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Using qualitative content analysis of social presence indicators within the Community of Inquiry model.

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Introduction

In 2000, Garrison et al. developed the Community of Inquiry (CoI) framework with the aim of structuring the process of learning in an online environment. It consists of three interrelated presences:

- social presence – the degree to which participants present themselves as 'real' people in an online community,
- cognitive presence – the degree to which learners can create meaning through sustained communication, and
- teaching presence – the design of learning materials which facilitate the development of the above two presences (Garrison, et al., 2000).

Figure 1 shows how these three presences overlap and when all three presences are effective, students benefit from a positive educational experience. Within each presence, several categories have been created to show different aspects of each presence in action (Stenbom, 2018). For example, social presence can be demonstrated by open communication; cognitive presence by exploration by students and resolving issues; and finally teaching presence is shown through facilitating discourse or direct instruction.

Two approaches have been developed and applied to analyse data for the CoI framework: content analysis of Computer Mediated Communication (CMC) and the more regularly used CoI survey. However, these were developed just as social media was in its infancy. Twitter went live in 2006 and has since grown to be used by 396 million people (The Social Shepherd, 2022). The CoI framework has been used regularly for Twitter analysis, but this paper argues that more qualitative content analysis is required along with a more appropriate form of coding to coincide with the affordances of the Twitter platform and how users adapt their use of language to fit their needs and the restrictions of the platform. This paper is based on the literature review, planned methodology and early data collection for a Doctorate of Education thesis researching how distance learners at The Open University establish social presence on Twitter to build a Community of Inquiry. The scope of the thesis and this paper is only on social presence within the CoI framework rather than all three presences and therefore focuses on Open University student-to-student interaction on Twitter.

Literature Review

This section discusses social presence within the Community of Inquiry framework, its subsequent measurement tools and examples of content analysis of social presence indicators.

Social presence within the Community of Inquiry framework
Social Presence is considered a key factor in effective online communication and learning as shown in the yellow circle in Figure 1 including socialisation, interaction and community development. Social presence is recognised as crucial to engaging groups in interaction and communication (Rourke, et al., 2001) and particularly important in online learning (Conklin, et al., 2019).

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It has been heavily used, discussed, and examined since its introduction although Jézégou's (2010) critical analysis of the model highlights some weaknesses including the lack of connection to its theoretical foundations in socio-constructivism and the difficulties in applying the indicators of each form of presence. Choo et al. (2020) use the Community of Inquiry framework to explore students' perception of the three presences in online courses and how it relates to course satisfaction through a survey of 223 US business students. This study argued that the most important presences for student satisfaction of online courses were teaching and cognitive but felt that social presence was the least important (p.179).

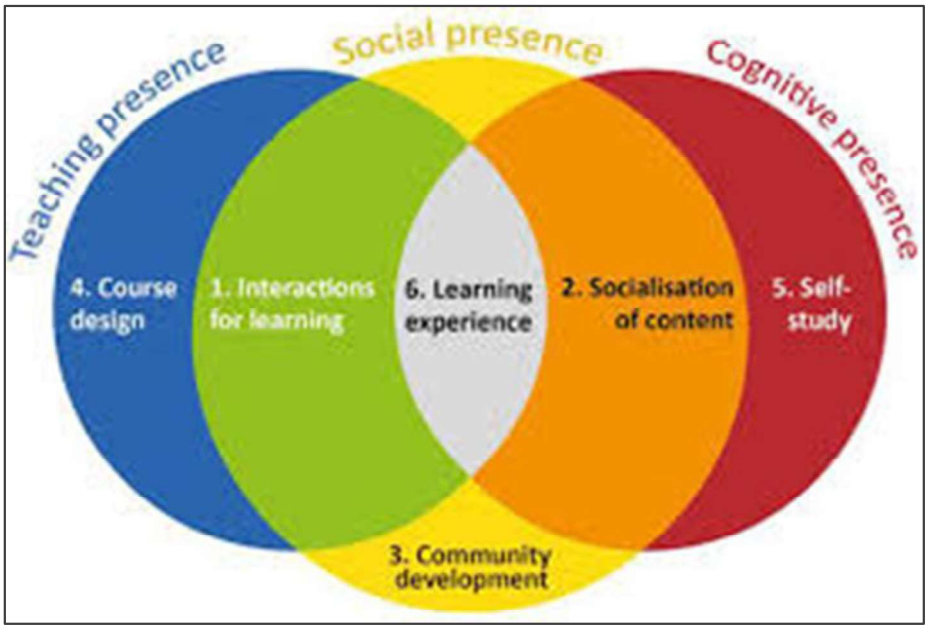

Figure 1: Community of Inquiry Framework (Garrison et al., 2000)

However, Andrews & Tynan (2012) showed that informal student networks were most beneficial for students to develop a sense of community while it is also claimed that establishing social presence will reduce students' feelings of isolation (Phirangee & Malec, 2017). Gossain (2019) claims that students are very aware of their social presence and 'curate their own digital identity based on what they post, their preferences, likes and follows' (p.84). While Rourke et al. (2001) argue that the aim for students to develop social presence is only to allow for effective cognitive presence, if participants do not find the interaction enjoyable and fulfilling, they will not remain in the group (Garrison, et al., 2000).

Social Presence survey

The CoI survey was first developed by Arbaugh et al. (2008) with the aim of providing empirical evidence of the framework's effectiveness taking it in a more quantitative direction. It is considered a valid, reliable and efficient measure of the dimensions of social presence. Arbaugh et al. (2008) developed 34 statements using a Likert scale of 0=Strongly disagree to 4=Strongly agree which were then used to calculate mean scores for each statement and collectively for each presence.

The CoI survey is relatively easy for researchers to use in a variety of study settings. For example, Choo, et al. (2020) used the Likert scale survey to study the extent to which the CoI framework can predict students' satisfactory learning experiences in online undergraduate business courses (p.173). Conklin et al. (2019) used analysis of survey responses for their study focusing on social presence for online students using a closed social media platform known as Yellowdig within a module.

The findings concluded that use of the platform did not affect social presence for these students but recognised that using an unfamiliar platform may have affected the outcome of the study and suggest that using Twitter may have had a different result. Delello & Consalvo's (2019) study focused directly on synchronous Twitter chats and argued that they help to achieve social presence. However, none of these studies analysed the messages written and posted by the students.

According to Stenbom's (2018) systematic review of studies using the Community of Inquiry survey, it provides 'results that are valid and reliable' (p.22) but needs to be used in more varied settings to allow for more general claims about online learning. While this recognised CoI survey instrument has been established and tested (Stenbom, 2018), it is clear from Garrison et al.'s (2000) original explanation of the CoI framework that it should be used to analyse original posts made in an online setting rather than retrospective thoughts on the experience of the discussion (p. 88).

Content analysis of Social Presence

Social presence within the Community of Inquiry framework is defined as 'the extent to which people within a network are perceived as real people' (Garrison, et al., 2000). As outlined, a weakness in much of the research into how students establish this social presence on Twitter is basing analysis solely on survey responses rather than including content analysis of student messages. Analysing the interactions of people on these social media platforms gives a more realistic view of how people interact within their network rather than basing it solely on their perception of the interaction. Content analysis is a methodological framework where textual analysis is applied to pre-existing material defining strict, systematic 'procedures for the rigorous analysis, examination, replication, inference and verification of written data' (Cohen, et al., 2018). Twitter has high amounts of naturally occurring data requiring reduction to manageable and comprehensible proportions. This is a key element of qualitative analysis, facilitating the systematic coding analysis of written communication making it possible to identify and classify words or phrases in terms of their structure and semantics, focusing on drawing valid conclusions from data in relation to the context in which it is found (Einspanner, et al., 2014).

Rourke et al. (2001) developed criteria and measurement tools for content analysis of social presence demonstrated within CMC, including a coding table of categories and indicators of social presence. The three categories indicating the nature of communication are affective (relating to emotions, feelings and mood); interactive (referring to building and maintaining relationships through replies and discussion); and cohesive (relating to group commitment and greetings) (Chatterjee & Parra, 2021). Within each category, a range of indicators are suggested for the types of messages that demonstrate that category of social presence as shown in Table 1.

Social Presence	
Categories	Indicators
Affective	Emoticons, humour, self-disclosure
Interactive	Continuing a thread, complementing, asking questions, retweets (quoting), replies, likes
Cohesive	Vocatives (using names), inclusive pronouns (we, our), salutations (greetings)

Table 1: Social presence categories and indicators within the CoI framework

Due to the large sample sizes when collecting tweets, data analysis software often supports the coding process. There is a wide range of Computer-Assisted Qualitative Data Analysis (CADQAS) software available, such as NVivo, for tweet content analysis and coding. Each tweet should be coded based on the style of language used and may fall within more than one category or indicator.

Category	*Indicators*	*Definition*	*Example*
Affective	Expression of emotions	Conventional expressions of emotion, or unconventional expressions of emotion, includes repetitious punctuation, conspicuous capitalization, emoticons.	"I just can't stand it when ...!!!!" "ANYBODY OUT THERE!"
	Use of humor	Teasing, cajoling, irony, understatements, sarcasm.	The banana crop in Edmonton is looking good this year)
	Self-disclosure	Presents details of life outside of class, or expresses vulnerability.	"Where I work, this is what we do ..." "I just don't understand this question"
Interactive	Continuing a thread	Using reply feature of software, rather than starting a new thread.	Software dependent, e.g., "Subject: Re" or "Branch from"
	Quoting from others' messages	Using software features to quote others entire message or cutting and pasting selections of others' messages.	Software dependent, e.g., "Martha writes:" or text prefaced by less-than symbol <.
	Referring explicitly to others' messages	Direct references to contents of others' posts.	"In your message, you talked about Moore's distinction between ..."
	Asking questions	Students ask questions of other students or the moderator.	"Anyone else had experience with WEBCT?"
	Complimenting, expressing appreciation	Complimenting others or contents of others' messages.	"I really like your interpretation of the reading"
	Expressing agreement	Expressing agreement with others or content of others' messages.	"I was thinking the same thing. You really hit the nail on the head."
Cohesive	Vocatives	Addressing or referring to participants by name.	"I think John made a good point." "John, what do you think?"
	Addresses or refers to the group using inclusive pronouns	Addresses the group as *we, us, our, group.*	"Our textbook refers to ..." "I think we veered off track ..."
	Phatics, salutations	Communication that serves a purely social function; greetings, closures.	"Hi all" "That's it for now" "We're having

Figure 2: Rourke et al.'s 2001 Social Presence Coding System

Rourke et al.'s (2001) original coding system, shown in Figure 2, was developed from CMC data in an online forum room at a conference. This meant that the affordances of a forum discussion, such as no limit to length of messages and more formal use of greetings, affected how the indicators were developed and described.

Lomicka & Lord's (2012) research used both the CoI survey and Rourke et al.'s (2001) coding system to examine how student social presence develops over a semester on Twitter and found that participants quickly formed a collaborative community for learning, sharing and reflecting. Most tweets fell within the affective and interactive indicators with a low number of cohesive examples of tweets but overall, they argue that these results fit with Garrison et al.'s (2000) theory of what constitutes a community within the CoI framework. While this research does directly analyse student tweets, so deals with concerns raised in Section 2.2, it was a compulsory teacher led task which students had to participate in as part of the course. This raises concerns about participant freedom of choice to take part in the research. It also only had 13 participants (11 female, 2 male) which limits the generalisability of the results. The authors suggest that follow-up research would be useful to see if students continued to use Twitter after the compulsory task had ended (Lomicka & Lord, 2012, p.59).

As the Twitter platform became more widely used in education and further studies were carried out, some researchers began to adapt the social presence indicators. This development of the codes and how it led to the coding system for my research will be outlined in the next section.

Methodology & Adaptations to Social Presence Indicators

The Open University (OU) is a large UK-based distance learning institution with over 175,000 students (The Open University, 2020). The Open University has a presence on most social media sites and within Twitter, it has various accounts for different faculties, modules and regions. The main account, @OpenUniversity, had over 172,000 followers in August 2022 while the official OU Student account, @OUStudents, had 31,400 followers and OU students regularly use this platform to communicate with each other and the university. As part of a doctoral research thesis, the use of Twitter by OU students was studied to discover how they used the platform and whether the communication would demonstrate social presence within the Community of Inquiry Framework. To assess this, tweets that contained key OU hashtags (#OUStudents or #OpenUniversity) or tagged the Twitter accounts @OUStudents or @OpenUniversity were collected between 1st August 2021 and 31st December 2021. Twitter's usual search function only allows a search of tweets posted within the last 7 days. Therefore, a Twitter Archiving Google Sheet (TAGS) was used to collect tweets over this six-month period which collected 45,111 tweets. Four activity peaks within that six-month period were identified and the tweets which occurred within the week surrounding that activity peak were selected for content analysis. This study received ethical approval from the Open University's Human Research Ethics Committee (HREC) and Student Research Project Panel (SRPP) and was logged with the Data Protection Officer.

The content analysis used the social presence indicators within the Community of Inquiry framework to assess to what extent students are establishing social presence on Twitter. Rourke et al.'s (2001) coding system was used as a starting point with inductive adaptations as tweets were coded. This led to changes in the indicators of social presence to make it more suitable for content analysis of tweets, shown in Table 2. Raw numbers of indicators were tallied and converted to percentages to facilitate comparison.

Category	Indicators	Examples from study
Affective	Expressions of Emotion	Positive: Phew, heart emojis, xx
		Negative: 'I hate this'
	Use of humour	Lol, sarcasm, jokes, wink or laughing emojis
	Self-disclosure	Personal information, 'I'm a single Mum'
		OU related information, 'I'm studying law'
Interactive	Direct reply	@mention reply
	Quoting another's message	Retweet (only counted in this indicator)
		Quote Retweet (new text coded for other indicators)
	Support	Giving advice
		Mention previous tweet
	Asking questions	Contains a question or implies a question.
	Complimenting/ Appreciation	'Thanks', 'you'll do great', 'well done', 'Congratulations', 'You've got this'
	Agreeing	'Yes', 'same here'
Cohesive	Vocatives	Name used in tweet 'Thanks Sam' or adding @mention later in tweet
	Group pronouns	Our, we, us, thanks everyone, 'my fellow students'
	Greetings	Hi, Happy Birthday, see you soon
		Good luck

Table 2: Adapted Social Presence coding system for Twitter

Some important adaptations included the separation of retweets and quote retweets. An affordance of Twitter is the possibility to retweet a post which is often seen as a show of support for the tweet and helps to bring it to the attention of a user's followers. Retweeting was traditionally included under Rourke et al.'s (2001) 'Quoting another message'. However, the choice of how to code retweets and quote retweets is an important consideration. While it could be argued that a retweet is getting the same message out to more people and amplifying it, it was decided to only code a retweet once in the quote category and not code any other text within the tweet which helps to avoid double coding of the original tweet. However, when the user retweets the original tweet but also adds their own text to the post, known as a Quote retweet, the new text added in the quote retweet was coded for other indicators.

Instances of self-disclosure were further separated to indicate whether students disclosed information related to their OU studies or their personal lives outside of study. This would allow for further analysis of the types of self-disclosure that students demonstrated. For example, within OU study related self-disclosure, students discussed the courses or degree pathways they were on. Non-OU study related examples of self-disclosure were often very personal including hardships suffered during previous educational experiences and how they came to select OU study.

Rourke et al.'s (2001) original descriptors did not separate emotion into positive or negative while some later adaptions did (Zou, et al., 2021). During coding, tweets which indicated emotion were separated into negative and positive to see if this would give further insight into the type of communication taking place between OU students on Twitter and present a form of sentiment analysis.

With regards to the use of vocatives under the Cohesive category, my research has taken a different approach to Baisley-Nodine at el. (2018) which counted @mentions which automatically appear in Twitter when the reply button is used as indicative of a vocative within the tweet. This led to double counting and heavily skewed results for the use of vocatives in their research. To more accurately show when a user takes the conscious decision to refer directly to a person they are communicating with, the adapted coding only counted a vocative when the user added a name such as 'Thanks Melanie' or included an @mention later in their tweet. This is regularly used in tweets to alert someone to being included in the discussion as they will receive a push notification.

Greetings are forms of communication that serve a purely social function and include words like 'Hi', 'Enjoy' or 'see you soon'. Due to the short number of characters available in tweets (280) most users leave out these phrases and it provides a further reason why this framework needed to be adapted from Rourke et al.'s (2001) original purpose of analysing forum discussions where word limit is not an issue and replies are often in the style of emails. 'Good luck' was placed into this category as this is a general greeting rather than a distinct sign of belief in the other user and somewhat different to phrases like 'You've got this' or 'You'll do great'. However, to ensure this wasn't skewing results for greetings, 'Good luck' was placed into a single subcategory which could be moved later if necessary.

Discussion of preliminary research findings

A preliminary coding of 1142 tweets included 2862 instances of social presence giving an average of over 2.5 social presence indicators per tweet. Rourke et al. (2001) originally designed the social presence density measurement tool to equally weight each of the 12 indicators. Figure 3 shows a visual representation of the breakdown of indicators. The initial three categories: interactive, affective and cohesive are shown in the centre leading to the second level indicators and finally the third level, including my newly added subcategories of indicators to allow for deeper content analysis and understanding of what OU students are saying on Twitter.

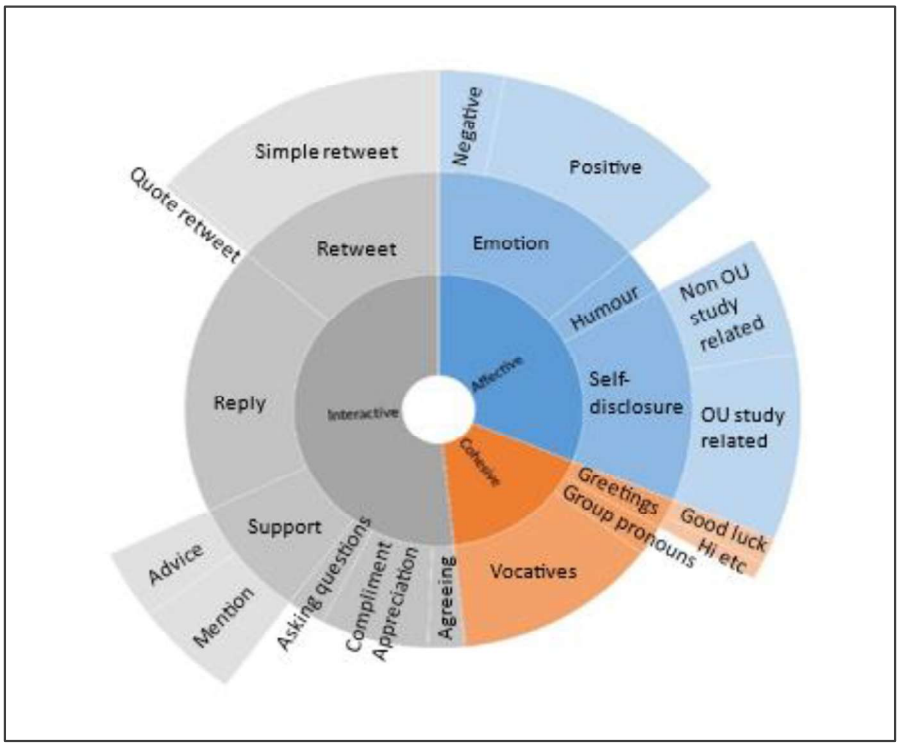

Figure 3: Visual representation of preliminary content analysis

At first glance, over half of the social presence indicators fell within the Interactive category including 523 replies. This is one of the many affordances of the Twitter platform that allows users to easily reply directly to any tweet. This automatically attaches the @username of the original tweet as well as anyone else mentioned in that tweet to the reply and Twitter uses push notifications to alert the original user that someone has replied to them, facilitating active discussion. A high number of replies suggests a community which gets involved in conversation and interaction with each other rather than mostly posting single tweets and is a good indicator of social presence when users want to initiate and respond to conversation within the group.

Perhaps more surprisingly for a public platform such as Twitter, the next two most prevalent indicators were 'expressing emotion' and 'self-disclosure'. For expressing emotion, examples included the use of emojis or phrases like 'I'm excited' or 'I'm nervous'. For self-disclosure, this included when students mentioned what course they were studying or some details about how they have found their OU journey or education so far. It is often assumed that students may be reluctant to share this information on a public platform due to privacy concerns (Tu, 2002). Tu (2002) argued that 'When one perceives an online learning environment to be less private, or they are unable to maintain their privacy online, they would naturally be less interactive' (p.94). However, the results from this research suggest otherwise and found that within the OU student community on Twitter, people often share information about their study progress and life experiences while keeping their profiles and tweets public. This can help to motivate and encourage others but also shows that students feel comfortable to share their personal stories and consider this a 'safe' space and links back to the original definition of social presence demonstrating that the people involved in this online community are 'real people'.

Within the emotion indicator, over 80% of tweets were of a positive nature with phrases such as 'very excited'; 'I loved studying' and 'can't wait to be back'. Therefore, less than 20% of tweets indicated a negative emotion with phrases such as 'I'm struggling really badly' and 'so much time wasted'. However, this would further demonstrate an issue with qualitative content analysis and the importance of 'units of meaning'. In some cases, a phrase such as 'I'm terrified' was used when students tweeted about starting a new module. At face value, this would suggest a strong negative emotion but in the context of tweets, this phrase is often used in an exaggerated comical way such as 'New module begins today, I'm terrified lol'. A phrase like 'I miss my student work' implies the student enjoyed studying and wishes they were doing more. This shows the importance of not depending on computer algorithms to calculate sentiment analysis where phrases like this can lead to false finds (Jackson & Bazeley, 2019).

There were 342 incidences of vocatives showing these are regularly used to build social presence. The regular use of names shows that users see others involved in the discussion as real people behind their username. The lowest incidences were Group Pronouns, involving the use of words like 'we' or 'us,' and Greetings at only 2% each.

Conclusion

This paper has argued that measuring social presence on Twitter within the Community of Inquiry framework requires more use of content analysis of tweets rather than basing analysis solely on the CoI survey results. Analysing the text of CMC on social media platforms rather than just how people perceive that interaction gives a more accurate picture of how the platforms are being used.

Alongside this, it has also been important to consider updating the original indicators of social presence for content analysis developed by Rourke et al. (2001) to ensure they are more suited to how Twitter is used. Affordances of Twitter such as keeping track of reply threads and quote retweets needed to be integrated. However, limitations of the platform, particularly character length have changed how users communicate on Twitter.

Other changes such as splitting emotion into positive and negative or self-disclosure into different topic areas allow for a fuller understanding of the manner of communication taking place within the online community.

This forms part of a doctoral research study which continues to develop the social presence indicators within the Community of Inquiry framework through further inductive coding of Open University student tweets to test if these students are demonstrating social presence through their interaction. Junko et al. (2013) argue that students need 'to improve their capacity to initiate self-directed, collaborative practices as a means to more effectively take ownership of their learning' (Junko, et al., 2013, p. 285). There is a growing requirement for further research into how students use social media to better develop self-directed learning and networking opportunities for them (Booth, 2015; Junko, et al., 2011). It also links closely with Contact North's (Peters, et al., 2018) suggestion of the importance of considering online support groups as an integral part of what online universities offer to replace similar student support systems in conventional universities and help to limit feelings of isolation.

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