanding the role of cultural dimensions in supporting learner agency and community building in the fully online learning context.

**Keywords** Fully online learning community (FOLC), Affective domain, Engagement, Collaborative learning

The COVID-19 pandemic has brought online learning to the forefront of many pedagogy and technology conversations (Dhawan, 2020). However, recent discussions view online learning as a homogenous approach to remote learning that is new to students and teachers. This online learning perspective stems from Emergency Remote Teaching (ERT), where teachers and students were given little to no time to prepare to transition to online learning spaces at the beginning of the COVID-19 pandemic (Hodges et al., 2020). Teachers and students within Ontario, Canada, were told to prepare online classes for two weeks, hoping the pandemic would normalize and a return to physical classrooms would be imminent. However, this was not the case; various versions of ERT were imple-

mented over two years. Students and parents faced many challenges with ERT, as there were expectations for digital tools and hardware, digital competencies, social competencies, and executive functioning (Erlam et al., 2021).

Instructors and course designers also faced many challenges while moving to ERT. Among the challenges was the lack of cues about student progress that would normally be collected on an ad-hoc basis by instructors while interacting with students in physically co-located classrooms. According to Usher et al. (2021), this caused many instructors to attend to and use alternative data sources, such as the number of times a user accesses a platform, as the basis for making decisions. Simultaneously, the pandemic identified, and perhaps exacerbated, inequalities that exist in higher education, such as existential inequality, which refers to dignity, autonomy, and representativity (Czerniewicz et al., 2020). While making these inequalities apparent, opportunities to address them arose as increased orientations to the use of online community-oriented collaborative environments began to emerge (Czerniewicz et al., 2020). Hadar et al. (2021) suggest that having to move to ERT during the pandemic gave rise to renewed interest in learner-centred resilience and well-being-focused approaches and shifting pedagogical emphasizes from traditional didactic modes to dynamic, flexible skills and competency-oriented processes.

Online learning can take many forms, including blended learning, where students participate in physical and virtual environments; hybrid or hyflex learning, where some students participate in physical environments while others in the same cohort work in virtual environments (Saichale, 2020); or fully online, where students participate in classes through a/synchronous tools (vanOostveen et al., 2016a). Codification of these forms is ongoing, with a variety of terms used in various contexts (Raes et al., 2019; Lakhal et al., 2020). As there are differences in physical classroom environments based on pedagogical decisions, there are also differences in online learning based on pedagogy, tools, and affordances. One such learning environment is the Fully Online Learning Community (FOLC) model (vanOostveen et al., 2016a). The FOLC model (Fig. 1) focuses on learning through social constructivism within spaces that learners share.

FOLC-type environments foster collaborative learning through Social and Cognitive Presence interactions within a digital space. Within these intersections, learners

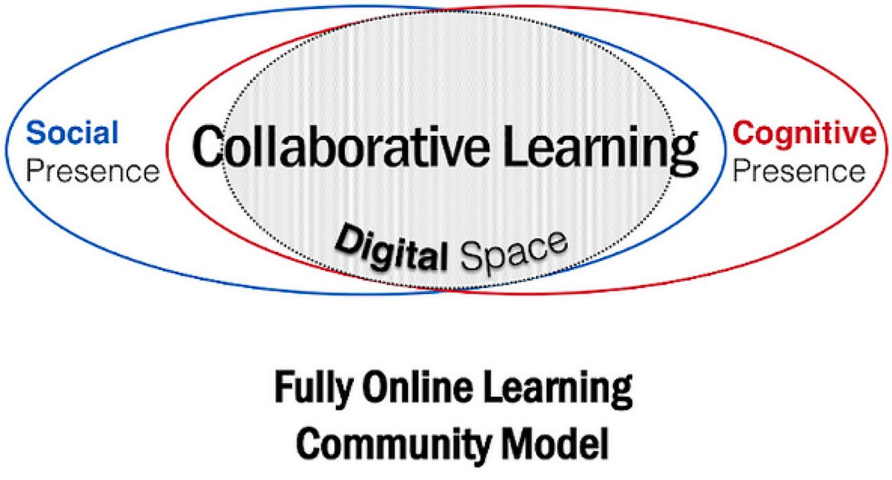


**Fig. 1** The Fully Online Learning Community (FOLC) model (vanOostveen et al., 2018)

are provided opportunities to co-create knowledge instead of being receivers of information. To achieve this, facilitators must nurture learning environments conducive to collaborative participation. Cognitive Presence allows learners to be challenged about their understanding of a topic to construct new meaning. Social Presence discusses the opportunities for learners to connect with others, encouraging communication through video conferencing tools.

### Affective domain

This project explores the role of the affective domain within collaborative online environments. Emotions detected through facial expressions and body language were analyzed with participation and active engagement within a collaborative online environment. Engagement, in the context of this study, refers to active involvement and participation in the online focus group discussions. It encompasses, among other things, behaviours such as collaborating, negotiating, feeling, perceiving, and reacting to others in online settings (Tu & McIsaac, 2002). The literature provides a close link between engagement and active learning within fully online learning community-type environments (Oh et al., 2018). We analyzed these affective experiences in relation to their connection to engagement, aiming to explore the following research questions.

1. What emotions are exhibited while participants are engaged?

    a. What emotions are displayed when engaging with peers?
    b. What emotions are displayed when engaging with content?

2. What, if any, relationship exists between using participants' videos and engaging with peers?

## Literature review

The focus of this research is the development of fully online learning communities, which historically predate the pandemic (vanOostveen et al., 2016a). According to Quinlan (2016), emotions are crucial in developing human relationships, particularly within communities. They serve as a communication tool, expressing feelings and needs to others. Positive emotions like joy and happiness can foster closeness and bonding, strengthening and building relationships (Meneghel et al., 2016). While often seen as harmful, negative emotions can also contribute to relationship development when managed effectively (Graham et al., 2008). They can signal problems or conflicts that should be addressed, leading to understanding and growth.

This literature review explores the intricate interplay between the development of fully online learning communities and the utilization of emotions within those communities. As education's digital landscape continues to evolve, creating and nurturing online learning communities has become a focal point of research. This review combines various studies to understand how emotions are leveraged to develop these communities. It scrutinizes the role of emotions and emotional intelligence in fostering engagement, collaboration, and a sense of belonging among online learners (Zembylas, 2008). Drawing from fields as diverse as behavioural psychology, education (particularly concerning social learning theories), and digital technology usage, this review aims to shed light on

the multifaceted role of emotions in shaping the growth and effectiveness of fully online learning communities.

The Fully Online Learning Community (FOLC) model (vanOostveen et al., 2016a) describes a community-based learning ecosystem. The model consists of four dimensions: Social Presence (SP), Cognitive Presence (CP), Collaborative Learning (CL), and Digital Space (DS). The most pertinent of these dimensions for the present study is the SP, as Social Presence Theory proposes that learners must perceive others as "real" in online environments to communicate openly, leading to better knowledge construction. Emotional responses can enhance social presence, making learners feel more connected (Gunawardena, 1995).

#### Online engagement

Environments designed using the Fully Online Learning Community Model are premised on students engaging in active learning while working within group or community environments: watching and listening to video clips, posting and responding to reflective blogs, and interacting with the course facilitator and other course participants in ways which reduce transactional distance (McKeithan et al., 2021; Molinillo et al., 2018). While active learning occurs in all four dimensions of fully online learning community-type environments, it is clearly apparent in the SP dimension. According to Gunawardena and Zittle (1997), SP can be characterized as "the degree to which a person is perceived as a real person in mediated communication" (p. 9) or, as Oh et al. (2018) suggest, "the ease with which one perceives to have the access to the intelligence, intentions, and sensory impressions of another" (para. 5 in Immersion and Dimensions of Presence section). Tu and McIsaac (2002) summarize SP to be the awareness of interactivity.

Oh et al. (2018) expands on the concept of presence within virtual environments having at least three sub-divisions: telepresence or the perception of being present in a computer-mediated environment, self-presence or the connection felt between the actual person and the virtual person (emotions or body), and social presence as defined in the previous paragraph. Molinillo et al. (2018) contend that student SP in online group work is related to their inclination to engage in problem identification, exploration, and working toward solutions.

Cleveland-Innes and Campbell (2012) contend that emotions are intricately connected to learning, engagement and motivation, leading to the contention that emotional presence or "the outward expression of emotion, affect, and feeling by individuals and among individuals" (p. 283) is necessary within an online community environment. Accordingly, if individuals are engaging with each other to establish a learning community, they must experience a closeness or immediacy/intimacy with each other, leading to a willingness to make themselves vulnerable to others whom they trust (vanOostveen et al., 2018).

#### Emotions and emotional intelligence

Emotional intelligence, or EI, the ability to understand and manage one's and others' emotions, is also crucial in relationship development (Dhani & Sharma, 2016). It enables empathy, effective communication, conflict resolution, and mutual understanding, vital for intimacy within learning communities. Emotional intelligence is increasingly recognized as a critical factor in successful collaborative learning. Cleveland-Innes and Campbell (2012) describe emotional intelligence as "the outward expression of emotion,

affect, and feeling by individuals and among individuals in a community of inquiry, as they relate to and interact with the learning technology, course content, students, and the instructor" (p. 283). Individuals who can manage and understand their own and others' emotions are believed to be more effective in knowledge construction (Brackett et al., 2011; Gunasekara et al., 2022).

Exploring the effects of emotions on the achievement of online learning outcomes, it was found that understanding and managing achievement emotions can significantly impact online learning outcomes (Fasso & Knight, 2018). When students experience positive emotions such as enjoyment, interest, and enthusiasm while engaging in online learning activities, they are more likely to have better academic performance and retention of knowledge. Positive emotions can also enhance motivation, engagement, and cognitive processes, improving learning outcomes. Conversely, the article also highlights the influence of negative affective states on online learning. States such as anxiety, frustration, and boredom can hinder learning progress and impede the achievement of desired outcomes. Anxiety, for example, can lead to reduced attention and impaired information processing, negatively affecting comprehension and retention (Fasso & Knight, 2018; Clarke, 2010; Wu & Yu, 2022).

#### Emotions from facial expressions and body language analysis

Facial expressions are one of the more essential aspects of human communication. The face and body movements are responsible for communicating thoughts, ideas, and emotions. Synchronous and asynchronous apps are employed in fully online learning community-type environments in a digital space co-created (vanOostveen et al., 2021) by all members of the learning community through the identification and use of Web 2 (social networking) and Web 3 (semantic networking) apps (Hope et al., 2023). When interacting through these types of apps, emotions can be expressed through emoticons and tone of text. However, emotions are best expressed through facial expressions and body language captured in audio-video conferencing software. The circumplex model of affect (Russell, 1980) states that emotional states are behavioural expressions of internal psychological sensations and that these sensations are caused by two physiological systems: valence (pleasant to unpleasant) and arousal (low activation to high activation) (Barrett & Russell, 2015). As Yagci and vanOostveen (2021) suggest, due to human nature's complexities, personal dispositions determine the affective states displayed by facial expressions and body language and the decoding the emotions of others.

#### Relevant social learning theories

This study is premised on social constructivist theories, suggesting that learning (adaptation and reorganization of concepts and constructs in each individual's mind) occurs in a social context, primarily through discourse with others and when interacting with human artifacts, such as written statements and computer files. However, critics argue that these theories may not fully account for individual abilities and preferences. They also may not fully capture the complexity of online learning environments, where social cues can be more obscure (Bandura, 1977).

Self-efficacy, or the perceptions of learning capability, has been positively correlated to personal motivation, engagement, and self-regulation (Schunk & Pajares, 2009). Bandura (1977) stated that learning is a set of cognitive processes in a social context and can

occur purely through observation or direct instruction. When synchronous applications are used in fully online learning communities, learners interact with each other and with other objects within the environment. Those "who feel more efficacious about learning should be more apt to engage in self-regulation (e.g., set goals, use effective learning strategies, monitor their comprehension, evaluate their goal progress) and create effective environments for learning (e.g., feedback from teachers, social comparisons with peers (Schunk & Pajares, 2009).

Self-Determination Theory (SDT) (Deci & Ryan, 2012) emphasizes the role of autonomy, competence, and relatedness in motivating quality learning. The theory suggests that learning environments that encourage independence instead of control in fostering motivation, positive actions, holistic growth, and mental wellness should be emphasized. Positive emotional responses from other learners can enhance these feelings, promoting engagement and knowledge construction in online learning communities.

Moore's (1993) Transactional Distance Theory (TDT) describes the separation between learners and teachers, particularly in the context of distance education. Psychological and communication gaps can arise due to the separation or distance. To minimize the resulting potential misunderstanding, the environments employed in this study used dialogue and community structures to reduce the distance between individuals (Blayone et al., 2017). According to vanOostveen et al. (2018), while facial expressions can help clarify shared thoughts, they can also lead to misunderstandings or unclear communication because societal expectations can mask emotions felt by learners and their struggle to decode expressions accurately.

#### Emotionally supportive learning environments

Research suggests positive emotional responses can contribute to knowledge construction and community development (Pekrun & Linnenbrink-Garcia, 2012). However, creating such environments can be challenging online, where body language cues are absent, and misunderstandings can easily occur. Moreover, the literature often needs to offer more concrete strategies for creating these environments (Pekrun & Linnenbrink-Garcia, 2012). The literature also often assumes that online learning communities are inherently beneficial. However, critics argue that these communities can also lead to feelings of isolation and disconnection, particularly if not well-managed (Kaufmann et al., 2022). Furthermore, the effectiveness of online learning communities can vary greatly depending on the platform used, the facilitation, and the participants involved (Rovai, 2002).

One of the issues that must be addressed is the nature of the communities that can be built in the environment. A traditional definition of community comes from Lave and Wenger (1991), who define it as a place where people are brought together by a shared purpose or set of aims. However, this definition seems to avoid the social nature of communities where people build relationships and personalize their interactions (Hod et al., 2018). Relevant definitions of community may also center on values since "what our community does not value we might even see; inversely, activities valued by our community are salient and inviting" (Trninic et al., 2018, p.622).

Derks et al. (2008) suggest that social presence and visibility are the most important contextual factors that influence emotional communication in both computer-mediated communication (CMC) and face-to-face (F2F) communication. While engaging

in collaborative learning, learners in FOLC-type environments are encouraged to use audio-video conferencing software applications such as Google Meet, Zoom or Microsoft Teams to make their facial expressions and body language accessible to others (vanOostveen et al., 2016b). vanOostveen et al. (2016b) also state that "while there is comfort and security in being supported, the real gains are made when students are being challenged about their preconceived notions, allowing for a redefinition of the concepts and processes involved" (p.16).

#### Conceptual framework (TIER)

The TIER Environmental Determinants and Emotional Response Framework employed in this research builds upon the Fully Online Learning Community (FOLC) model, which guides the structuring of online learning environments with a focus on collaborative learning and community building (vanOostveen et al., 2016a). Additionally, it is essential to note that the FOLC model is firmly rooted in a constructivist perspective, highlighting the importance of both social presence (SP) and cognitive presence (CP) and introducing the concept of collaborative learning (CL) within a digital space (DS) to reduce the transactional distance (Moore, 1993) and promote trust-building for effective communication (vanOostveen et al., 2016b).

The TIER framework (see Fig. 1) was designed for this study, incorporating essential elements used in analyzing the facial expression data produced by Noldus' FaceReader and from the coding of body language and verbalizations, and not previously theorized regarding the affective domain within collaborative online environments. It facilitates a nuanced exploration of how Triggers (T), Interpretations (I), Emotions (E), and Responses (R) shape the dynamics of online learning communities and provides a structured and tailored approach to guide research into the affective domain within collaborative online environments. The primary focus of this framework is to conceptualize the elicitation of emotions and how these emotions impact online engagement and community building. The TIER framework systematically examines the interplay between environmental determinants, emotional responses, and subsequent behaviours in online collaborative learning settings. The conceptualization of the TIER Environmental Determinants and Emotional Response Framework is informed by various psychological and educational theories discussed (See Fig. 2).

Trigger (T): The "Trigger" phase within the TIER framework delves into the environmental determinants that initiate emotional responses in online collaborative settings. These triggers are contextual and influenced by (SP and CP, as theorized in the Fully Online Learning Community (FOLC) model (vanOostveen et al., 2016a). Additionally, FOLC acknowledges the importance of the digital space, recognizing its role in supporting SP and CP through various dimensions of human-computer-human interaction and associated competencies. In this context, SP aligns with the ability to project oneself into a community of inquiry, examining how learners in online settings are perceived and how this impacts emotional responses. CP emphasizes collaborative problem-solving and synthesizing solutions to trigger emotional responses in online learning environments.

Interpretation (I): The individual interpretations of triggers are conceptualized in the "Interpretation" phase within TIER, recognizing that external triggers do not solely shape emotions but are influenced by numerous factors. This phase aligns with the

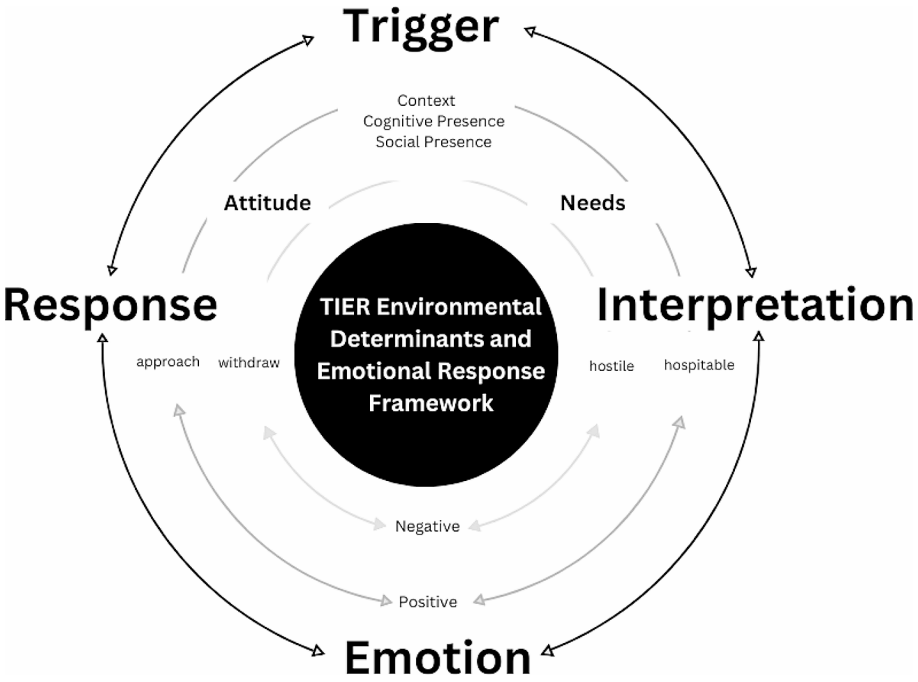


**Fig. 2** Conceptual framework used - TIER framework

Circumflex model, which posits that information is first interpreted and categorized within an individual's emotional state before becoming an affective experience (Russell, 1980). The interpretation phase investigates how interpreting triggers as hostile or hospitable can lead to distinct emotional responses (Cacioppo et al., 2012), potentially affecting subsequent behaviours within online learning contexts.

Emotion (E): Drawing from the Evaluative Space Model (Norris et al., 2010), which broadens the understanding of evaluative processes, the TIER framework considers the discrimination of a stimulus or its features, encompassing its appetitive or aversive nature, hostility or hospitality and perception of pleasantness or unpleasantness. These discriminations, beyond verbalization, are exemplified by affective priming or the role of emotional experiences on cognitive processes (Norris et al., 2010). On the responsive aspect, evaluative processes coordinate behavioural responses to facilitate appropriate approach or withdrawal, engagement or avoidance, and acceptance or rejection (Cacioppo et al., 2012). These emotional processes are theorized to play a pivotal role in shaping subsequent behaviours and levels of engagement, potentially bridging the gap between trigger and response within the context of learning.

Response (R): The "Response" phase within TIER aligns with the Elaboration Likelihood Model (ELM)(Petty & Cacioppo, 1984). ELM proposes two distinct routes to persuasion: central and peripheral. The central route is characterized by deliberate consideration and cognitive effort, facilitating critical analysis and attitude changes based on the strength of arguments. In contrast, in the peripheral route, persuasion relies on surface-level cues like source attractiveness or emotional appeal, with less emphasis on thoughtful analysis. This model underscores that attitudes formed through central processing are more likely to shape behaviour. When individuals are highly motivated and able to invest cognitive effort (high elaboration likelihood), attitudes formed through the central route are enduring and predictive of subsequent behaviour, highlighting the role

of active student engagement and information-seeking behaviour. These behaviours may emphasize the proactive role of learners who comprehend the impact of emotions in both life and learning; they might deliberately seek out constructive emotional engagement, recognizing its potential to shape their attitudes and, consequently, their actions (Petty & Cacioppo, 1984).

In this research, we delved into the affective domain within collaborative online contexts, particularly emphasizing the elicitation of emotions through facial expressions and body language analysis. Our central hypothesis posited that displaying positive emotions encourages engagement in online environments, enabling the social construction of new knowledge and cultivating a sense of community.

In conclusion, while a growing body of literature explores the connections between emotional responses and knowledge construction in online learning communities, significant gaps and areas of controversy exist. More research is needed to understand these dynamics and develop effective strategies for promoting positive emotional responses and successful learning in online environments.

## Methodology

The study used qualitative methods (Silverman, 2021) to investigate the interplay of facial expressions, body language, and verbal contributions demonstrated by participants as they engaged in a fully online discussion. The study aimed to explore the relationship between displayed emotional responses and their impact on knowledge construction within community development.

### Study design

The study recruited participants enrolled in fully online courses at Ontario Tech University. Participants were volunteers from the fully online programs that were running at the time of the study (an undergraduate program in Educational Studies and a Master of Education program). There are more than thirty courses in these programs. Both programs are in the Faculty of Education. Prospective participants were sent project information via social media channels or email. Enrollment of interested participants was established on a first-come, first-served basis due to limited space in the project. Participants engaged in 50-minute, online, synchronous discussions in groups of three to six. Each group was presented with the same montage of photographs depicting Canadian issues to instigate discussion. As seen in Fig. 3, the collage featured photos of children touching a globe, a polar bear on a small piece of ice, a group of people standing behind barbed wire, a news headline that says “healthcare costs” with a stethoscope laid on top, four paintings designed with red, black, blue, and brown, and a Canadian flag with a substance dripping from the top.

For each focus group, recruited participants had a choice of scheduled sessions to a maximum of 6 participants per session. Most participants did not know each other prior to these sessions. The researchers employed a graduate student trained in a particular role: provocateur, collaborator, compliant, and non-participatory. The planted colleague was meant to add nuances to the discussion and elicit various emotional responses from the participants. Other participants were not informed about the “plant” until the end of the discussion. All fully online sessions were recorded, and the final dataset comprised eight sessions with two to five participants each. For this project, the researchers only


**Fig. 3** Focus group collage

analyzed six of the recorded sessions. To gather the most reliable and trustworthy data possible, researchers analyzed and coded participant behaviours in a series of iterative steps, including watching the video with sound, watching the video without sound to rely on changes in body language, and proceeding to watch with sound again to confirm emotional changes and triggering events.

Researchers were divided into three teams of two, and each team was initially assigned two recorded sessions to analyze. The recorded data were analyzed in three stages and then double-coded by at least two research teams. In the first stage, researchers established a general outline of observable criteria, including emotions, time stamps, events, thick description, and reflection (See Table 1 for definitions of each category).

In the second stage, researchers focused on state events and the duration of the events that resulted in each emotional response. The third stage saw the addition of two

**Table 1** *Stage one coding definitions*

| Emotions | The Emotions category captured the emotional responses displayed by participants during the observation period. |
|---|---|
| Time Stamp | The Time Stamp category recorded the exact time the emotional response was observed. |
| Event | The Event category documented the specific situation or context that triggered the emotional response. |
| Thick Description | The Thick Description category detailed the emotional response, including any accompanying verbal or nonverbal cues. |
| Reflection | The Reflection category allowed the observer to provide personal reflections and interpretations of the observed emotional responses. |

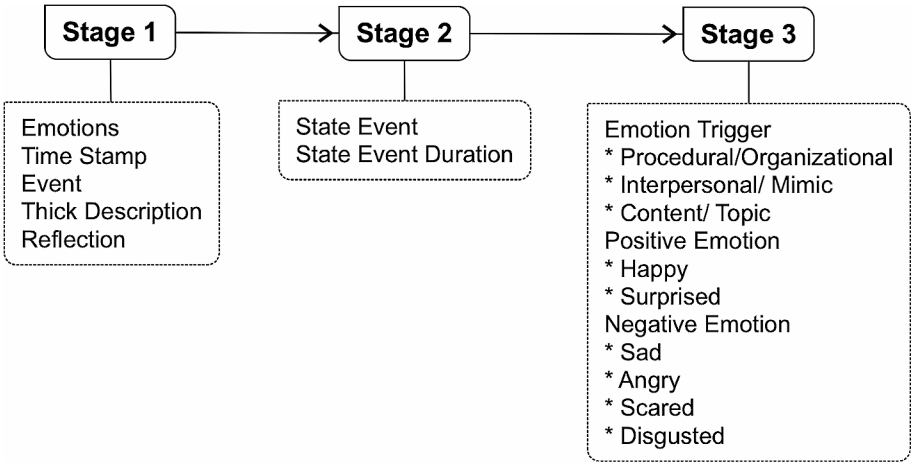


**Fig. 4** Coding scheme and stages

additional categories: emotional triggers and an indicator of whether the observed emotion was positive or negative (See Fig. 4).

Emotional triggers were categorized into Procedural/Organizational, Interpersonal/Mimic, and Content/Topic. The second category utilized the Face Reader® analysis of facial expressions to divide emotions into Positive (Happy and Surprised) and Negative (Sad, Angry, Scared, Disgusted).

Furthermore, the researchers contrasted the facial expression data derived from Face Reader® with their team's assessment of the emotions in each video, offering a deeper understanding of the emotional dynamics of the conversations. These data helped establish the coding scheme used in the fourth stage. During the fourth stage, the researchers utilized Noldus' The Observer XT software to classify participant behaviours and emotional responses observed during the online focus groups. This information was leveraged to gauge the participants' overall engagement in the online discussions.

These elements of the coding scheme (See Table 2) were established to understand the observable behaviours demonstrated by participants in the recorded sessions.

The final negotiated coding scheme has five behaviour groups, including eye movements, body gestures, adjusting technology, vocal changes, and discussion contributions. The first observable behaviour, "looks at participant video," targets when and how often participants are seen looking at the video feed of other participants. The "non-verbal gestures" code focused on capturing participants' body language as reactions to environmental stimuli. To help determine participants' levels of social presence in the online focus groups, the number of times participants turned their cameras off was perceived

**Table 2** *Stage Four Coding Scheme*

| Behaviour groups | Observed Behaviours |
|---|---|
| Eye movements | looks at participant video |
| Body Movement | non-verbal gestures (face and/or body) |
| Technology adjustments | turns off camera |
| Vocal changes | change in volume and/or pitch |
| Contributions to discussion | contributes new information |
| | replies to comments |
| | shares personal information |
| | checks in with other participants |

to be representative of social presence in this study The subsequent observable behaviour investigated changes in the volume and pitch of participants' voices during their responses. The last coded behaviour was focused on participants' verbal contributions, including when they stated new information, responded to others, shared personal information, and checked in with other participants.

### Reliability checks

To ensure the reliability of the coding scheme and subsequent findings, the research team set up two sessions for reliability coding to check the accuracy of the coding scheme (Fitzner, 2007). After each researcher coded the assigned session, the research team met to compare results and discuss discrepancies in the coding. To do this, the researchers downloaded the visualization from Observer XT to match up the coded observable behaviours and their durations. Subtle differences were found in the start and stop times of the coded behaviours. Some researchers coded the duration for more extended periods, while others perceived participants to stop and start behaviours, resulting in shorter durations. After these negotiations, the researchers coded another segment for comparison. Results were similar, with minimal discrepancies.

### Data analysis process

To analyze the data and produce findings for the study, researchers aligned the coded data from Observer XT with the emotional responses gleaned from FaceReader. The behavioural analysis involved manually fixing the data to remove unnecessary information so the researchers could align observed behaviours with a corresponding emotional state based on the coded timeframe. Coding the data was a long and tedious process involving double-checking the durations of emotional responses from FaceReader data with the events coded in Observer XT. To capture the time participants demonstrated engagement, researchers targeted events where participants were coded to be actively engaged. The participants' behaviours were quantified and totalled to measure their overall level of active engagement in the online focus group discussion.

### Limitations

Several limitations were identified. Firstly, the participant pool consisted solely of individuals from educational programs, potentially limiting the applicability of findings to broader demographics. Secondly, participants' familiarity with the virtual environment used in the study may introduce biases in the interpretation of facial expressions and emotional cues. Thirdly, this research study focuses on emotions as interpreted through observed behaviours. Participants may have felt other emotions without demonstrating

any specific observed behaviours. Consequently, these emotions fall beyond the scope of this study. In the future, it may be possible to add galvanic skin response and the measurement of heart rate indicating arousal to the data sources providing access to these undetected emotional responses. Lastly, the subjective nature of emotion interpretation by researchers could introduce bias, influencing how emotions are identified and categorized within the dataset. To address the limitations, the study sessions were structured to encourage interactions, and the data analysis involved iterative steps, including double-coding and reliability checks.

## Findings

In exploring our first research question of what emotions are exhibited while participants are engaged in online learning, we also questioned what emotions were displayed when engaging with peers and what emotions are displayed when engaging with content. We found that participants who displayed positive emotions (e.g., happy, surprised) were likely to contribute with greater frequency than their peers. Additionally, we found that participants exhibiting positive emotions tended to have longer verbal contributions. For example, the participant from one of the sessions displaying the most positive emotions (161 occurrences) contributed 37 times for a total of 639.8 s, while the participant displaying the least positive emotions (12 occurrences) contributed 18 times for a total of 425.5 s. Verbal contributions coded as team building (e.g., "sharing personal information" and "checking in with other participants") were also associated with positive emotions and participants smiling or displaying interest and compassion.

Additionally, participants tended to share personal information in the second half of the session. Verbal contributions also tended to increase in duration in the second half of the discussion. For example, among the three participants in one of the sessions, the longest contribution in the first half was 57.2 s, while in the second half, the longest contribution was 96.6 s long. Furthermore, we found that participants were prone to display negative emotions (e.g., boredom, anger, fear, anxiety, disgust) when they were not verbally contributing to the conversation and appeared not actively engaged through observable body language (e.g., nodding, head shaking, gesturing).

We also found that overall, positive emotions tended to last significantly longer than negative emotions, with one of the participant's overall positive emotions duration of 572.0 s and overall negative emotions duration of 44.4 s. In addressing our second research question, which explores the relationship between attending to other participants' videos and engagement with peers, our study found a notable tendency for participants to use non-verbal body language (e.g., facial expressions, body movements) while making verbal contributions.

Moreover, we found that participants frequently shifted their eye gaze from the center of the screen, where the collage was displayed, to the right side of the screen, where other participants' videos were located. This shift occurred particularly when participants were not verbally contributing to the conversation or immediately after speaking (see Fig. 5). The movement of the eyes to the right suggests increased social awareness, as participants appeared to seek support and validation from their community of practice (CoP) after sharing their viewpoints and while others were speaking. In contrast, during their own verbal contributions, participants' eye gaze focused more on the center

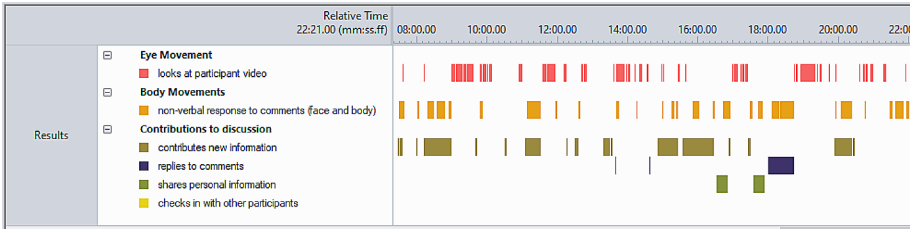


**Fig. 5** Coding sample for engagement behaviours

of the screen, specifically the collage. Participants also reciprocated this support (e.g., nodding or smiling) while others were speaking.

Additionally, participants often directed their attention to peers' video feeds when sharing personal information. This suggests a desire for emotional support and validation during moments of personal disclosure and vulnerability.

Note: This figure illustrates coding visualization. The first line (gray) indicates timestamps. The second line (red) represents looking at other participants' videos. The third line (orange) represents non-verbal communication. The fourth line (brown) represents contributing to the discussion. The fifth line (blue) represents replying to other participants. The sixth line (green) represents sharing personal information. The seventh line (yellow) represents checking in with other participants.

Notably, we found that the duration and pattern of contributions experienced a significant shift during one of the sessions, where an instructor took on the participant role. Specifically, when an instructor assumed the role of a participant, a hierarchical dynamic emerged. In this setting, participants primarily directed their responses to the facilitator, leading to a notable decrease in peer-to-peer interactions.

## Discussion

Our findings resonate with previous research (Blanchard & Markus, 2004; Preece, 1999; Rheingold, 2000), providing empirical confirmation of established trends. For instance, in alignment with Moore's transactional distance theory (1993), we observed that participants were more inclined to share personal information in the second half of our virtual discussions. This pattern suggests a reduction in transactional distance over time, indicating that participants began to perceive the virtual space as a secure and conducive environment for personal disclosure. This finding supports Moore's notion that as participants become more familiar with the learning environment, the perceived psychological distance between them and their peers decreases, fostering a sense of safety.

Similarly, our study corroborated Moore's transactional distance theory (1993) in the context of verbal contributions. We noted that the duration of verbal contributions increased during the second half of our discussions, coinciding with the observed decrease in transactional distance. This pattern aligns with stages of engagement in a CoP from peripheral and passive to a more active and engaged state (Lave & Wenger, 1991). The observed trend in our study reflects this progression as participants became comfortable, shared personal information, and engaged in longer and more informative contributions as the discussion advanced. Our findings also support Gilly Salmon's (2011) Five-Stage Model for e-learning, which outlines the stages learners typically progress through in an online environment: access and motivation, online socialization, information exchange, knowledge construction, and development. Specifically, the

observed increase in engagement and information sharing reflects the transition from the initial stages of access and motivation to the later stages of information exchange, knowledge construction, and development.

Furthermore, our study reinforced a well-documented finding from positive psychology research (Fredrickson, 2001; Lyubomirsky et al., 2005; Seligman & Csikszentmihalyi, 2000) and a multidimensional perspective on student engagement (Heilporn et al., 2024), positing that emotional engagement can significantly influence behavioural engagement. Consistent with Fredrickson's (2003) work on the longevity of positive emotions, we found that positive emotions tend to endure significantly longer than negative emotions in our virtual discussions. This finding aligns with the emerging science of positive psychology, underscoring the value of positive emotions in building and sustaining a sense of community and well-being within the group. For instance, positive emotions like joy, gratitude, and interest can create upward spirals of continued positive affect and social bonding (Fredrickson & Joiner, 2002). These emotions promote behaviours that elicit further positive responses from others, thus prolonging the positive emotional state. In social settings, positive emotions facilitate smoother and more frequent interactions, leading to a feedback loop that sustains these emotions over time (Waugh & Fredrickson, 2006). Moreover, positive emotions are associated with the release of neurotransmitters like dopamine and endorphins, which have lasting effects on mood and can reinforce the emotional experience long after the initial trigger (Ashby et al., 1999). Therefore, the prolonged presence of positive emotions not only enhances immediate interactions but also contributes to the development of a supportive and engaged learning community.

Several factors could account for our finding that participants tended to display negative emotions while not verbally contributing. One possibility is that participants disagreed with the conversation's direction or content, leading to negative emotions and withdrawal from active participation. However, it is also possible that negative emotions displayed during non-participation indicate that participants were still engaged and listening to the conversation. Additionally, these negative emotions might stem from a lack of appropriate challenge. According to Flow Theory (Csikszentmihalyi, 1990), participants must be optimally challenged based on their skill level to experience Flow. If participants are either overkilled or underskilled for the task at hand, they may experience boredom or anxiety, respectively, leading to disengagement. Thus, ensuring the content and interactions are appropriately challenging could mitigate negative emotions and enhance overall engagement (Cleveland-Innes & Campbell, 2012).

Moreover, the observed shifts in eye gaze toward peers' video feeds, particularly during moments of non-verbal contribution or personal disclosure, indicate social awareness and the importance of visual cues in virtual settings. This behaviour suggests that participants actively seek and reciprocate social support and validation, reinforcing the community of practice dynamics outlined by Lave and Wenger (1991). The tendency to look at peers when sharing personal information underscores the need for emotional support and the desire for a secure environment for personal disclosure, resonating with findings by Biocca et al. (2003) and Oh et al. (2018) on social presence.

Participants also tended to use non-verbal language simultaneously to verbally contributing to the discussion, which emphasized the role of the camera in enriching communication. It also facilitated approval and mutual understanding through widely recognized

body language, such as nodding in agreement or smiling in response to shared sentiments. The use of body language enhances communication clarity and impact (Burgoon et al., 2022), suggesting that participants use non-verbal cues to reinforce their verbal messages, possibly linked to TDT principles of reducing distance through effective communication (Moore, 1993). These insights underline the dual role of non-verbal communication in conveying individual messages and fostering group cohesion and emotional support. This dual function is crucial for creating a sense of presence and emotional closeness, reducing transactional distance and promoting an inclusive and engaging online learning environment.

The change in duration and pattern of contributions we observed in the session where an instructor took on the participant role underscores the importance of exploring what happens when the role of the instructor is distributed to all members of the community within FOLC-type environments. Future research in this area could explore the instructor's role, focusing on power dynamics and their influence on establishing and maintaining a cohesive online community. Understanding how instructors navigate their roles and interact with students in such contexts can yield valuable insights for enhancing the effectiveness of online teaching strategies and fostering a more inclusive and engaging online learning environment.

## Conclusions

Our study focused on the Fully Online Learning Community (FOLC) model and its emphasis on emotional intelligence within diverse online learning theories, leading to several notable findings. The FOLC model, grounded in social constructivism and bolstered by theories like Self-Efficacy and Self-Determination Theory (SDT), highlights the essential role of emotions in virtual learning environments. Empirically, this study supports the FOLC model's assertion, revealing a positive correlation between emotional intelligence and student engagement in online settings. This finding underscores the significance of emotional intelligence as a critical facilitator of effective communication and understanding in online education.

Central to our investigation was the interplay between emotions and online engagement. The study distinctly illustrated how positive emotions such as enthusiasm and joy are intrinsically linked to heightened participation and cognitive engagement. Our findings aligned with the conceptual framework's focus on the affective domain, reinforcing the importance of emotional dynamics in learning processes. Equally noteworthy is the role of negative emotions, which, although less extensively explored within this study, presented an area for future inquiry, particularly their capacity to impact engagement and learning outcomes.

Addressing the challenges of creating emotionally supportive online learning environments, we observed several key factors. Technological barriers and digital competencies emerged as significant concerns, affecting everything from background and lighting to internet connection quality, impacting student engagement. The Transactional Distance Theory (Moore, 1993) provided a lens to understand the role of video conferencing and personal information sharing in creating cohesive learning communities. The assertion that reducing transactional distance enhances community cohesion was empirically supported here.

Managing diverse emotional responses and building trust and rapport online presented unique challenges. The study highlighted the importance of instructional design in ensuring active participation and emotional regulation and supporting students' varied emotional and cognitive needs. Cultural differences in communication and ensuring privacy and safety emerged as pivotal concerns in online learning environments. The study's findings on the impact of emotions on engagement substantiate the importance of emotional responses in online learning settings, as outlined in the TIER conceptual framework.

### Recommendations for Future Research

The TIER framework's emphasis on body language was another focal point of our study. Our observations confirmed that non-verbal cues, although limited to the constraints of video camera displays in online environments, are vital for emotional understanding and management within online learning communities. This aspect was underscored in both the literature and our empirical findings. However, our research did not investigate the use of electronic non-verbal cues or the use of negative non-verbal cues, suggesting a potential area for further exploration. Future research should explore how virtual platform design can further support and enhance non-verbal communication strategies to improve interaction quality and learning outcomes. Furthermore, while the role of the instructor was not a primary focus of this study, observations from the session with the instructor present hints at potential differences in dynamics within FOLC-type environments, signalling an avenue for future research.

We recommend that future research extends towards a broader understanding of the affective domain in online learning. Investigating equity and diversity, including cultural nuances, the instructor's role, the sense of belongingness, community size, and the degree of agency afforded to learners, remains crucial. Such exploration is vital in understanding transformational changes from traditional learning contexts, as posited by Coomey and Stephenson (2018), and in enhancing the effectiveness and inclusivity of online learning environments. In conclusion, we propose that this investigative approach offers valuable insights particularly relevant to Fully Online Learning Community settings.

#### Abbreviations

| | |
|---|---|
| CL | Collaborative Learning |
| CMC | Computer-mediated Communication |
| CM | Cognitive Presence |
| DS | Digital Space |
| EMT | Emergency Remote Teaching |
| EI | Emotional Intelligence |
| F2F | Face-to-Face |
| FOLC | Fully Online Learning Communities |
| SDT | Self-Efficacy and Self-Determination Theory |
| SP | Social Presence |
| TDT | Transactional Distance Theory |
| TIER | Triggers (T), Interpretations (I), Emotions (E), and Responses (R) |

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#### Author contributions

AS was the corresponding author and leading/major contributor in writing the manuscript, including developing the conceptual framework, coding scheme, findings and conclusion. AS coded, analyzed and interpreted data. AH contributed to coding, analyzing, and interpreting data, as well as the planning and writing of the methodology and abstract. JB contributed to coding, analyzing, and interpreting data as well as the planning and writing of the methodology. PM contributed to coding, analyzing, and interpreting data. Contributed to the planning and writing of

introduction and findings. JT contributed to coding, analyzing, and interpreting data. JT contributed to the planning and writing of the introduction and findings of the manuscript. AB contributed to the literature review portion of the paper by doing some initial literature searches and writing about the affective domain in fully online contexts. RvO, as an Ontario Tech University faculty member and the director of the EILab where this research was housed, contributed to all aspects of the project and, in particular, was responsible for writing significant portions of the literature review. EC was responsible for the final review and provided valuable feedback for the modification of the manuscript before submission. All authors read and approved the final manuscript.

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**Data availability**
Data will be made available upon reasonable request.

## Declarations

**Ethics approval and consent to participate**
The research study (REB File #14236) received ethics approval from the Ontario Tech Research Ethics Board on March 02, 2023, as confirmed by Dr. Ginny Brunton, REB Vice-Chair. The need for approval was acknowledged, and the study's compliance with ethical standards, including the Tri-Council Policy Statement and Ontario Tech Research Ethics Policy, was verified.

**Consent for publication**
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**Competing interests**
The authors declare no competing interests.

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**References**

Ashby, F. G., Isen, A. M., & Turken, A. U. (1999). A neuropsychological theory of positive affect and its influence on Cognition. *Psychological Review*, *106*(3), 529–550. https://doi.org/10.1037/0033-295X.106.3.529.
Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.
Barrett, L. F., & Russell, J. A. (2015). An introduction to psychological construction. In L. F. Barrett, Russell J. A. (Ed.), *The psychological construction of emotion* (pp. 1–17). Guilford Press.
Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators & Virtual Environments*, *12*(5), 456–480. https://doi.org/10.1162/105474603322761270.
Blanchard, A., & Markus, M. (2004). The experienced sense of a virtual community: Characteristics and processes. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *35*(1), 64–79. https://doi.org/10.1145/968464.968470.
Blayone, T. J. B., vanOostveen, R., Barber, W., DiGiuseppe, M., & Childs, E. (2017). Democratizing digital learning: Theorizing the fully online learning community model. *Int J Educ Technol High Educ*, *14*, 13. https://doi.org/10.1186/s41239-017-0051-4.
Brackett, M. A., Rivers, S. E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Social and Personality Psychology Compass*, *5*(1), 88–103. https://doi.org/10.1111/j.1751-9004.2010.00334.x.
Burgoon, J. K., Manusov, V. L., & Guerrero, L. K. (2022). *Nonverbal communication* (2nd edition.). Routledge.
Cacioppo, J. T., Berntson, G. G., Norris, C. J., & Gollan, J. K. (2012). The Evaluative Space Model. In Van Lange, P., Kruglanski, A.W. & Higgins, E.T. (Eds.). *Handbook of Theories of Social Psychology*, Vol. 1, https://doi.org/10.4135/9781446249215.
Clarke, N. (2010). Emotional intelligence and learning in teams. *Journal of Workplace Learning*, *22*(3), 125–145. https://doi.org/10.1108/13665621011028594.
Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *The International Review of Research in Open and Distributed Learning*, *13*(4), 269–292. https://doi.org/10.19173/irrodl.v13i4.1234.
Coomey, M., & Stephenson, J. (2018). Online learning: It is all about dialogue, involvement, support and control—according to the research. In J. Stephenson (Ed.), *Teaching & learning online* (pp. 37–52). Routledge.
Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.
Czerniewicz, L., Agherdien, N., Badenhorst, J., et al. (2020). A Wake-Up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigit Sci Educ*, *2*, 946–967. https://doi.org/10.1007/s42438-020-00187-4.
Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. In Van P. A. M. Lange, E. T. Higgins, & A. W. Kruglanski (Eds.), *Handbook of theories of social psychology* (pp. 416–437). Sage Publications Ltd.
Derks, D., Fischer, A. H., & Bos, A. E. R. (2008). The role of emotion in computer-mediated communication: A review. *Computers in Human Behavior*, *24*(3), 766–785. https://doi.org/10.1016/j.chb.2007.04.004.
Dhani, P., & Sharma, T. (2016). Emotional intelligence: History, models and measures. *International Journal of Science Technology and Management*, *5*(7), 189–201.
Dhawan, S. (2020). Online learning: A panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018.
Erlam, G. D., Garrett, N., Gasteiger, N., Lau, K., Hoare, K., Agarwal, S., & Haxell, A. (2021). What really matters: Experiences of emergency remote teaching in University Teaching and Learning during the COVID-19 pandemic. *Frontiers in Education*. https://doi.org/10.3389/feduc.2021.639842. 6.

Fasso, W., & Knight, B. A. (2018). Affect in Online Learning: Outcomes, Emotions, and Affective States. In I. Management Association (Ed.), *Innovative Applications of Online Pedagogy and Course Design*, 131–151. https://doi.org/10.4018/978-1-5225-5466-0.ch007.

Fitzner, K. (2007). Reliability and validity: A quick review. *The Diabetes Educator*, *33*(5), 775–780. https://doi.org/10.1177/0145721707308172.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218.

Fredrickson, B. L. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist*, *91*(4), 330–335. https://doi.org/10.1511/2003.4.330.

Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger Upward spirals toward Emotional Well-Being. *Psychological Science*, *13*(2), 172–175. https://doi.org/10.1111/1467-9280.00431.

Graham, S. M., Huang, J. Y., Clark, & Helgeson, V. S. (2008). The positives of negative emotions: Willingness to Express negative emotions promotes relationships. *Personality and Social Psychology Bulletin*, *34:3*, 394–406.

Gunasekara, A. N., Turner, K., Fung, C. Y., & Stough, C. (2022). Impact of lecturers' emotional intelligence on students' learning and engagement in remote learning spaces: A cross-cultural study. *Australasian Journal of Educational Technology*, *38*(4), 112–126. https://doi.org/10.14742/ajet.7848.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications*, 1(2/3), 147–166.

Gunawardena, C. N., & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education*, *11*(3), 8–26. https://doi.org/10.1080/08923649709526970.

Hadar, L. L., Alpert, B., & Ariav, T. (2021). The response of clinical practice curriculum in teacher education to the Covid-19 breakout: A case study from Israel. *Prospects*, *51*, 449–462. https://doi.org/10.1007/s11125-020-09516-8.

Heilporn, G., Raynault, A., & Frenette, É. (2024). Student engagement in a higher education course: A multidimensional scale for different course modalities. *Social Sciences & Humanities Open*, *9*, 100794. https://doi.org/10.1016/j.ssaho.2023.100794.

Hod, Y., Bielaczyc, K., & Ben-Zvi, D. (2018). Revisiting learning communities: Innovations in theory and practice. *Instructional Science*, *46*(4), 489–506.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The Difference Between Emergency Remote Teaching and Online Learning. Educause Review 2020. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and_online-learning.

Hope, A., Branch, J., Lean, G., & vanOostveen, R. (2023). Exploring Faculty and Student Awareness of Web 2.0 and 3.0 Tools in Fully Online Learning Community Environments. In T. Bastiaens (Ed.), Proceedings of EdMedia + Innovate Learning (pp. 1326–1332). Vienna, Austria: Association for the Advancement of Computing in Education (AACE). Retrieved July 25, 2023 from https://www.learntechlib.org/primary/p/222652/.

Kaufmann, R., & Vallade, J. I. (2022). Exploring connections in the online learning environment: Student perceptions of rapport, climate, and loneliness. *Interactive Learning Environments*, *30*(10), 1794–1808. https://doi.org/10.1080/10494820.2020.1749670.

Lakhal, S., Mukamurera, J., Bedard, M-E., Heilporn, G., & Chauret, M. (2020). Features fostering academic and social integration in blended synchronous courses in graduate programs. *International Journal of Educational Technology in Higher Education*, *17*(5). https://doi.org/10.1186/s41239-020-0180-z.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.

Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, *131*(6), 803–855. https://doi.org/10.1037/0033-2909.131.6.803.

McKeithan, G. K., Rivera, M. O., Mann, L. E., & Mann, L. B. (2021). Strategies to promote meaningful student engagement in online settings. *Journal of Education and Training Studies*, 9(4). https://redfame.com/journal/index.php/jets/article/view/5135/5402.

Meneghel, I., Salanova, M., & Martínez, I. M. (2016). Feeling good makes us stronger: How Team Resilience mediates the effect of positive emotions on Team Performance. *Journal of Happiness Studies*, *17*, 239–255. https://doi.org/10.1007/s10902-014-9592-6. https://doi-org.uproxy.library.dc-uoit.ca/.

Molinillo, S., Aguilar-Illescas, R., Anaya-Sánchez, R., & Vallespín-Arán, M. (2018). Exploring the impacts of interactions, social presence and emotional engagement on active collaborative learning in a social web-based environment. *Computers & Education*, *123*, 41–52. https://doi.org/10.1016/j.compedu.2018.04.012.

Moore, M. G. (1993). The theory of transactional distance. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 66–85). Routledge.

Norris, C. J., Gollan, J., Berntson, G. G., & Cacioppo, J. T. (2010). The current status of research on the structure of evaluative space. *Biological Psychology*, *84*(3), 422–436. https://doi.org/10.1016/j.biopsycho.2010.03.011.

Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A Systematic Review of Social Presence: Definition, Antecedents, and Implications. Frontiers in Robotics and AI, 5, 114–114. https://doi.org/10.3389/frobt.2018.00114.

Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and Student Engagement. In S. Christenson, A. Reschly, & C. Wylie (Eds.), *Handbook of Research on Student Engagement*. Springer. https://doi.org/10.1007/978-1-4614-2018-7_12.

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and Peripheral routes to persuasion. *Journal of Personality and Social Psychology*, *46*(1), 69–81. https://doi.org/10.1037/0022-3514.46.1.69

Preece, J. (1999). Empathic communities: Balancing emotional and factual communication. *Interacting with Computers*, *12*(1), 63–77. https://doi.org/10.1016/S0953-5438(98)00056-3.

Quinlan, K. M. (2016). How emotion matters in four key relationships in teaching and learning in higher education. *College Teaching*, *64:3*, 101–111. https://doi.org/10.1080/87567555.2015.1088818.

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2019). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learning Environments Research*. https://doi.org/10.1007/s10984-019-09303-z.

Rheingold, H. (2000). *The virtual community: Homesteading on the electronic frontier (Rev. ed)*. MIT Press.

Rovai, A. P. (2002). Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *Internet and Higher Education* 5, 319–332. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=a3af6140b0b50559b44385d98012f9ee46e5b4b4

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161–1178. https://doi.org/10.1037/h0077714.
Saichale, K. (2020). Blended, flipped, and Hybrid Learning: Definitions, developments, and directions. *New Directions for Teaching and Learning*, *2020(164)*, 95–104.
Salmon, G. (2011). E-moderating: The key to teaching and learning online (3rd ed.). Routledge. https://doi.org/10.4324/9780203816684.
Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory. In K. R. Wentzel, & A. Wigfield (Eds.), *Handbook of motivation at School*. Routledge.
Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*(1), 5–14. https://doi.org/10.1037/0003-066X.55.1.5.
Silverman, D. (Ed.). (2021). *Qualitative research*. SAGE. (5E.).
Trninic, D., Swanson, H., & Kapur, M. (2018). Productive dissent in learning communities. *Instructional Science*, *46*(4), 621–625.
Tu, C. H., & McIsaac, M. (2002). The relationship of Social Presence and Interaction in Online classes. *American Journal of Distance Education*, *16*(3), 131–150. https://doi.org/10.1207/S15389286AJDE1603_2.
Usher, M., Hershkovitz, A., & Forkosh-Baruch, A. (2021). From data to actions: Instructors' decision making based on learners' data in online emergency remote teaching. British Journal of Educational Technology, 2021, 1–19.
vanOostveen, R., DiGiuseppe, M., Barber, W., Blayone, T., & Childs, E. (2016a). New conceptions for digital technology sandboxes: Developing a Fully Online Learning Communities (FOLC) model. In *Proceedings of EdMedia: World Conference on Educational Media and Technology* 2016 (pp. 672–680). Association for the Advancement of Computing in Education (AACE), June 29, 2016, Vancouver, B.C. Retrieved from https://www.learntechlib.org/primary/p/173015/.
vanOostveen, R., Childs, E., Clarkson, J., & Flynn, K. (2016b). Becoming close with others online: Distributed community building in online PBL courses. *The College Quarterly*, 19(1). Retrieved from http://collegequarterly.ca/2016-vol19-num01-winter/becoming-close-with-others-online.html.
vanOostveen, R., Childs, E., Gerbrandt, J., & Awwadah, K. (2018). Exploring social immediacy/intimacy in fully online learning communities through synchronous tools. In T. Bastiaens, J. Van Braak, M. Brown, L. Cantoni, M. Castro, R. Christensen, G. Davidson-Shivers, K. DePryck, M. Ebner, M. Fominykh, C. Fulford, S. Hatzipanagos, G. Knezek, K. Kreijns, G. Marks, E. Sointu, E. Korsgaard Sorensen, J. Viteli, J. Voogt, P. Weber, E. Weippl & O. Zawacki-Richter (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 2138–2141). Amsterdam, Netherlands: Association for the Advancement of Computing in Education (AACE). Retrieved October 19, 2018 from https://www.learntechlib.org/p/184455.
vanOostveen, R., Hunter, W. J., Childs, E. A., Barber, W., & Gerbrandt, J. (2021). Collaborative learning in co-created Digital Space: The fully online Learning Community Model. In H. K. Dhir (Ed.), *Barriers for Teaching 21st-Century competencies and the impact of digitalization*. IGI Global.
Waugh, C. E., & Fredrickson, B. L. (2006). Nice to know you: Positive emotions, self-other overlap, and complex understanding in the formation of a new relationship. *The Journal of Positive Psychology*, *1*(2), 93–106. https://doi.org/10.1080/17439760500510569.
Wu, R., & Yu, Z. (2022). Exploring the effects of achievement emotions on online learning outcomes: A systematic review. *Frontiers in Psychology*, *13*., Article 977931. https://doi.org/10.3389/fpsyg.2022.977931.
Yagci, U., & vanOostveen, R. (2021). Developing coding structures for becoming affect-savy in the fully Online Community Model. *Journal of Educational Informatics*, *2*(1), 3–23. https://doi.org/10.51357/jei.v2i1.105.
Zembylas, M. (2008). Adult learners' emotions in online learning. *Distance Education*, *29*(1), 71–87. https://doi.org/10.1080/01587910802004852.

## Publisher's Note