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Knowledge Construction in Online Health Community Support Groups

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Abstract

Content analysis was used to study interactions in an online health community support group relying on discussion forum software as a medium for discussions. We found that the overwhelming majority of the threads considered are on topic, which indicates that the discussion forum does contribute to the group's mission. By applying existing scales to measure the complexity of interactions from a social constructivist perspective (the level of learning), we find a wide range of levels of learning among the threads. In particular, there are substantial numbers of threads involving rich discussions of facts and ideas resulting in substantial numbers of threads rated at middle and high levels of learning. This discovery sets the stage for our future research of the impact of the level of learning in a discussion thread on the quality of information the thread offers and on user satisfaction about such information.

Keywords

collaborative media, health community support group, knowledge construction

INTRODUCTION

As the world population is ageing and the prevalence of chronic disease rises, increased demand is placed on existing health care services. One solution is for people to take greater responsibility for their own health care. Hence, there is a growing interest in community-based health care, in empowering patients to be more proactive in dealing with chronic conditions and in prevention (Minkler 2004; Robb et al. 2006). Information technology has a role in allowing patients to be proactive by making the relevant tools available, and IT industry views patient centred healthcare as a potentially important growth market, as demonstrated by the Intel Health initiative by Intel Corporation (Intel).

The Internet already plays a major role in empowering patients by allowing them to access information related to their health conditions and concerns. In New Zealand, the Government facilitates this empowerment by paying for access to the Cochrane Library of health databases online for all New Zealand residents (Website). Yet, simply accessing non-personalised information in databases is not necessarily the best way for patients to learn how to deal with their problems, as it requires high levels of digital information literacy and does not address patients' emotional needs, while information specific for local conditions may not be available. A more interactive and personalised way for patients to elicit information and to receive moral support is by joining online health community support groups relying on the Internet to exchange information between patients and their family members.

Online health community support groups established with the participation of health professionals can be viewed as one of the realisations of the patient centred health care paradigm. At present, the paradigm of patient centred health care is gaining momentum in health policy (Robb et al. 2006). Patient centred health care suggests a different, more equitable approach to communication between patient and doctor (Ong et al. 1995; Stewart et al. 2000) as patients become more knowledgeable about their health conditions, which enables them to participate in making decisions (Calabretta 2002; Suggs 2006).

In New Zealand, there are over 80 on-line health and disability support groups (Ghazali et al. 2008). The use of Web-based media allows collaborative interactions among their members. Discussions over the Internet using mailing lists, web logs, and discussion forums make it possible for members of health community support groups to access and share information, share experiences, and support others to give motivation and express empathy. These interactions not only enable networking among individuals with similar concerns, but also result in learning. Our aim in this study was to assess the richness of leaning displayed in such online interactions by
measuring the level of learning for a range of discussion threads, relying on the social constructivism approach as the theoretical background.

Social constructivism suggests that learning happens (and knowledge is "constructed") when individual learners interact to negotiate meanings in a group (Leahey et al. 1985; Palincsar 1998; Vygotsky 1964). The social constructivism perspective proved to be effective in enabling researchers to describe interactions happening in online discussion groups in educational settings (Hmelo-Silver 2003; Puntambekar 2006; Schellens et al. 2005; Schrire 2006). In our view, the social constructivism perspective suits the learning phenomenon in health community support group online discussions, which involve interactions similar to those in educational settings, as - in both cases - discussion participants are motivated by the ability to gain understanding relevant to solving their problems.

In the case of learning as part of patient-centred healthcare, problems with learning may have grave consequences, as patients' health and well-being are at stake. Therefore, the quality of information obtained via online discussions in health community support groups is of major interest. One may expect that in the course online discussions the information contributed by members is scrutinised leading to low quality information being labelled as such and rejected. Thus, a smoothly flowing online discussion would, to a degree, manage the risks associated with patients making decisions based on information obtained from the Internet. In our future research, we intend to verify this view empirically by relating the quality of information with the level of learning in discussions where the information is conveyed.

Transcripts of interactions in online health community support groups are available as online discussion records. In prior studies in computer mediated collaborative learning content analysis has been used as a tool to analyse such transcripts (De Wever et al. 2006). In this study, we use content analysis to quantitatively measure levels of learning in health community support group online discussions by using existing scales originally developed for the educational setting.

THEORETICAL BACKGROUND

Earlier studies in analysing knowledge construction (learning) in computer mediated collaborative learning came from the educational sector (De Wever et al. 2006). For this study is adopting theory from those earlier studies to apply it in a different area, the health sector.

While it is quite common to view interactions in interactive learning environments in terms of knowledge construction, and to distinguish low level discussions in which information is merely shared from better quality discussions where information is questioned, explained, evaluated and combined to create new knowledge, most authors adopt a qualitative approach and there is no established measurement scale that could be used to quantitatively measure the level of a discussion in terms of knowledge construction (De Wever et al. 2006). In this study, to measure the level of learning in terms of knowledge construction, we followed Schellens and Valcke (2005) and use, simultaneously, the scales from Veerman et al. (2001) and Gunawardhena (1998). By using the two scales at the same time, we achieved a degree of redundancy that allowed us to manage the risk that a chosen scale does not work. In the course of future research we may expect that one of the scales is going to be found to be more useful than another, which will allow us to make a further contribution to the eventual development of a widely recognised scale for knowledge construction.

In analysing the learning process, Veerman et al. (2001) introduce two categories: task related and non-task related content. Non-task related content corresponds to social, technical (related to online environment features and usage), and senseless content appearing in the discussion. In the context of discussions in health community support groups, non-task related content is any content that does not directly address solving health related problems faced by the participants. In our analysis, we follow Veerman et al. (2001) and distinguish task related (directly related to addressing health issues) and non-task related content as a preprocessing step. Then, we focus on task related content only to apply Veerman et al. (2001) and Gunawardhena (1998) scales.

To apply the Veerman et al. (2001) scale, we categorize the task related content into three types of communication: new information (facts, experiences/opinion, and theoretical ideas), explication or elaboration of previous information, and evaluation of previous information. Evaluation corresponds to a higher level of learning than explication, while explication corresponds to a higher level of learning than just new information. We relied on instructions provided in Veerman et al. (2001) to allocate each unit of content to one of these categories.
In the model by Gunawardena (1998), based on the analysis of on-line debates, the levels of learning are identified somewhat differently from the way which they are identified in the model by Veerman et al. (2001) and covers a wider range of possibilities, up to the creation of newly constructed meanings. The levels (denoted by Gunawardena as "Phases") are:

- **Phase 1** – Sharing information or experience. This Phase is characterised by the emergence of a new question or statement in the discussion relating to a problem.
- **Phase 2** – Exploration. This Phase is characterised by further refinement of the previous statement or question, which may include disagreement, clarification, or advancing the argument.
- **Phase 3** – Negotiation of meaning. This Phase is characterised by negotiation around issues emerging in Phase 2 and by formulation of tentative solutions.
- **Phase 4** – Testing. This Phase is characterised by testing and modification of tentative solutions.
- **Phase 5** – Newly constructed meaning. This Phase is characterised by the formulation of a final summary of agreements attained by the group.

For a detailed procedure applied to allocate content to Phases according to this scale, refer to the source (Gunawardena 1998).

Schellens and Valcke (2005) found the scales from Veerman et al. (2001) and Gunawardhena (1998) to lead to consistent results. While Schellens et al. (2005) indicated a preference for the Gunawardhena (1998) scale due to its wider range, the scale by Veerman et al. (2001) appears to be more readily applicable to health-related discussions, as it is focused on making sense of information, rather than on negotiation. In the research described in the following sections, we applied both of the scales and compared the outcomes.

**RESEARCH DESIGN**

This study uses on-line discussions in a health community support group that are publicly available for access in the open (not password protected) Internet. We chose a health community support group that focuses on promoting a healthy lifestyle, rather than one that covers a specific disease (and thus involves more vulnerable participants), as we wished to minimise any harm in case our investigation interfered with the discussions. However, as we simply observed the discussions and did – and will - not post, or reveal the identity of the group, and will publish only summative information, the chances of such interference are extremely low.

To make it possible to follow and capture the discussions, we chose an online health community support group using an asynchronous online discussion forum as the technology enabling the discussions. In addition to enabling access to data, the online discussion forum as a medium for discussions promotes higher levels of learning, as it encourages participants to follow the development of the argument and to reflect on past contributions (Pena-Shaff et al. 2004).

At the time of our investigation, the discussion forum totalled more than 175,000 discussion threads with new threads appearing daily - the discussion traffic was rather high. It was possible to access full content without logging on, although a logon was required to post new messages or to reply to existing messages. For the purposes of our investigation, a logon was not needed, as we did not interact with the discussions in any way at all.

This study uses a discussion thread (rather than a message or a part of a message, such as a sentence) as the unit of analysis, for the following reasons. First, from the social constructivism approach, learning takes place in a group (Leahy et al. 1985; Salomon 1993). Learning is a process of interaction, communication, co-construction, and negotiation (Stahl 2004; Weinberger et al. 2006). Unlike a single message (or a part of a message), a discussion thread reflects the online activities of a group formed by individuals contributing to the thread. To assess the process of online learning in its entirety, we need to take into account not only the individual contributions, but also the interaction pattern they form. Dennen (2008) asserts the necessity of using large enough units of analysis in studying knowledge by stating that “knowledge is not a series of discrete facts, and thus documentation of learning through coding and counting small units in isolation is insufficient”, which is
congruent with our view that the use of a large unit of analysis - such as a discussion thread - is necessary in studying knowledge construction in discussion media.

In our study, we selected at random 100 discussion threads created in the third and fourth weeks of March 2009. We applied Veerman et al. (2001) and Gunawardhena (1998) scales independently to each of the threads. Due to resource constraints we used a single rater, so that inter-rater reliability scores could not be obtained.

RESULT

Eighty-eight threads out of the 100 threads considered were identified as task related communication. This number is likely to be affected by the following factors: (i) clear instructions and guidelines were provided by the discussion forum administrators regarding the aim and the scope of the discussion forum, (ii) the formal character of membership in the health support group, resulting in health community support group members who are allowed to post messages realising the importance of using the discussion forum appropriately, and (iii) the effective management of the discussion forum, for example threads are allocated to appropriate high level topics. The threads found to be non-task related (12%) primarily were devoted to social interactions.

Table 1. Fractions of task-related threads at different levels of the scale by Veerman et al. (2001).

<table>
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<tbody>
<tr>
<td>2.3%</td>
<td>58.0%</td>
<td>9.1%</td>
<td>23.9%</td>
<td>6.7%</td>
</tr>
</tbody>
</table>

An application of the learning scale by Veerman et al. (2001) to task-related threads (see Table 1 for a summary of results) resulted in 51 threads being rated as experience sharing. In part, the large portion of threads in this category may be attributed to the health support group policy of encouraging their members to share their experiences (while the discussion of such experiences leading to higher level learning and knowledge construction is not explicitly emphasized - unlike as is often the case in educational settings).

By sharing their experiences and opinions, members of an on-line discussion may have an opportunity to get feedback from other members. Such feedback could be appreciation, support, opinion, or accounts of similar experiences accompanied by comments or expressions of concern. This may result in the thread being rated at higher level of learning. In particular, we found 8 threads at the level of "theory", 21 threads at the level of "explication", and 6 at the level of "evaluation" according to the scale by Veerman et al. (2001). It should be noted that once a theory had been stated, it usually led to discussions around it (raising the thread to the level of "explication"), while "evaluation" - taking stock of information in the thread - was relatively rare.

An application of the scale by Gunawardhena (1998) to the 88 task-related threads has led to the results summarized in Table 2. Most of the threads (more than 80%) were rated at Phase 1 and Phase 2 of knowledge construction. This result came from the high proportion of experience sharing and opinions followed by supporting and clarification statements. The low proportion of threads rated at Phase 4 and Phase 5 is consistent with the results obtained in the prior study by Schellens and Valcke (2005).

Table 2. Percentage of task-related threads at different levels of the scale by Gunawardhena (1998).

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Phase 4</th>
<th>Phase 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.7%</td>
<td>44.2%</td>
<td>10.5%</td>
<td>2.3%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

Schellens and Valcke (2005) in their study suggested a relationship between the two scales. In particular, according to Schellens and Valcke (2005): (i) the "new idea" type of communication according to Veerman et al. (2001) - that consists of facts, experiences, and theoretical ideas corresponds to Phase 1 in knowledge construction according to Gunawardhena (1998), (ii) the "explication" type of communication according to Veerman et al. (2001) corresponds to Phase 2 in knowledge construction according to Gunawardhena (1998), and (iii) the "evaluation" type of communication according to Veerman et al. (2001) corresponds to Phase 3 in knowledge construction according to Gunawardhena (1998).
Figure 2: Comparison of the two scales

A comparison between the two scales according to our data is given in Figure 2 which shows the percentages of task related threads falling under (i), (ii) and (iii) - as introduced in the previous paragraph. One can see that apart from the overall tendency to have a smaller percentage of threads at a higher level of learning, the detailed relationship suggested by Schellens and Valcke (2005) could not be confirmed: whilst there is a clear decrease in the number of threads from "new idea" to "explication" (Veerman et al. scale), the number of Phase 1 and Phase 2 threads (Gunawardhena scale) is almost the same. The discrepancy with Schellens and Valcke (2005) may be due to poor reliability of one of the scales in the context of health related discussions - in our future research this will be investigated by using multiple, independently working raters. In particular, the scale by Gunawardhena (1998) that we felt to be less naturally fitted the health discussions domain may be less reliable.

FUTURE RESEARCH

This study is part of a wider project intended to study knowledge construction in online discussions in health community support groups. In the future research, we intend to add two more variables: knowledge type (evidence-based versus not evidence-based knowledge) and knowledge satisfaction by users accessing the transcripts of discussion forum discussions (see Figure 3).

As suggested earlier in this article, in discussion threads at higher levels of learning, where information is subjected to scrutiny as members explicate it and evaluate it, one may expect that tentative solutions that have no solid basis would be identified as such and rejected. In the medical domain, it is common to distinguish evidence-based knowledge (treatments that have been scientifically demonstrated to be effective, for example by using double-blind trials) and knowledge that is not evidence-based (treatments that are “believed” to be effective, but have never been never demonstrated to be effective in sufficiently rigorous scientific trials) (Gray 2001). One would expect that in discussion threads at higher levels of learning evidence-based knowledge would be more clearly asserted than in discussions at lower levels of learning, as courses of action that are not evidence-based would be exposed as high-risk. To test this hypothesis, we will need to develop a scale measuring the degree to which a discussion thread presents evidence-based knowledge (in Figure 3 we refer to the corresponding variable as "knowledge type").

Figure 3: Research model for the impact of levels of learning in health community support group online discussions on knowledge satisfaction and knowledge type
It is well known that most of the discussion forum users never post, but limit their participation to following the discussions conducted by others. Users who only read, and never post are known as "lurkers". In prior studies, it was found that while the exact fraction may vary, it is common that more than 90 percent of the discussion forum users are lurkers (Katz 1998; Nonnecke et al. 2000a; Nonnecke et al. 2000b; Nonnecke et al. 2001). Thus, most of the people obtaining information from health community support group discussion forums are likely to be lurkers who would judge the trustworthiness of the information they obtain by observing the discussions, but do not contribute to the discussions directly.

In the future research we intend to investigate how the level of learning in a discussion thread impacts the degree of satisfaction of lurkers accessing the thread on the basis of the knowledge they gain from the thread. As discussions at a higher level of learning expose a variety of perspectives making it possible to both better comprehend the solutions suggested, and to form a better idea regarding their fit to a particular situation and their trustworthiness, we expect that threads involving higher levels of learning will result in higher degree of satisfaction. It should be noted that prior studies in the educational domain found that active discussion participants were more satisfied with discussions at higher levels of learning (Kanuka et al. 1998), but we are not aware of any satisfaction studies involving lurkers. We will use an existing satisfaction scale (with possible adjustments) and simulate lurkers by employing raters with an appropriate background.

CONCLUSION

In this content analysis study of interactions in an online health community support group, we found that the overwhelming majority of the threads considered were on topic, which indicates that the online media does contribute to the group's mission (to facilitate the sharing of information and experiences related to a particular health issue).

By applying two existing scales to measure the levels of learning, we found that there is a wide range of levels of learning among threads. In particular, there are substantial numbers of threads involving discussion of facts and ideas resulting in substantial numbers of threads being rated at middle and higher levels of learning. This discovery sets the stage for our future research of the impact of the level of learning in a discussion thread on the quality of information it offers and on the user satisfaction relating to such information.

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