
Applying the community of inquiry framework: a novel tool for systematic and economic coding and analysis of forum discourse *in situ* and in context

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Abstract: The online discussion forum (ODF) is one of the most widely used e-learning tools in open distance learning (ODL) environments. A popular line of research focuses on producing instruments that can be used to assess the level and amount of learning that takes place via transcript analysis of ODF-discourse. Of current interest is the influential community of inquiry (CoI) theoretical framework, first described by Garrison, Anderson and Archer in 2000. With validation of an ever-evolving framework a constant research focus, the CoI literature provides little insight into educator-level experiences when applying the framework.

This paper describes and documents the author's approach and experience in using the framework to assess the status of the CoI in an ODF-driven course. In particular, it describes the motivation for, design, application and analysis results achieved with a novel tool that allows systematic and economical coding and analysis of ODF discourse *in situ* and in context.

Keywords: community of inquiry framework; online discussion forums; ODF; coding; analysis; transcript analysis.

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1 Introduction

The online discussion forum (ODF) is one of the most widely used e-learning tools in open distance learning (ODL) environments (MacDonald, 2008). Whereas the initial purpose of ODF's may have been a convenient way of communicating with other group members as a viable alternative to face-to-face meetings (Finegold and Cooke, 2006), it

is increasingly being recognised as a valuable e-learning tool. For this reason, a popular line of research focuses on producing instruments that can be used to assess the level of learning that takes place via transcript analysis of ODF discourse. There is a need for such analysis since the pedagogy behind ODFs assumes that students will work together and not independently as in traditional distance education (Swan and Ice, 2010). Since 1992 at least 15 content analysis instruments have been suggested by various authors, starting with the model of Henri (1992), to a recent framework suggested by Weinberger and Fischer (2006). Each instrument approaches analysis from a different theoretical background and employs wide-ranging units of analysis. But the theoretical and empirical bases of all these instruments need to be improved (De Wever et al., 2006).

The focus of this paper is on one such instrument. The community of inquiry (CoI) theoretical framework, first described by Garrison, Anderson and Archer in 2000, seeks to define, describe and measure elements supporting the development of online learning communities. It originated specifically in the context of computer conferencing in higher education, i.e., asynchronous, text-based group discussions (Garrison et al., 2010). It is one of the most influential online learning frameworks available today with the initial CoI article, published in 2000 by Garrison et al., having been cited 1,275 times on Google Scholar at the time of writing. Whereas a number of studies have validated the CoI framework (e.g., Arbaugh et al., 2008; Garrison and Arbaugh, 2007), it is yet to become a full-fledged theory of online learning, partly because of difficulties related to a methodology which can best be described as exploratory and interpretivist.

A fictional but largely autobiographic scenario presented in the introduction to an early CoI framework paper by Rourke et al. (2001) not only provides the motivation for the development of the framework, but also describes some of the methodological challenges of transcript analysis as it relates to the framework itself.

“A mildly exhausted Professor Jones, who has just completed an online course, attempts to reflect on the success of her course by analyzing readily-available transcripts of student messages generated over 13 weeks on a forum for evidence of higher-order thinking. She is quickly disappointed when the 950 messages take her 4 days to analyse. Attempts at cutting and pasting illustrations of higher-order thinking into a word-processor ... result in a hodge-podge of decontextualized quotations. Running out of time, she finds a set of criteria in the literature and hires two students (raters) to review the messages and identify certain constructs – only for them to disagree on 70% of the categorizations, while one has identified 2032 incidents and the other only 635. Feeling overwhelmed and depressed, Professor Jones returns to the literature only to find that most of the methodological issues she has been dealing with have not been addressed by major researchers in the field. She also finds that there is no coherent, long-term tradition of researchers who have resolved the methodological problems.” (Condensed from Rourke et al., 2001).

In reviewing the history of the CoI framework nearly a decade later, Garrison et al. (2010) note that the challenges as illustrated in this story remain in existence today. As the framework evolved over a decade of research, these challenges were extended to include epistemological issues related to the forms of learning that are exposed in transcripts, the choice of best unit of analysis, and an inherent challenge of identifying and counting many more interesting variables (Garrison et al., 2010). In an effort to resolve these issues, and because the CoI framework is not intended as a recipe or craft know-how (Garrison et al., 2010), research does not report on educator-level

experiences in applying the framework. The result is that educators may be unable to make decisions on the extent to which they can apply the CoI framework to their own settings.

The main purpose of the current paper is to fill this gap in the CoI literature by describing and documenting the context of the author's experiences in using the framework to assess the status of the CoI in an ODF-driven course. Whereas the CoI-framework holds intuitive appeal, he finds himself in the same position as Professor Jones. An explosive growth in administration, a decline in faculty influence, and the institutional corporatisation of universities, as aptly described by Ginsberg (2011), leaves little space, time, and energy for formal reflection. In an attempt to overcome these restraints, a novel CoI coding tool was conceived, developed and applied.

The paper is structured as follows. Firstly, a brief review of relevant CoI research is presented. Two pervasive issues that led to the development of the novel CoI coding tool are highlighted. The subsequent development and functionality of this tool are presented next. The paper then reports on a recent application of the tool in a web-based distance course. Two dynamically-generated analysis reports are compared with one another, and then related to the results from a recently-introduced and student-driven CoI-survey instrument. The latter approximates the essential elements of the CoI framework. Throughout the paper, the approach followed is documented.

2 A brief review of the CoI framework and related research

The definition of an educational CoI as provided by the CoI authors, is:

“A group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding. The CoI framework represents a process of creating a deep and meaningful (collaborative-constructivist) learning experience through the development of three interdependent elements – social, cognitive and teaching presence” (CoI, 2011).

Social presence is defined as the ability of participants to identify with the community, communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities (Garrison, 2007). Teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes (Anderson et al., 2001). Lastly, cognitive presence is defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2001). Hence, in an environment that is intellectually and socially supportive, and with the guidance of a knowledgeable instructor, students will engage in meaningful discourse, the result being personal and lasting understanding of course topics (Rourke and Kanuka, 2009).

To measure these presences from ODF transcripts, various coding schemes have been suggested over the years. Table 1 presents the benchmark CoI coding scheme, as proposed by Garrison and Arbaugh (2007).

Table 1 CoI elements, categories and indicators

<i>Components</i>	<i>Categories</i>	<i>Indicators</i>
Social presence	Open communication	Risk-free expression
	Group cohesion	Encourage collaboration
	Affective expression	Emoticons
Cognitive presence	Triggering event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Applying new ideas
Teaching presence	Design and organisation	Setting curriculum and methods
	Facilitating discourse	Sharing personal meaning
	Direct instruction	Focusing discussion and resolving issues

Source: Garrison and Arbaugh (2007, p.159)

The purpose of the coding scheme is to assist the coder in analysing ODF-transcripts by way of quantifying the interactions that takes place, inter alia, between instructors, students and content. Each presence is defined by several categories and indicators, the latter guiding the coding of transcripts.

Two pervasive issues from the CoI and general literature as it relates to the methodology of discourse analysis and the purpose of this paper are highlighted.

Firstly, the act of discourse analysis (covering both the coding and analysis processes) has been described as tedious, laborious, challenging and time-consuming (Garrison et al., 2010, 2006; Rourke et al., 2001). Hence, in recent years, there has been a concerted effort to develop in its place a psychometrically sound and quantitatively-driven CoI instrument to cater for larger cross-disciplinary and institutional studies (Garrison et al., 2010). This development is in line with Naidu and Järvelä (2006), who, in reviewing a special edition on computer-mediated communication content analysis, state that the nature thereof offers other opportunities and possibilities to arrive at the same conclusions. Several authors, including Akyol and Garrison (2008) and Shea and Bidjerano (2009) have thus investigated the interdependence of the presences using a newly developed student-driven CoI survey instrument that appears to offer a viable and practical alternative.

However, as suggested by Gonyea (2005), a reliance on students' self-reports of learning may well suggest a potential and important research limitation. He asks the question: what evidence do researchers and assessment professionals in higher education have that self-reported responses are credible? Also, as Naidu and Järvelä (2006) state, individual learners are influenced by social values and the cultural context in which learning takes place. Contextual perspectives in forum discourse analyses, while urgently needed, are a rare occurrence. Although they posit that full evidence of learning cannot be found from 'traces' such as discussion threads, they submit that the written text offer the opportunity to understand human communication patterns in online communication, its conventions, form and functions, the nature of the subtexts within it, and how people derive meaning and understanding in such contexts. Hence the current paper takes the view that ODF analysis provides a potentially richer source of data for

contextual insights into teaching and learning processes than surveys. Moreover ODF analysis provides an instructor perspective of the status of the CoI, as opposed to a student perspective. This advantage, however, is gained at the expense of tediousness, difficulty and time.

A second pervasive issue relates to statistical generalisability or representativeness. Charges of subjectivity are often levelled at the process of coding (Barbour, 2001), and transcript analysis research (including CoI research) therefore typically reports on the use of two or more coders in an effort to increase objectivity. Such approaches require additional proof of the inter-coder (or inter-rater) reliability coefficients achieved. Whereas Rourke et al. (2001) state that such negotiated approaches result in a higher level of objectivity because an instructor brings subjectivity and interpretive bias to the coding process, it is countered that bias already exists in ODF transcripts if the instructor is an active participant in the ODF. An active instructor involuntarily analyses forum discourse *in situ* when he/she reads forum discourse. Such 'informal' analysis, if conducted *without* the intention to generalise findings to other populations, is driven by the personal and phenomenological insights of the instructor. These insights, if acted upon by the instructor, necessarily define or push subsequent interactions (and discourse) in the ODF into different directions. The instructor is thus in the best position to code and evaluate ODF discourse because he/she has created, and is an integral part of, the context within which the ODF exists and functions. This is not to deny the advantages multiple coders bring to transcript analysis. As Barbour (2001) states, the greatest potential of multiple coding lies in its capacity to furnish alternative interpretations (i.e., act as the 'devil's advocate' in alerting researchers to all potentially competing explanations), and not on satisfying the statistical requirements of journals that publish the work. But, according to her, what is required is thoroughness, and it is immaterial whether analysis is carried out by a conscientious lone researcher, by a team, or by involving independent experts. What matters is that a systematic process is followed and that this is rendered transparent in the written research project.

What is required then is a CoI coding tool that will allow the instructor to systematically and economically code ODF discourse *in situ* and in context. Ideally, such a tool should also be able to generate an analysis report on demand. The next section reports on the design and functionality of a tool that meets these requirements.

3 Tool design

In late 2011 the author approached Thomas Seifert, a developer of the open-sourced ODF software Phorum (<http://www.phorum.org>) used in the course, with suggestions to develop a plug-in module specific to Phorum software that will allow him to code ODF discourse *in situ* and in context. A prototype (CoI Coding Module version 0.5, or CCM) was generously made available to the author early in 2012. The author extended the CCM code to generate a dynamic analysis report (DAR) on demand. A full version of the CCM is expected to be available for download from the Phorum web site towards the end of 2012.

As plug-in software, the multi-file CCM is installed by copying the files into the 'mods' subdirectory of the Phorum installation directory, and enabling it in the administrative back-end. The CCM tool is then ready to be configured. Figure 1 shows a screen shot of the CCM tool as available and configured in the administrative back-end.

Figure 1 Administrative back-end view of the CoI coding module tool

Add Element

Name of Element

Add Category

Belongs to Element: Social Presence

Name of Category

Add Indicator

Belongs to Element: Social Presence

Belongs to Category: Open Communication

Name of Indicator

Element	Category	Indicator
Social Presence (Edit Delete)	Open Communication (Edit Delete)	Risk-free expression (Edit Delete)
	Group Cohesion (Edit Delete)	Encourage collaboration (Edit Delete)
	Affective Expression (Edit Delete)	Emoticons (Edit Delete)
Cognitive Presence (Edit Delete)	Triggering Event (Edit Delete)	Sense of Puzzlement (Edit Delete)
	Exploration (Edit Delete)	Information exchange (Edit Delete)
	Integration (Edit Delete)	Connecting ideas (Edit Delete)
	Resolution (Edit Delete)	Applying new ideas (Edit Delete)
Teaching presence (Edit Delete)	Design and Organization (Edit Delete)	Setting curriculum & methods (Edit Delete)
	Facilitating Discourse (Edit Delete)	Sharing personal meaning (Edit Delete)
	Direct Instruction (Edit Delete)	Focusing and resolving issues (Edit Delete)
None (Edit Delete)	None (Edit Delete)	None (Edit Delete)

As the self-explanatory screenshot shows, elements, categories and indicators are highly configurable in a tree structure. Here the coding scheme presented in Table 1 was configured by the instructor. A ‘none’ option was added to flag messages that did not fit any indicator. Whereas the CMM was specifically developed for transcript analysis using the CoI schema of elements, categories and indicators, innovative analysts should be able to configure any coding scheme by combining elements, categories and indicators.

For example, a theoretical framework that offers indicator-level schema only can create a single abstract (or fictional) element and category, and then expand it at indicator level.

Figure 2 shows an instructor-only view of the CCM as incorporated into the front-end of the ODF, the coding template appearing directly after each student message. Here the layout has been slightly edited to protect personal information.

Figure 2 Front-end of the CoI coding module (version 0.5)

Have been on this for quite sometime now and all I need is your help.
My code...

```

$result = mysql_query("SELECT * FROM course") or die(mysql_error());
if ($result)
{
while ($row = mysql_fetch_array($result)){
print "<input type=\"checkbox\" name=\"courses[]\" value=\"\$row[cid]\"
$row[cid]='checked'; } / >$row[cname]\n";
}
    
```

How to retain the checked checkboxes when the form returns without submitting.

Element	Category	Indicator	Select
Social Presence	Open Communication	Risk-free expression	<input type="checkbox"/>
	Group Cohesion	Encourage collaboration	<input type="checkbox"/>
	Affective Expression	Emotions	<input type="checkbox"/>
Cognitive Presence	Triggering Event	Sense of Puzzlement	<input checked="" type="checkbox"/>
	Exploration	Information exchange	<input type="checkbox"/>
	Integration	Connecting ideas	<input type="checkbox"/>
	Resolution	Applying new ideas	<input type="checkbox"/>
Teaching presence	Design and Organization	Setting curriculum & methods	<input type="checkbox"/>
	Facilitating Discourse	Sharing personal meaning	<input type="checkbox"/>
	Direct Instruction	Focusing and resolving issues	<input type="checkbox"/>
None	None	None	<input type="checkbox"/>

what I actually mean is after you tick some checkboxes which are dynamic and you click on submit but the form returns due to other empty inputs. How can I make that form remember what I previously checked?

Element	Category	Indicator	Select
Social Presence	Open Communication	Risk-free expression	<input type="checkbox"/>
	Group Cohesion	Encourage collaboration	<input checked="" type="checkbox"/>
	Affective Expression	Emotions	<input type="checkbox"/>
Cognitive Presence	Triggering Event	Sense of Puzzlement	<input type="checkbox"/>
	Exploration	Information exchange	<input type="checkbox"/>
	Integration	Connecting ideas	<input checked="" type="checkbox"/>
	Resolution	Applying new ideas	<input type="checkbox"/>
Teaching presence	Design and Organization	Setting curriculum & methods	<input type="checkbox"/>
	Facilitating Discourse	Sharing personal meaning	<input type="checkbox"/>
	Direct Instruction	Focusing and resolving issues	<input type="checkbox"/>
None	None	None	<input type="checkbox"/>

Note: Some areas have been edited out to protect identity.

The first advantage the CCM brings the coder is that there is no need to create transcripts of ODF discourse. For the reason that an active instructor will necessarily read all messages before (optionally) replying, he finds himself in an ideal position to code *in situ* and in context. Coding *in situ*, it is proposed, imposes a coding process that is methodical and systematic. For example, as novice coders become more comfortable and

experienced with the coding scheme, they may want to recode. Similarly, experienced coders, as they become aware of the context of an earlier message, may also want to recode. The CCM greatly simplifies recoding in that preceding (and already coded) messages are, in the normal processes of following discussion and/or constructing an answer, re-scanned by the instructor. Changing a previously-coded indicator(s) simply requires the previously-assigned indicator(s) to be unticked, and the new indicator(s) to be ticked and saved. In this manner, a message thread with its coded messages is revisited several times during the lifespan of a thread, thereby increasing the robustness of the coding process.

In this screenshot, which depicts two concurrent messages from a student, the first message, after being read by the instructor, was coded as a 'sense of puzzlement'. Despite the message clearly encouraging collaboration, it was not coded as such, as will be explained shortly. In the next message he elaborated on his first message. This second message was coded as 'encourage collaboration', in addition to 'connecting ideas'. If the two messages were coded in isolation (and thus out of context), the instructor, or an independent coder, may well have coded 'encourage collaboration' twice, thereby skewing the analysis results. Furthermore, by providing a snippet of programming code, it appears the student is also exchanging information. Whereas it was a course requirement that students include selected evidence of their efforts when requesting support for purposes of clarity and to provide other students with problem-solving experiences (see Section 4), this particular snippet does not provide evidence of an effort to resolve the problem, and was therefore not coded as exploration. These two coding examples highlight the significance of instructor-driven coding and coding in context.

The rest of this paper reports on a recent application of the CCM. The DAR that is generated in the CCM back-end on demand allows the instructor to gauge the status of the CoI at any point in time. The DAR will be presented and discussed in more detail in the results and discussion section.

4 Setting

The setting this paper reports on is that of a web-based distance and introductory short course in internet programming, offered in the first semester of 2012. An ODF was employed as the primary means of communication and support between instructor and students, with students required to report their progress, contribute new knowledge, and especially support fellow students in coding a practical and portfolio-driven web-based application. While the instructor played an active role in the ODF, the course is collaborative constructivist, with students graded on the depth of their contributions to the ODF and the mark obtained contributing 10% towards their final mark.

DARs generated throughout the coding process provide the instructor with inherent advantages as it pertains the status of the CoI and his teaching strategies. In the setting this paper reports on, the instructor generated two reports. The first DAR was generated at a point 75% into the total duration of the course, and the second DAR as students prepared to submit their portfolios. The first DAR analysed a total of 1206 messages posted in 90 topics by 39 students and the instructor. The instructor was responsible for 159 messages, followed by a student who posted 105 messages (overall mean = 18.6; min = 1; max = 159; S.D. = 29). The second DAR analysed a running total of 1,329

messages in 106 topics, the instructor responsible for 186 messages and the same student 118 messages (overall mean 21.8, min = 1; max = 186; S.D. = 34).

5 Coding methodology

The following comments as they relate to the coding methodology are relevant:

- Since categories were established prior to the analysis, the approach was *priori* (Stemler, 2001).
- Whereas coding was done at *message* and/or *sentence* level (Oriogun, 2006), it was at times extended to *thread* level, depending on the complexity and the context of the individual messages.
- Analysis involved quantifying and tallying the presence of *explicit* concepts (Busch et al., 2005). However, because the instructor coded *in situ*, he necessarily scanned preceding messages within an already familiar topic before replying. An *explicit* concept may therefore have adopted an *implicit* meaning that was driven by the instructor's sensitivity to the wider context wherein the message existed. The result was that the indicator selected may point at the product of a meaningful relationship that existed outside the specific message, rather than at the message itself. This approach is perceived as 'coding in context', which presents one of the main motivations for the development of the CCM.

6 Results and discussion

The DAR generates simple descriptive statistics that is intended to provide the instructor with manageable summaries that reveals the results of the coding process and describes the status of the CoI based on the data produced. Whereas inferential statistics are required to draw valid conclusions that extend beyond the immediate data, descriptive statistics are sufficient for the current purposes (Trochim, 2005).

This section firstly reports on the results obtained from the two DARs, which are then compared to the results from a post-course student survey using the CoI survey instrument. The purpose of this comparison is not to triangulate results in an attempt to validate the CMM or instructor-driven coding, but to gain a sense of the status of the CoI from two different perspectives. Whereas concern has been expressed about the credibility of student self-reports, a significant discrepancy will nonetheless be noteworthy.

6.1 DARs results

Table 2 presents the 1st DAR as generated by the CCM. Messages that were coded as 'none' (239) are not reflected in the report.

As a group, *cognitive presence* indicators had the most (370 or 38.1% of the total) occurrences, followed by *teaching presence* (351 or 35.9%) and *social presence* (248 or 26%). Whereas the literature reports interesting results on ratios achieved (e.g., Swan,

2002; Vaughan and Garrison, 2006), the purpose of the current paper is to inclusively report on the instructor's experiences in using the CCM to gauge the status of the CoI.

Table 2 CoI coding module dynamic analysis report (DAR) #1

<i>Presence</i>	<i>Running tally</i>	<i>Category</i>	<i>-> Indicator</i>	<i>Tally</i>	<i>%</i>
Cognitive	96	Exploration	-> Information exchange	96	9.9
Cognitive	162	Integration	-> Connecting ideas	66	6.8
Cognitive	218	Resolution	-> Applying new ideas	56	5.6
Cognitive	<u>370</u>	Triggering event	-> Sense of puzzlement	152	15.7
Social	121	Affective expression	-> Emoticons	121	12.5
Social	188	Group cohesion	-> Encourage collaboration	67	6.9
Social	<u>248</u>	Open communication	-> Risk-free expression	60	6.2
Teaching	41	Design and organisation	-> Setting curriculum and methods	41	4.2
Teaching	245	Direct instruction	-> Focusing and resolving issues	204	21
Teaching	<u>349</u>	Facilitating discourse	-> Sharing personal meaning	104	10.7
Totals	967			967	100

Nonetheless, for purposes of theoretical sensitivity, the ratio achieved (38.1%: 35.9%: 26%) differs substantially from a stable and research-proven ratio (19.6%: 18.6%: 61.7%) which significantly favours *social presence* over the *teaching presence* and *cognitive presence* across five variables: academic institution, academic discipline, academic level, course level and group size (Gorsky et al., 2012). Here the ratio achieved was more balanced with a notable relegation of the *Social presence* element. Whereas the importance and roles of social presence in the educational process have been researched (e.g., Annan, 2011; Vaughan and Garrison, 2006), the current author interpreted the relegation of *social presence* to indicate a shift towards more 'academically-inclined' activities in line with the collaborative-constructivist approach followed. That said, at indicator level, the 12.5% returned for *affective expression* was the third highest of all indicators, while group cohesion and open communication percentages compared favourably to other presence categories like integration, resolution, and design and organisation. The results therefore suggested that students were able to identify with the community, communicate purposefully in a trusting environment, and were able to develop inter-personal relationships, but not at the expense of more academically-inclined activities.

Of the *cognitive presence* indicators, *sense of puzzlement* had the highest occurrence (152 or 15.7% of the total occurrences). This result was not unexpected for two reasons: in a collaborative-constructivist environment, the first probable use of an ODF by students will be to ask questions. Students were also tasked to post their questions on the ODF. The remainder of the *cognitive presence* indicators were reasonably balanced i.e., all cognitive activities were represented. Per formal definition, it was concluded that learners were able to construct and confirm meaning through sustained reflection and discourse.

The larger *teaching presence* indicator spread was also expected. *Direct instruction*, with 204 occurrences (21% of the total, and the highest percentage reported) was expected since the instructor was an active participant in the ODF. However, considering that the instructor posted 159 messages and that not all his messages were instructional, it is evident that students were actively embracing direct instruction duties. This finding was particularly pleasing as it showed students to not make use of the ODF as ‘one-stop-solution’ shop, but instructed in the truest sense of the stated collaborative-instructivist approach.

In summary, the results from the 1st DAR pointed at a well-balanced, well-managed and effective CoI. As such, the instructor, from his perspective, saw no need to change the teaching or learning strategies employed.

Table 3 presents the 2nd DAR. Messages that were coded as ‘none; (258) are not reflected in the report.

Table 3 CoI coding module dynamic analysis report (DAR) #2

<i>Presence</i>	<i>Running tally</i>	<i>Category</i>	<i>-> Indicator</i>	<i>Tally</i>	<i>%</i>
Cognitive	105	Exploration	-> Information exchange	105	9.8
Cognitive	185	Integration	-> Connecting ideas	80	7.4
Cognitive	246	Resolution	-> Applying new ideas	61	5.6
Cognitive	<u>417</u>	Triggering event	-> Sense of puzzlement	171	15.9
Social	141	Affective expression	-> Emoticons	141	13.1
Social	213	Group cohesion	-> Encourage collaboration	72	6.7
Social	<u>277</u>	Open communication	-> Risk-free expression	64	5.9
Teaching	45	Design and organisation	-> Setting curriculum and methods	45	4.2
Teaching	260	Direct instruction	-> Focusing and resolving issues	215	20
Teaching	<u>377</u>	Facilitating discourse	-> Sharing personal meaning	117	10.9
Totals	1,071			1071	100

At face value, the second DAR does not differ substantially from the first. The order and size of the ratio achieved between presences (38.9%: 35.2%: 25.8%) was very similar to the 1st ratio reported – the only noticeable differences that the cognitive and teaching ratios slightly increased, while the social presence ratio slightly decreased. Individual indicator percentages increases and decreases were negligible. With students finalising their portfolios a slight shift towards cognitive and teaching activities can be expected. Once again a conclusion of a well-balanced, well-managed and effective CoI was reached.

To gain a student perspective of the status of the CoI, students were requested to complete the 34 item enhanced CoI survey instrument as used by Arbaugh et al. (2008).

6.2 Student survey results

At the time of writing this article a total of n = 12 students completed the survey, resulting in a rather disappointing response rate of only 31%. However, the low standard

deviations (S.D.) reported suggest that a greater response rate would not necessarily have resulted in different findings, although this is conjecture.

Students' ratings of the importance of CoI items were scored using an ordinal scale ranging from (1 = strongly disagree) to (5 = strongly agree). Since the survey questions are stated in the positive a higher score is preferable. Because a survey question or a coding indicator may have a narrower or wider meaning, a comparison between the mean scores per question and the coding scheme tallies is not possible. Table 4 therefore only lists the mean grand score and mean S.D. per presence.

Table 4 Enhanced CoI survey instrument results: grand mean score and mean standard deviation per presence

<i>Components</i>	<i>Grand mean</i>	<i>Mean S.D.</i>
Cognitive presence	4.23	0.24
Social presence	4.21	0.25
Teaching presence	4.08	0.25

The grand mean yielded by *teaching presence* items (questions 1–13) was 4.08 (S.D. = 0.25). *Social presence* items (questions 14–22) returned an grand mean of 4.21 (S.D. = 0.25), while *cognitive presence items* (questions 23–34) returned an grand mean of 4.23 (S.D. = 0.24).

The results showed the students to have perceived the CoI to be *cognitive: social: teaching-orientated*. This orientation differed from both the DAR ratio orientations reported, with the *teaching* and *social presences* trading position. The grand means' spread, however, was much closer than the DAR's ratios, indicating that students perceived the CoI slightly different to the instructor. Whereas research indicates that the success of an online community depends on the learners' perceptions of social presence and their motivation for participation in online discussions determines their participation levels (Weaver and Albion, 2005), it is reasonable to conclude that the students were more sensitive to the level of 'sociality' that existed in the ODF than what the instructor perceived. Alternatively the survey questions on *social presence* are far more descriptive than what the CoI coding scheme allows for, and what the instructor, despite coding in context, can code for.

Nevertheless, there was student agreement on a largely cognitively-driven ODF. Garrison and Arbaugh (2007) state that the emergence of a cognitive presence may be the result of a process they termed 'progressive development of inquiry'. Their data suggests that cognitive presence may be defined in terms of a cyclical process of practical inquiry where participants move deliberately from understanding the problem or issue through to exploration, integration and application. The current course presentation model may have contributed to such a cyclic process in three ways: the collaborative-constructivist approach that was followed (students were required to report their progress, contribute new knowledge, and support fellow students in completing a practical and portfolio-driven web-based application) is progressive by design; students were graded on the depth of their contributions in the ODF, thereby favouring cognitive contributions; and the portfolio-driven approach, with systematic and progressively challenging assignments, requires cognitive acts in itself.

In summary, despite a different orientation, the close proximity and generally positive grand mean scores obtained across the presences were suggestive of a well-balanced, well-managed and effective CoI.

Ignoring these minor differences between the DARs results and the student survey results, it is concluded that the CCM is an effective tool for instructor-driven coding and analysis of ODF discourse *in situ* and in context.

In closing this section, the author has to report that despite extensive experience in qualitative coding, it took some time to get comfortable with the CoI coding scheme. In some instances he found the category descriptions more descriptive and useful than the indicators. Hence, in the first week or so, coding was somewhat uneconomical as he frequently had to re-code messages. But as he became familiar with and confident with the descriptions and the act of reading messages followed by coding and optional re-coding, the process became increasingly easier, if not second nature. cursory views at the DAR were particularly motivating because he could see results of his coding efforts, as well as the status of the CoI.

7 Conclusions

The main purpose of the current paper was to describe and document the author's experiences in applying the CoI framework in assessing an ODF-driven course. Having argued a case for a coding tool that allows an active instructor to analyse ODF discourse systematically, economically, *in situ* and in context, the CCM tool was developed, introduced and applied. The DAR's generated by the CCM returned a conclusion of a well-balanced, well-managed and effective CoI. The CoI survey instrument results appeared to confirm the instructor-driven conclusion, suggesting that the CCM is, at minimum, an effective, accurate and reliable tool for instructor-driven coding *in situ* and in context.

It is acknowledged that these conclusions are superficial. That is, what *exactly* defines a well-balanced, well-managed and effective CoI? In the absence of CoI research that investigates all three elements simultaneously, the current author firstly had to rely on the formal definitions provided by the original CoI authors to make judgments, and these are perhaps not perfect. His approach, however, was augmented by informal personal e-mail feedbacks from students who indicated that they thoroughly enjoyed the course and the presentation model. Secondly, he had to rely on the survey grand means that were evenly spread and approximated his previous conclusions.

A further question that may arise is why one would want to regress to content analysis when research on the CoI survey instrument appears promising? Despite the reasons already provided for developing the CCM, it cannot be denied that a survey *is* less tedious and easier to implement. But at best a survey can only be administered post-course as it would not make sense to run the same survey several times during a course. The instructor can therefore only make corrections in the teaching and learning strategies *after* the course has been presented, whereas the CCM allows the instructor to generate DAR's at any point during the course and adjust his/her teaching strategies accordingly. A further question raised by this research is how many times students can repeat the same survey in their years of study before it becomes a matter of 'going through the motions'?

Finally, it is acknowledged that further research is needed to formally validate the CCM tool, the methodology followed, and the results achieved. Answering these questions was not a purpose of this paper. Rather, it was about a Professor Jones who has little space, time, and energy available for formal reflection. For him, use of the CCM provided a level of reflection (if not intimacy) which was novel, refreshing and insightful. It required him to tick or untick an indicator (or two or three) below a forum message which, being part of his routine, he was reading and revisiting anyway. Yet, at the same time, it changed the way he read, and responded, to student messages. Already, he is more an educator than he was before.

References

- Akyol, Z. and Garrison, D.R. (2008) 'The development of a community of inquiry over time in an online course: understanding the progression and integration of social, cognitive and teaching presence', *Journal of Asynchronous Learning Networks*, Vol. 12, Nos. 2–3, pp.3–22.
- Anderson, T., Rourke, L., Garrison, D.R. and Archer, W. (2001) 'Assessing teaching presence in a computer conferencing context', *JALN*, Vol. 5, No. 2, pp.1–17.
- Annan, D. (2011) 'Social presence within the community of inquiry framework', *International Review of Research in Open and Distance Learning*, Vol. 12, No. 5, pp.38–54.
- Arbaugh, J.B., Cleveland-Innes, M., Diaz, S.R., Garrison, D.R., Ice, P., Richardson, J.C. and Swan, K.P. (2008) 'Developing a community of inquiry instrument: testing a measure of the community of inquiry framework using a multi-institutional sample', *The Internet and Higher Education*, Vol. 11, Nos. 3–4, pp.133–136.
- Barbour, A. (2001) 'Checklists for improving rigour in qualitative research: a case of the tail wagging the dog?', *BMJ*, Vol. 322, No. 7294, pp.1115–1117.
- Busch, C., De Maret, P.S., Flynn, T., Kellum, R., Le, S., Meyers, B., Saunders, M., White, R. and Palmquist, M. (2005) 'Content analysis', *Writing@CSU*, Colorado State University, Department of English.
- CoI (2011) 'Official website for the community of inquiry framework', available at <http://communitiesofinquiry.com/> (accessed on 2 February 2011).
- De Wever, B., Schellens, T., Valcke, M. and Van Keer, H. (2006) 'Content analysis schemes to analyze transcripts of online asynchronous discussion groups: a review', *Computers & Education*, Vol. 46, No. 1, pp.6–28.
- Finegold, A.R.D and Cooke, L. (2006). 'Exploring the attitudes, experiences and dynamics of interaction in online groups', *The Internet and Higher Education*, Vol. 9, No. 3, pp 201–215.
- Garrison, D.R. (2007). 'Online community of inquiry review: social, cognitive, and teaching presence issues', *Journal of Asynchronous Learning Networks*, Vol. 11, No. 1, pp.61–72.
- Garrison, D.R. and Arbaugh, J.B. (2007) 'Researching the community of inquiry framework: review, issues, and future directions', *Internet and Higher Education*, Vol. 10, No. 3, pp.157–172.
- Garrison, D.R., Anderson, T. and Archer, W. (2000) 'Critical inquiry in a text-based environment: computer conferencing in higher education', *The Internet and Higher Education*, Vol. 2, Nos. 2–3, pp.1–19.
- Garrison, D.R., Anderson, T. and Archer, W. (2001) 'Critical thinking, cognitive presence, and computer conferencing in distance education', *American Journal of Distance Education*, Vol. 15, No. 1, pp.7–23.
- Garrison, D.R., Anderson, T. and Archer, W. (2010) 'The first decade of the community of inquiry framework: a retrospective', *Internet and Higher Education*, Vol. 13, Nos. 1–2, pp.5–9.

- Garrison, D.R., Cleveland-Innes, M., Koole, M. and Kappelman, J. (2006) 'Revisiting methodological issues in transcript analysis: negotiated coding and reliability', *Internet and Higher Education*, Vol. 9, No. 1, pp.1–8.
- Garrison, D.R., Ice, P. and Akyol, Z. (2010) 'The community of inquiry framework: a review of research & practice', Paper presented at the *HICE Conference*, 6–9 January, Hawaii.
- Ginsberg, B. (2011) *The Fall of the Faculty: The Rise of the All-Administrative University and Why It Matters*, Oxford University Press, Oxford.
- Gonyea, R.M. (2005) 'Self-reported data in institutional research: review and recommendations. education research and statistics', *New Directions for Institutional Research, Special Issue: Survey Research: Emerging Issues*, Vol. 2005, No. 127, pp.73–89.
- Gorsky, P., Caspi, A., Blau, I., Vine, Y. and Billet, A. (2012) 'Toward a CoI population parameter: the impact of unit (sentence vs. message) on the results of quantitative content analysis', *The International Review of Research in Open and Distance Learning*, Vol. 3, No. 1, pp.49–72.
- Henri, F. (1992) 'Computer conferencing and content analysis', in A.R. Kaye (Eds.): *Collaborative Learning through Computer Conferencing: The Najaden Papers*, pp.115–136, New York, Springer.
- MacDonald, J. (2008) *Blended Learning and Online Tutoring: Planning Learner Support and Activity Design*, 2nd ed., Gower, Aldershot, England.
- Naidu, S. and Järvelä, S. (2006) 'Analyzing CMC content for what?', *Computers & Education*, Vol. 46, No. 1, pp.96–103.
- Oriogun, P.K. (2006) 'Content analysis of online transcripts: measuring quality of interaction, participation and cognitive engagement within CMC groups by cleaning of transcripts', *International Journal of Instructional Technology and Distance Learning*, Vol. 3, No. 3, ISSN 1550–6908, available at http://www.itdl.org/Journal/Mar_06/article03.htm.
- Rourke, L. and Kanuka, H. (2009) 'Learning in communities of inquiry: a review of the literature', *Journal of Distance Education*, Vol. 23, No. 1, pp.19–48.
- Rourke, L., Anderson, T., Garrison, D.R. and Archer, W. (2001) 'Methodological issues in the content analysis of computer conference transcripts', *International Journal of Artificial Intelligence in Education (IJAIED)*, Vol. 12, No. 1, pp.8–22.
- Shea, P. and Bidjerano, T. (2009) 'Community of inquiry as a theoretical framework to foster 'epistemic engagement' and 'cognitive presence' in online education', *Computers & Education*, Vol. 52, No. 3, pp.543–553.
- Stemler, S. (2001) 'An overview of content analysis', *Practical Assessment, Research & Evaluation*, Vol. 7, No. 17, pp.1–8.
- Swan, K. (2002) 'Building communities in online courses: the importance of interaction', *Education, Communication and Information*, Vol. 2, No. 1, pp.23–49.
- Swan, K. and Ice, P. (2010) 'The community of inquiry framework ten years later: introduction to the special issue', *Internet and Higher Education*, Vol. 13, Nos. 1–2, pp.1–4.
- Trochim, W. (2005) *Research Methods: The Concise Knowledge Base*, 1st ed., Atomic Dog Publishing, Mason, Ohio.
- Vaughan, N. and Garrison, D. R. (2006) 'How blended learning can support a faculty development community of inquiry', *Journal of Asynchronous Learning Networks*, Vol. 10, No. 4, pp.139–152.
- Weaver, C.M. and Albion, P.R. (2005) 'Momentum in online discussions: the effect of social presence on motivation for participation', in *ASCILITE 2005: Proceedings of Australasian Society for Computers in Learning in Tertiary Education Conference, Balance, Fidelity, Mobility: Maintaining the Momentum?*, Sydney, Australia, pp.703–706.
- Weinberger, A. and Fischer, F. (2006) 'A framework to analyze argumentative knowledge construction in computer supported + tive learning', *Computers & Education*, Vol. 46, No. 1, pp.71–95.