Communication as Argumentation: The Use of Scaffolding Tools by a Networked Nursing Community

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Abstract: This article analyzes the use of argumentation scaffolding strategies and tools by a networked community of nurses. Participants came from hospitals, health centres, and heart care institutes in three Canadian provinces. Over a six-month period, the nurses set a discussion agenda to address problems affecting the cardiac-patient population, using argumentation scaffolding as one of their networking tools. Data collected from two networked conferences is compared using transcripts of online conversations, interviews, and questionnaires. The analysis, drawing upon a theoretical framework integrating the work of Piaget, Habermas, and Grize, indicates different uses of the scaffolding tool as the nurses moved from the brainstorming, reflexive stage of discussion to the production of a co-authored document, The Heart Health Toolkit.

Keywords: Networked communication; Argumentation; Electronic conferencing; Scaffolding tools

Résumé : Cet article analyse l’utilisation de stratégies et outils d’échafaudage de l’argumentation employés par une communauté en réseau d’infirmières et infirmiers. Ces professionnelles et professionnels viennent des hôpitaux, de centres de santé et d’institutions spécialisées en cardiologie de trois provinces canadiennes. Pendant de six mois, les infirmières et infirmiers ont entamé des discussions en ligne afin de discuter la problématique de la population cardiaque, grâce à l’échafaudage de l’argumentation d’un système de forums de discussion. Les données des conversations tenues dans deux forums de discussion, ainsi que celles provenant de questionnaires et d’entrevues ont été comparées. L’analyse, effectuée grâce à une approche théorique intégrant les travaux de Piaget, Habermas et Grize, a mis en évidence différentes utilisations de l’outil d’échafaudage. Par ailleurs, elle démontre que les infirmières et infirmiers ont évolué d’un stade réflexif de discussion à un stade de production. Ce processus a mené à la rédaction collaborative d’un instrument d’enseignement : la trousse en santé du cœur.
Introduction
With the development of the Internet and the World Wide Web over the past decade, many stories of how networked communities have emerged and evolved have been told. Although field guides and manuals have been made available to geeks and the public in general, there are too few in-depth studies on community-building strategies and tools that enable networked communities to flourish. Researchers need to understand the specifics of networked communication to envisage how to make the best use of networked environments.

Many authors have noted the challenges and advantages of using networked technologies to support and advance communication (Bereiter, 2002; Feenberg, 1987, 1999, 2001; Harasim, 1990; Hewitt, 2001; Hiltz & Turoff, 1993; Mason & Bacsich, 1998; Proulx & Latsko-Toth, 2000; Rheingold, 2000; Scardamalia, 2002; Scardamalia & Bereiter, 1994; Wellman & Giulia, 1999). Challenges are usually related to the absence of “real” body indices, such as facial expressions and voice intonation. Advantages mentioned by experts, such as freedom from time and space constraints (Feenberg, 1989; Harasim, 1999; Harasim, Hiltz, Teles, & Turoff, 1995; Kim, 2000; Palloff & Pratt, 1999; Wenger, McDermott, & Snyder, 2002) and evidence concerning the cognitive advantages of engaging in text editing, tend to be very general (Bereiter & Scardamalia, 1987; Bruer, 1994; Harasim, 1990). The objective of this article is to address these issues and to contribute to this literature by showing how the application of appropriate software tools and discussion strategies may assist in community-building.

In this article, I focus on the use of the scaffolding tool made available as a part of conferencing software called Knowledge Forum. This software was used by a professional order in the nursing domain, in partnership with hospitals, health centres, and institutes across three Canadian provinces. They decided to build a community of nurses with expertise in heart care to address the increasing incidence of heart illnesses, which are the second-highest cause of death in Canada (Statistics Canada, 1997). I collaborated with this professional order by supervising the facilitation and community-building process.1 In this article, I examine how the “scaffolding argumentation tool” was deployed by this group of health professionals as a component of their processes of deliberation during a series of online conferences held in 2003.

The scaffolding argumentation tool provided a template for debate by inviting participants to deliberately schematize a sentence, a series of sentences, or parts of a sentence within a posted message. The use of this intentional structure makes apparent the components of an argument by breaking it down into categories such as claims, evidence, data, questions, solutions, and opinions. These categories can be adapted to the particular needs of a community when participatory methods of research design are made a part of the research process.

I begin by introducing the theoretical notions that are central to the critical constructivist theoretical standing that underlies my approach to scaffolding strategies and the software tool. After reviewing the methodological strategies
adopted, I present the results of this study. As this research indicates, there was a
decrease in the use of scaffolds as participants moved from brainstorming ideas
in the first conference to working toward a common goal in the second. Nurses
who participated in the projects became aware of their processes of argumenta-
tion and used this scaffolding tool effectively as a means to better health services
by creating a group-authored “toolkit” for distribution to the Canadian public.

Communication as argumentation
Underlying the scaffolding practices that will be described is a theoretical per-
spective that merges genetic epistemology (Piaget, 1949-1950), the theory of
communicative action (Habermas, 1987), and the communication model pro-
posed by Jean-Blaise Grize (1996; 1997). Jean Piaget, who was a psychologist, a
logician, a sociologist, a mathematician, and a biologist, made it clear that his
interest in those disciplines was practical. He studied their genesis and develop-
ment to demonstrate that a non-philosophical and evidence-based epistemology
(genetic epistemology) was possible. Piaget believed that content was but one of
many dimensions of knowledge. For him, meaning systems (content, affectivity,
culture) are intertwined with logical systems (form, cognition, nature). Fur-
more, it is through the logical operators subjacent to the content of values
people exchange that construction should be identified.

Communication is understood here as a mechanism of species survival that
weaves logical systems (logos) and meaning systems expressed through values
that are, on the one hand, affective (pathos) and, on the other hand, moral
(ethos), a view derived from genetic epistemology (Campos, 2003; 2005; 2005-
2006; in press). Humans are able to “think”; that is, cognitive reasoning abilities
expressed by logical operations (Piaget, 1976a; 1977) that “carry” content (i.e.,
perceptions, emotions, feelings,) (Piaget, 1954). Exercising judgment is a result
of cognitive and affective individual and social abilities on the basis of acquired
values (Piaget, 2000). All communication exchange, in this framework, is one of
values.

This view led Piaget to propose the model of value exchange—a systemic
model that allows the researcher to extract the logical possibilities subjacent to
the content of value exchange among individuals, groups, or societies (1949-50;
1977). For Piaget, individual and social exchanges imply the following possibil-
ities: social autism, social constraint, and co-operation. Social autism may occur
if social exchanges take place in which the reasons subjacent to the arguments of
the interlocutor are merely egocentric. Disequilibrium of value exchange occurs
in situations of social autism because the egocentric interlocutor is not able to
communicate. In this case, there is no exchange between interlocutors. In condi-
tions of social constraint, the reasons put forward express relationships based on
the exercise of authority (power). Disequilibrium arises in situations of social
constraint when, or if, one of the interlocutors unilaterally enforces his or her val-
ues in the exchange. Co-operation is a form of social exchange in which the rea-
sons put forward neither express the egocentrism of an individual nor are based
on relations of power and authority. Such relationships try to achieve equilibrium
in the process. As a consequence, autonomous behaviour is made possible
because interlocutors are equal or believed to be equal (Piaget, 1949-1950; 1977).
Few people have explored the influence of Piaget’s constructivist epistemology on Habermas (Freitag, 1992), and yet, Habermas’ distinction between “teleological action” and “communicative action” (1987) is very similar to Piaget’s understanding of “social constraint” and “co-operation.” For Habermas, instrumental reason, or teleological action, occurs in circumstances in which Self and Other engage in controlling exchanges for egocentric uses. Conversely, communicative action occurs in circumstances in which Self and Other act according to reasons that are put on the table for discussion in the interest of finding common ground. In this normative model of society, subjects strive for equilibrium and “intersubjective understanding”: “communication with a view on achieving an agreement” (Habermas, 1987, vol.1, p. 396). This concept is very similar to Piaget’s definition of “co-operation” as “a process that generates reason” (Piaget, 1977, p. 226). Both scholars attribute enormous importance to the idea of argumentation as intrinsic to communication. For Habermas, intersubjective understanding is a process of negotiation in which the validity of claims is assessed through logical reasoning—through what I am terming here as the process of debate, deliberation, or argumentation.

According to Grize’s model of communication, developed to account for the ill-defined knowledge dimension of the Piagetian model of logical exchanges, all conversational activity is argumentation (1982; 1997). Grize’s model of communication is called “schematization” and is related to the Piagetian concept of the “scheme,” which is anything that can be generalized from a given action (Piaget, 1976b). In this model, argumentation takes place within “schemes” that are both logically formal and content-bound.

According to Grize, communication is argumentation because in all communicative action individuals intend to convince the interlocutor, even if what he or she is to be convinced of is quite banal, such as “Wow!” to comment on a falling star. This understanding is different than the understanding of argumentation in the domain of logic, where argumentation is usually defined, very narrowly, as a process of resolving a dispute. While Habermas tends to understand argumentation in this classical and orthodox use, the contribution of Grize to this discussion is that “argumentation as arguing” is just one of the possibilities of argumentation (1982; 1996). This heuristically enhances Piaget’s model of value exchange and allows for a reinterpretation of that process as one of “conversation.”

For Grize (1996; 1997), conversation is a co-construction that happens in situated contexts. Values exchange are co-constructions that are composed of the articulation of goals (intentionality), individual and social representations involved in language use, and the social history of cultural pre-constructs that informs shared meanings. To be exchanged, values are interpreted according to the “images” that interlocutors have of each other’s meanings. This analysis, however, is always mindful of the “scheme,” or the logical structure subjacent to content. These “schematization” processes, although situated, thus have subjacent forms from which a certain set of commonalities, or universality, can be claimed.

**From argumentation to scaffolds**

According to Piaget, logical strategies can be understood as “scaffolds” leading individuals to new paths of understanding, and this notion of scaffolds has greatly
influenced researchers in psychology and, more recently, education sciences. Leo S. Vygotsky (1979) developed the idea of scaffolds as a cognitive mechanism able to trigger deeper paths of understanding within zones of proximal development, in which children could go beyond expected development with the help of an expert peer (an older child or an adult). Later, Jerome Bruner (1975; 1985) applied the Vygotskian notion of scaffolds to the creation of conceptual tools to trigger development and extend the learning possibilities previously studied by Piaget and collaborators: M. Amann, C.-L. Bonnet, F. Graven, A. Henriques, M. Labarthe, R. Maier, A. Moreau, C. Othenin-Girard, C. Straz, S. Uzan, T. Vergopoulos (1974). Because the co-construction of knowledge cannot be separated from circumstances of communication, I also understand scaffolds as a means to enable meaningful and deliberate interactions based on natural logic and the will to co-operate.

In computer-mediated-communication contexts, scaffolds typically refer to both participation and moderation strategies and software tools associated with communicative intentions to support collaboration, knowledge co-construction, and inter-subjective understanding (or co-operation). Scaffolds have been used as strategies for participatory design (Balka, 1997; Bjerknes & Bratteteig, 1995) and as a method for building participatory networked communities in the context of the present research (Campos, 2004a; 2004b; 2004c). Building on the concept of scaffolds, cognitive psychologists have developed electronic conferencing environments and tools to support knowledge construction and collaboration (Harasim, 1999; Scardamalia & Bereiter, 1994). Scardamalia and Bereiter (1994) developed a specific tool within an electronic conferencing environment that would act as an empirical mechanism able to scaffold representations of discourse structures. The software developed by these University of Toronto researchers, which we used in our case study, is Knowledge Forum.

Scaffolds as tools (Figure 1) aim to support argumentation and negotiation processes, as Scardamalia and Bereiter have demonstrated with their research (Scardamalia, 2002; Scardamalia & Bereiter, 1994).

**Figure 1: Knowledge Forum scaffolding tool**

The software allows the user to attribute “tags” to a selection of text in an electronic-conferencing message. The “tag” has opening and closing brackets to indicate where the scaffolding is occurring. In addition, the user (or the designer)
can invent attributions that are included within the “tags” in the form of titles, such as those presented below (problem, opinion, questioning). In this way, the authors can structure their thoughts prior to writing, and readers can easily identify and follow the communicative “intentions” of the writer.

**Participatory action methods, community consultation, and scaffold design**

All parties interested in the success of the networked community were involved in the process of creating an appropriate forum and set of tools for discussion: the professional order of nurses, the facilitator, and, most of all, the nurses. The nurses were recruited through advertising published by the professional order, which stressed the voluntary nature of the networked community. The facilitator, a nurse herself, is an expert on heart care, as were all participants that accepted the challenge. They came from different kinds of professional settings (hospitals, health centres, universities, et cetera).

The system was set up because the professional order wanted the nurses to prepare recommendations that could ameliorate their practices and to share knowledge co-constructed by them with cardiac patients, their families, and the public at large. Prior to launch, the nurses who accepted the invitation to participate voluntarily were organized into three groups to become acquainted and to receive technological training. The first subgroup comprised nurses living in municipalities located within two hours from “Big Town A area, Province A,” including towns in “Province B.” The second subgroup was in the “Big Town B area, Province A,” and the third gathered nurses living in distant parts of Province A and Province C. The first two groups each met face-to-face for a full day, and the third met through a telephone conference. The goals of the meetings were to provide an opportunity for close contact, to enable discussions about how to build a community together, and to introduce the nurses to the conferencing software. The nurses met again in the middle and at the end of the six-month project.

Prior to launching the networked community, the facilitator and I designed forums, which are called “views” in Knowledge Forum, as they allow the designers to go beyond the tree-like structure of messages because of the software’s graphical interface and image- and video-embedding possibilities. These views included a “Welcome” page to provide administrative information from the facilitator and to give access to the other conferences. The “Presentation” section allowed the participants to introduce themselves with a short biography and photo. The “Tips” forum was a place for publication of tips on how to navigate through the environment, which was prepared by the facilitator and enriched by the nurses themselves throughout their learning exploration of the environment. “At the Heart of Our Exchanges” became the brainstorming space in which the nurses could identify the problems related to their practices that were most appealing for discussion and most relevant for their professional lives as related to public needs.

In addition to features that are common to other conferencing systems, such as keywording and word search, the Knowledge Forum software enables users to edit their messages after they are posted; annotate messages by inserting “post-
Although it was my idea to deploy a schema within the networked community of nurses, scaffolding use was not imposed, but proposed. The idea was to provide a structured way to enable in-depth conversation by assessing the claims put forward. During the training sessions with the conferencing software, the nurses were introduced to the possibilities of the scaffolding tool and to the proposed scaffolds. They were told that the working hypothesis was that the scaffolds would help them structure discourse, facilitate knowledge co-construction, and contribute to argument-building and understanding.

As researcher, I not only analyzed data resulting from networked-community-building and exchanges to fulfill my personal scholarly interests (theory- and method-building, regarding engagements with grant-funding agencies, publishing, et cetera), but also participated actively as conceptual and practical “coach.” My role was not only to inform the participants about the possibilities of networked conversation as argumentation to enable them to achieve the goals that they set for themselves, but also to act as networked-community-building architect. In addition, although I never wrote messages, I was an active reader of them so that I could discuss intervention strategies with the facilitator. Together we addressed questions such as, “What are the best scaffolding strategies to enable the nurses to achieve their goals? How do we help the nurses structure their messages and organize their discussions? When should the facilitator intervene? Why should the facilitator intervene through scaffolding in one situation, encourage the nurses in another, and remain silent in another?”

To adapt what in argumentation are called the “parts” of an argument (such as a claim, data, hypothesis, warrant, conclusion, and so on), the design team proposed changes that would make sense to the nurses. Five argumentation scaffolds were negotiated. In the “claim” scaffold, the participants were invited to name an initial problem, express concerns or difficulties, or affirm something. The “data” scaffold was used to present facts, statistics, scientific data, research results, or other information. Using the scaffold titled “envisaged solutions,” participants hypothesized a possible answer and a set of processes. In “questions,” the nurses asked further questions or made inquiries. The most contentious scaffold, from my point of view (and as I will explain later), was the “opinion” scaffold. This scaffold allowed the nurses to present their subjective viewpoints to lead to a new turn of argumentation (Figure 2).

This scaffolding structure was intended to allow users to insert “tags” within the text or to bracket sentences. It was thus potentially helpful to writers, as it invited them to categorize and structure their own thinking by making their intentions clear.

This system was used in nine online conference situations during the six-month period. The entire database for these nine conferences consists of 545 messages and approximately the same number of annotations (“post-its” inserted within the messages). For the purpose of this study, two conferences were chosen...
for data analysis: “At the Heart of Our Exchanges” and “Heart Health Kit.” The first conference, “At the Heart of Our Exchanges,” was conducted to identify problems related to heart care practices. In this conference, 122 messages were posted. The second conference, “Heart Health Kit,” was composed of 141 messages and was created to prepare deliverables to address the problems identified in the first conference. In the first conference, the nurses explored the difficulties of engaging patients in preventative strategies, such as encouraging them to share the responsibility for their treatment and to participate in the development of nursing strategies that could help their condition. In this conference they decided to prepare a “teaching instrument”: a heart care guide. In the second conference, the nurses prepared the guide for patients to help them control symptoms and signs of heart failure and thereby to enable self-surveillance. The Heart Health Kit was later published on the Internet and used in their workplaces.

Figure 2: Scaffolds used in the networked community of nurses: “Claim,” “Data,” “Envisaged solutions,” “Questions,” and “Opinion”

In retrospect, these two conferences were chosen for analysis because, in addition to the continuity between them, they provide comparative evidence of scaffold use by the nurses to structure their arguments, co-construct knowledge, and reach inter-subjective understanding as they moved from the brainstorming phase to a more production-oriented phase of deliberation and discussion. This analysis was done in three progressive steps, although it focuses on the second step of the overall procedure. First, I extracted the logical operations, such as affirmations, negations, disjunctions, and the use of conditionals, within the progressive networked-community discourse. Second, I identified the main structure of the arguments: their premises, conclusions, and parts (claim, data, et cetera). Third, I related the arguments found in a message to arguments presented in previous messages in order to identify the progressive context of argument co-construction and the development of chains of arguments throughout the messages. The method allowed my team to tabulate numbers and view the process of co-construction; verbatim examples are presented in the next section. The messages were coded blindly by two research assistants. Inter-coder reliability was 88.93% for the first conference, “At the Heart of Our Exchanges,” and 95.6% for the second conference, “Heart Health Kit.”
Data and analysis of scaffold use

I was surprised by the consistent use of scaffolds by the nurses within the Knowledge Forum software. I realized that a numerical tabulation of the messages that used scaffolds, the percentage of sentences that were encapsulated in scaffolds, and information on the types of scaffolds used would provide additional information on the patterns of usage and the processes of reasoning that the nurses engaged in as they used the scaffolding tool during the two conferences.

Approximately three quarters of all messages in the first conference and one third in the second used at least one scaffold. In the first conference, 73.8% of the 122 messages posted used at least one scaffold. In the second conference, 67.4% of the 141 messages posted used at least one scaffold. The data generally demonstrates the ability and willingness of the nurses to structure their arguments deliberately and to fulfill the agenda that they had set for themselves: to participate in an intentional and co-operative process of deliberation to improve public knowledge of cardiac care. What is noticeable, specifically, is a slight decline in the appearance of scaffolds between the first and second conferences, a pattern that was repeated when we compared the percentage of sentences placed within scaffolds with those placed outside of a scaffolding bracket.

Scaffolding is a tool that is used by the participant to categorize either the entire message or a selection of text in a message. In the first conference, 69% of the sentences were placed inside of the scaffolding template. In the second conference, 43.5% of the sentences in the posts were within scaffolds (Table 1).

Table 1: Sentences within and outside scaffolds (all messages)

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within scaffolds</td>
<td>706</td>
<td>69.9</td>
</tr>
<tr>
<td>Outside scaffolds</td>
<td>304</td>
<td>30.1</td>
</tr>
<tr>
<td>Sub-total</td>
<td>1010</td>
<td>100</td>
</tr>
<tr>
<td>Sentences First Conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within scaffolds</td>
<td>741</td>
<td>43.5</td>
</tr>
<tr>
<td>Outside scaffolds</td>
<td>362</td>
<td>56.5</td>
</tr>
<tr>
<td>Sub-total</td>
<td>1103</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>2713</td>
<td></td>
</tr>
</tbody>
</table>

In the second conference, there was an increase in the number of sentences posted, from 1011 to 1703; however, fewer of these sentences were placed within one of the scaffolding brackets.

This trend is less dramatic if we look at the data in another way. If all messages in which the participants did not insert any scaffolds are excluded and only messages with scaffolds are analyzed, a different picture emerges. In this case, a much higher level of sentence inclusion within scaffolds is found: 92% in the first conference and 70.8% in the second conference (Table 2).
Table 2: Sentences within and outside scaffolds (analyzing only messages using scaffolds)

<table>
<thead>
<tr>
<th>Scaffolds</th>
<th>First Conference</th>
<th>Second Conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within scaffolds</td>
<td>766</td>
<td>741</td>
</tr>
<tr>
<td>Outside scaffolds</td>
<td>62</td>
<td>303</td>
</tr>
<tr>
<td>Sub-total</td>
<td>828</td>
<td>1044</td>
</tr>
</tbody>
</table>

These numbers suggest that scaffolds were used to classify large portions of the nurses’ sentences when they decided to structure their thoughts as arguments using the scaffolding tool.

In total, these sets of numbers also indicate a significant difference in scaffold use from the first conference to the second. In general, there was a decrease in the use of the scaffolding tool from the first conference to the second. One hypothesis is that the nurses simply lost interest in the tool. What is more plausible is that it is attributable to the context and the difference in intent between the two conferences.

In the first conference, the nurses were engaged in a process of identifying and discussing common problems of their practices, as well as actively exploring possible solutions. The nurses were in a “reflexive mode.” This kind of discussion led to a more consistent pattern of complex argument construction, as the nurses presented ideas, justified them, and defended them in the wake of questioning from the other participants. In the second conference, the nurses were in a “production mode.” They engaged in fewer arguments and less sustained deliberations because they were oriented toward a collective writing activity. To prepare this Heart Health Kit, made available online to the general public and to heart care patients in hospitals and health centres, the nurses engaged in a collaborative assessment of its content and not in a reflexive debate on problems as in the first conference. Producing a guide required hands-on activity to assemble data and tips, which led to a different use of scaffolds from the participating nurses. The data on the types of scaffolds used points to these different modes of deliberation in the two conferences (Table 3).

More “questioning” and “envisioned solutions” scaffolds were used in the first conference. “Questioning” and “envisioning solutions” scaffolds were used in the search for answers to claims made or problems identified. What increased dramatically in the second conference was use of the “data” scaffold, which went from 23% in the first conference to 39.5% in the second one. The use of “data” scaffolds indicates that the nurses posed fewer questions and engaged less in envisaging solutions for their problems; for this reason, there was also a slight drop from the first to the second conference in the number of “claims” made, from 13.5% to 10.8%.
The numbers concerning the occurrence of scaffold types, shown in Table 3, hint at the different intentions and modalities of reasoning appropriate to each conference (reflexive mode versus production mode) and provide indicators of the intentional character of the interactions within this community in these two phases. The differences in these forms of argumentation are demonstrated in two excerpts. In this first excerpt, a message written by the facilitator, we see the “claim,” “questioning,” and “envisaged solutions” scaffolds in action:

*Claim* – The problem concerning the patient decision to take charge of his/her health is related to the non modification [sic] of behaviours that are health-damaging. It seems to be important, following what you have proposed, that the patient becomes responsible for her/his own health.

*Envisaged solutions* – The solutions envisaged here refer to the importance of considering the needs of each patient and that of following her/his level of adaptation to the illness in order to enable the nurses to guide her/him in the process of taking charge of her/him [sic] health.

*Questioning* – What are the nursing strategies that should be specifically designed to follow the patients in their process of taking charge of their health in order to help them change behaviours that are damaging to their health? What are the models of behaviour change that could guide our discussion?

In this example, the facilitator structures her message by presenting the “claim” that patients need to take charge of their health. This is followed by the presentation of an “envisaged solution” that makes reference to suggestions from a prior post. In “questioning,” the nurses challenge each other to propose other possible solutions to the problem.

This is just one of many instances in which the nurses reasoned in response to the facilitator’s challenges in order to try to achieve a consensus. This example reveals the complexity of this process of deliberation in the first conference, as the nurses reassessed new knowledge and reflected critically to reconstruct previously held concepts, notions, or ideas.

### Table 3: Occurrence of scaffold types

<table>
<thead>
<tr>
<th>Scaffold type</th>
<th>Conference</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First conference</td>
<td>Second conference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
<td>Number</td>
</tr>
<tr>
<td>Claim</td>
<td>20</td>
<td>13.5</td>
<td>20</td>
</tr>
<tr>
<td>Data</td>
<td>21</td>
<td>23.0</td>
<td>73</td>
</tr>
<tr>
<td>Questioning</td>
<td>60</td>
<td>27.0</td>
<td>33</td>
</tr>
<tr>
<td>Envisaged solutions</td>
<td>34</td>
<td>24.3</td>
<td>35</td>
</tr>
<tr>
<td>Opinions</td>
<td>27</td>
<td>12.2</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>222</strong></td>
<td><strong>100</strong></td>
<td><strong>185</strong></td>
</tr>
</tbody>
</table>
This first-conference process is very different from the general trend of scaffold use in the second conference. In the second conference, the presentation of data is more important, a trait captured in the following message written by one participating nurse.3

Claim – Patients would like to understand what arterial blood pressure is.

Data – Arterial pressure is the force exerted by the blood. . . . Maximum tension is measured when the heart cavities contract (systolic pressure) and minimum when the heart cavities relax.

Excerpts from the transcripts also reveal how the conference participants “built on” the contributions of others using explicit or implicit conditionals. This is captured in the following short message written by one participating nurse:

Claim – With psychiatric patients, there are contracts [in my health centre] prepared to enable them to take charge of their health and make them responsible for the follow-up. We have one contract concerning aid, another one concerning what has to be done to act effectively. . . . Because they engage in the process of taking charge, most contracts are respected.

Envisaged solutions – A contract with cardiac patients is a solution to be considered.

Knowledge is often developed through the use of explicit or implicit conditionals, e.g., “If we apply a technique to psychiatric patients, then this could be a solution for patients with heart problems.” These examples from the conference underline some of the mechanics of scaffold use.

Table 4: Stand-alone occurrences and co-occurrences of scaffolds

| Messages with | Conference              |        |        |
|              | First conference | Second conference |
|              | Number | Percentage | Number | Percentage |
| 1 scaffold   | 37     | 42.0       | 65     | 68.3       |
| 2 scaffolds  | 25     | 28.4       | 15     | 16.3       |
| 3 scaffolds  | 16     | 18.2       | 12     | 13.0       |
| 4 scaffolds  | 7      | 8.0        | 2      | 2.2        |
| 5 scaffolds  | 3      | 3.4        | 0      | 0          |
| Total        | 88     | 100        | 92     | 100        |

The complex structure of reasoning and discussion characteristic of the reflexive mode of argumentation is indicated by two further sets of data (Table 4). The first conference contained a greater percentage of “co-occurrences” of scaffolds in various combinations. In the first conference, the nurses combined more than one scaffold in the body of the messages in 58% of the cases. In the second conference, combined co-occurrences were used in 31.5% of the messages.
Inserting just one scaffold in a message was more frequent in the second conference: just one scaffold was used in 68.5% of messages, as opposed to 42% in the first conference, as displayed in Table 4. Although in Table 5 the total number of messages from the first conference is 90 and from the second is 95, in Table 4 the co-occurrences of scaffolds from the first and second conferences are, respectively, 88 and 92. This quantitative distortion is due to the fact that co-occurrences of scaffolds sometimes overlap, something that does not happen with stand-alone scaffold occurrences.

The numbers are eloquent if one examines the specific combinations of scaffolds used. In the first conference, the pairing of the “questioning” and “envisaged solutions” scaffolds represents 51.3% of all scaffolds, indicating a high level of inquiry and hypothetical reasoning characteristic of the reflexive mode. In the second conference, the use of scaffolds changes significantly. Reflexive thinking, suggested by the use of the “questioning”/”envisaged solutions” scaffold combination is still high, but the “data” scaffold is alone responsible for 39.5% of the second conference messages (see Table 3), which is characteristic of the production mode, in which the nurses were busy producing content for the “Heart Health Kit.”

Table 5: Occurrence of pairs of scaffolds

<table>
<thead>
<tr>
<th></th>
<th>Claim</th>
<th>Data</th>
<th>Questioning</th>
<th>Envisaged solutions</th>
<th>Opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conf 1</td>
<td>8</td>
<td>5</td>
<td>19</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Conf 2</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

Another interesting quantitative trend is that the “opinion” scaffold occurred more frequently when it was not combined with other scaffolds. It accounts for 54.1% of the stand-alone scaffolds in the first conference and 20.6% of the stand-alone scaffolds of the second. The “opinion” scaffold was brought into the design after discussions with the nurses, who proposed that such a scaffold was missing. In contrast to the other scaffolds—“claim,” “data,” “envisaged solutions,” and “questions”—which are clearly parts of an argument, the “opinion” scaffold sometimes implied “claim,” “data,” or “envisaged solutions.” I failed to convince the nurses that the meaning of the “opinion” scaffold would overlap with the other scaffolds and create a theoretical distortion in the data. Practically speaking, in some circumstances it was “easier” to structure one’s thoughts within this open-ended scaffold. Interestingly, the use of this scaffold is significant in the community, especially in the first conference (reflexive mode). Its use declined in the second conference, perhaps because “opinions” were less pertinent in the production mode, the purpose of which was to decide on the data that would be incorporated into the Heart Health Kit.
Conclusion

When people participate in electronic conferences, they have written conversations that can be understood as argumentation processes in which values are exchanged and co-constructed. Co-construction, according to Grize (1996; 1997), reveals the intentionality of interlocutors, their individual and social representations, and the cultural pre-constructs that inform language use. Networked interaction through text-based conferencing systems allows for processes of co-construction that fall somewhere between essay-writing and face-to-face exchanges. The literature has highlighted that electronic conferencing allows participants to reflect more consistently about their ideas, because of the editing process that is involved in active reading and writing (Bereiter, 2002; Bereiter & Scardamalia, 1987; Bruer, 1994; Scardamalia, 2002; Scardamalia & Bereiter, 1994). In writing, intentions may become less spontaneous and more thoughtful and, if properly supported, can lead to structured discussion. The argument is that reflexive behaviour is difficult in face-to-face conversations.

The analysis I have undertaken suggests how the use of scaffolds can play an active role in the way participants (in this case, nurses) structure and integrate their thoughts in written form as a collaborative process of knowledge-building through argumentation. The scaffolds acted as tools for the community of nurses, who were interested in discussing and responding practically to pressing issues in the area of cardiac care. The scaffolds also provided a glimpse into the processes of negotiation, knowledge co-construction, and intersubjective understanding in this community.

In this case, the scaffolding tool was adapted and used in conjunction with participatory-action research for several reasons. The use of the tool was intended to contribute to the nurses’ professional development by engaging them in a process of reflection and structured communication to advance expert knowledge. It invited the nurses to negotiate arguments with one another to enable them to achieve intersubjective understanding through a negotiation process. Finally, it provided me, as a communications researcher, with an opportunity to analyze whether and how this form of structured communication made possible by the software could contribute to intersubjective understanding and community building in the process of trying to achieve a deliberate set of agreed-upon goals.

The usefulness of these tools, and of these processes of reasoning for community-building, is indicated in the data collection and in the response of the nurses to the project. Our group conducted a follow-up questionnaire. When the nurses were asked about their experience with the scaffolding tool, 81.1% considered it to have made a positive contribution to their practices. Their perception of collaboration was also worth noting: 63.6% strongly agreed collaboration was achieved, while 18.2% found it to be achieved to a reasonable degree. Collaboration was believed to be weak by 9.1% of respondents, and another 9.1% did not respond. With respect to their ability to achieve consensus, 54.5% found it to be strong, while 27.3% responded that it was reasonable. For 9.1%, it was perceived as weak, and 9.1% did not respond. Finally, 63.6% of the nurses considered the networked conversations to be in-depth discussions, while the rest (36.4%) described them as commentaries about the topics. Most nurses, in semi-
structured interviews conducted after the networked community ended, considered the experience worth pursuing and commented that forums for knowledge-sharing were important to their professional development.

This case study explores a specific community experience in which processes of reflection and reason may occur. The scaffolds were used to critically assess concepts, notions, and ideas and to transform these ideas through a co-operative intersubjective understanding process. The goal of the networked community was not simply to succeed in exchanging information, but to understand or, more precisely, to negotiate in order to achieve “intersubjective understanding” (to invoke Habermas). Such an intersubjective understanding was exercised through an open and deliberate process of argument evaluation in which claims, evidence, questions, opinions, and solutions were formally put on the table. This process took place in their informal networked conversations, in which they applied constructed “schemas” to analyze new situations. Most conference messages show the use of at least one of the scaffolds created to help participants structure their thoughts in networked conversation. In these respects, the tool may be used more frequently when participants are engaged in the brainstorming phase of a project.

As our experience also suggests, these scaffolding tools are effective if applied with adequate facilitation and scaffolding strategies aimed at achieving intersubjective understanding through supplementary means of supporting co-operation and knowledge co-construction, such as participatory-design methods that engage the community in adopting and adapting the tools for their specific community. In this case, the results were very positive. The nurses involved in the networked community on heart health supported one another, discussed topics of their interest, sought solutions for problems of practice, and produced a concrete deliverable.

In the first conference, the nurses used the scaffolding tool in exploring the problems of educating patients and helping them take charge of their health. During this brainstorming process, they explored dozens of issues related to cardiac illnesses in the search for the most appropriate deliverable—one that would enable patients, families, the public, and the nurses to ameliorate heart care. As I suggested above, scaffolding use anchored an active process of hypothesizing, resulting in a reflexive mode of knowledge co-construction. This intersubjective understanding led the nurses to work together on the building of the Heart Health Kit, which was fully developed in the second conference.

Building a networked community collectively and structuring conversations with the help of argumentation strategies to achieve co-operative inter-understanding does not, in itself, necessarily affect practice. However, in this case, the critical communication process within this networked community of nurses resulted in a concrete object of knowledge. This exercise in criticism entailed a transformation in the delivery of an important health message.

In any communication, understood as an exchange of values, there is a difference between being able to “succeed” and to “understand.” In text-based communication through conferencing systems, a person can “succeed” in communicating something through language without having an interlocutor in mind. However, to “understand” means to lay down an argument, identify the premises that sustain it, and conclude by putting forward acceptable explanations.
for the subject at stake—or a solution, if the argument deals with a problem. Understanding requires logical reasoning, interpretation, and negotiation abilities. This intentionality is closely interconnected with awareness of the processes of discussion and deliberation and the ability to articulate one’s values and goals. This case study demonstrates how a community of writers can intentionally co-construct knowledge through the use of appropriate logical forms, or “scaffolds,” to lead to new paths of understanding.

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Notes
1. I report my contribution to this endeavour here. Additional researchers from three universities, in collaboration with a research centre funded by private and public organizations interested in technology in the workplace, also took part in the research process by looking at other aspects (organizational, technological, and pedagogical).

2. This notion of collaboration and the software were developed by scholars involved in Computer Support for Collaborative Learning (CSCL). Scardamalia and Bereiter are participants in the CSCL.

3. The brackets indicate parts of the text that were deleted, including scaffolds that were not pertinent to the example in question.

References


