How interactive is a semantic network? Concept maps and discourse in knowledge communities

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Abstract

Computer-mediated learning needs to be social too. Interactivity is a central construct for collaborative knowledge construction in online communities. We present an operationalized framework for measuring interactivity in online discussions, based on our view of interactivity as a socio-constructivist process. We hypothesize that the traditional design for online discussion platforms, with linear, chronologically threaded forums and bulletin boards, would result in less interactive behavioral patterns. We propose a semantic network topology to online discussions, which in turn reflects a social constructivist process. To that end, we developed Ligilo, an online discussion platform. Here, each discussion contribution and content item is expressed as a node in a semantic network of posts. We describe a field study comparing interactivity using threaded-based discussion and Ligilo's semantic, networked based discussion. Initial results indicate higher interactivity in content creation patterns, suggesting learning, motivation and sustainability for discussion and community.

1. Introduction

Online knowledge communities [1] are those virtually gathered around a shared subject of interest, with the purpose of constructing existing knowledge. Despite the rhetoric of "community", and the shared purpose and motivation, online exchange of information and learning can be lonely [2]. Computer-mediated learning and knowledge management, whether formally or informally, need to be social too. We consider Interactivity to be a central design and evaluation construct for social and discussion infrastructure for knowledge communities. Among the intended outcomes of interactivity are engagement in online communities, sociability, group’s potential to stick together, cooperation, and longevity [3]. Thus, interactivity is either an outcome of effective collaboration or a mediating variable, resulting in better co-creation outcomes. Scholars are debating the conceptualizations of interactivity, and designers struggle with building it into systems. Specifically one line of research views interactivity as situated within the medium [4], while Rafaeli [5] contrasted this conceptualization with examining interactivity as a process-related variable. In his definition, interactivity is predicated on the relatedness of sequential posts.

In this paper, we propose a socio-constructivist [6] view on Rafaeli's [5] definition of interactivity. In our view, the afforded structure of information, which is a property of the medium, can impact interactivity, as a process-based construct. To that end, we present a novel discussion platform, designed as a socio-constructivist medium, which enables the structuring of an online discussion in a network based design, instead of the traditional, thread-based design [7]. We will show empirical evidence supporting the hypothesis that higher degrees of interactivity in content creation patterns appear when using the networked-based platform compared to the classical thread-based design.

In the rest of the Introduction section, we will review the relation between interactivity and social constructivism in the context of knowledge communities' online discussions. Following a review of the theory, we briefly present Ligilo, an online discussion platform designed in response to this theoretical layout. Next, in the Method section, we operationalize interactivity measures in knowledge communities. Finally, we describe a field experiment comparing traditional and semantic approaches to discussion platforms.

1.1. Interactivity in Knowledge Communities

Online discussions hold a promise for collaborative knowledge construction: participants in online communities are afforded the opportunity to share ideas, learn from peers, and build knowledge collectively. These virtual settings enable less-assertive participants to compose their thoughts [8], while allowing more time for all participants to reflect on and respond to the contributions of others

[9]. In practice, however, online discussions often do not meet expectations for engagement [10-12]; contributions frequently do not respond to or build on one another [13]; and discussions are often shallow [14] and incoherent [15]. The research proposed here aims at exploring the potential of semantic network structures as a form of co-created or shared knowledge to increase the effectiveness of online community discussions, specifically in terms of interactivity.

Among a wide range of Interactivity conceptualizations we follow [5] who looks at interactivity as the extent to which posts in a sequence relate to each other. In this definition, interactivity is a process-related, variable characteristic of communication settings. It expresses the degree to which communication transcends reaction. Interactivity describes and prescribes the manner in which conversational interaction as an iterative process leads to jointly produced meaning and it merges speaking with listening [3]. We contend that online discussions have an evolving, different and complementing role over face to face conversations in the process of knowledge construction. Online conversations are wider, longer, asynchronous, persistent, documented, and might invite considerable ongoing reflection. In the next sub-section, we will relate the building blocks of the Social Constructivism of knowledge theory to Rafaeli's theoretic definition to interactivity.

1.2 Interactivity and Social Constructivism

A growing consensus among constructivist philosophers and epistemologists is that the creation of new knowledge involves both existing knowledge and the drive to relate to it new meanings and infer ways of representing these meanings [16]. Social Constructivism extends constructivism by pointing to the central social role that the community plays in the individual learning process [6]. Communal Constructivism is an approach to learning in which learners not only construct their own knowledge (constructivism), thanks to interacting with their environment (social constructivism), but are also actively engaged in the process of constructing knowledge for their community [17]. Social constructivism emphasizes interactivity as a mean for learning [6]. Vygotsky argued that all cognitive functions are originated in social interactions and that learning was the process by which learners were integrated into a knowledge community.

In the present work, online discussions are conceptualized from a social constructivist perspective, encouraging participants to interact while adding to both collective and individual understanding through discourse. Social constructivism is an interactive process. Interactivity in knowledge communities is a constructivist process [18]; thus, it must be considered an essential metric when evaluating knowledge communities [5].

1.3 Discussions structured as Concept Maps: a socio-constructivist approach for discourse

In this sub-section we draw from the literature body underlying Concept Maps to deduce the rationale for semantic networked discussions in the field of knowledge communities.

Human beings are able to perceive regularities in objects and events and, through language, to code these regularities symbolically in their memory [19]. These symbols, usually represented by words, are defined by Novak [20] as concepts. When two or more concepts are related through the use of linking words, propositions are formed. Concepts and propositions become the fundamental units of meaning stored in our cognitive structure [20]. Concept maps, the result of Novak's research into human knowledge construction, are two-dimensional graphical displays of concepts connected by directed arcs, tagged by semantic relationships (linking phrases) between pairs of concepts and forming propositions [16] (see **Figure 1** for an example). A growing body of research indicates the usefulness of concept maps as learning and organizing aids in solving problems, taking decisions, and making tacit knowledge explicit. These goals are achieved by explicitly representing the semantics of a certain knowledge domain and plotting networks of concepts and interrelationships [20-21]. Concept maps (and other cognitive maps) have proved useful in collaborative settings as well, such as brainstorming, cross-cultural collaborative knowledge-construction, collaborative learning [16, 21-23] and are specifically used by experts to preserve organizational knowledge [24].

Concept mapping emerged from Ausubel's Assimilation Theory of Meaningful Learning [25], which explained evidence from Novak's research. Novak had concluded that the integration of new and old knowledge was a function of both the quantity and the quality of cognitive structure organization. The underlying basis of Ausubel's theory is that meaningful (as opposed to rote or memorized) human learning occurs when new knowledge is purposively linked to an existing framework of prior knowledge in a non-arbitrary and substantive fashion. In rote learning, by contrast, new concepts are added to the learner's framework in an arbitrary and verbatim way, thereby producing weak and unstable structures that quickly degenerate. Collaboration is thus a coordinated activity resulting from the continued attempt to construct and maintain a shared conception of a problem [26].

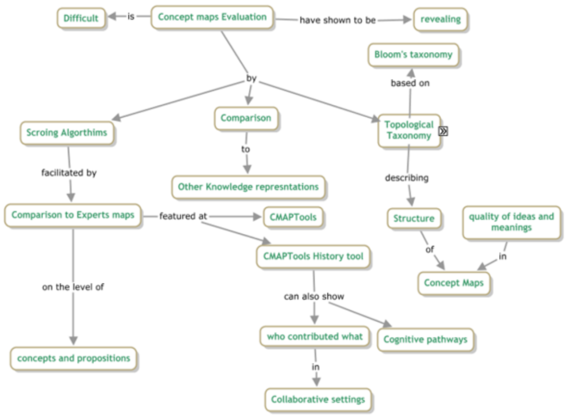

Figure 1: An example for a concept map, using IHMC's Cmap tool [16]. Entities are circled, relations are semantically tagged.

The use of concept mapping as a constructionist tool enables participants in knowledge communities to represent their individual, abstract knowledge tangibly; they can now create an “object to think with” that “can be shown, discussed, examined, probed, and admired” [27]. In groups, concept maps become a facilitation tool for distributing cognition [28].

The next section introduces Ligilo, a discussion platform, whose design draws from the networked knowledge representation and semantically tagged interrelations among concepts, as used in concepts maps, and which is adapted to support interactive online discussions. Ligilo's architecture and its reliance on the Semantic Web[1] architecture are described in [7]. In the next sub-section, we focus on the socio-constructivist nature of Ligilo, as well as on the way Ligilo fosters a hyperlinked environment of knowledge, where relations among posts are explicitly and collaboratively structured by the community members for the whole community.

1.4 Ligilo: A networked-topology discussion platform

Ligilo is an online discussion platform, enabling knowledge communities to create collective concept maps through discussion. It is intended to provide community participants with a hyperlinked learning environment, where the relations among content items are semantically explicit, and reading is experienced as browsing in a network of content items.

Linear representation of knowledge (e.g., unstructured text, lists of threaded messages) is the basic form of sharing knowledge online (e.g., blogs, forums). However, research has shown that human mental models are non-linear [20] and that the process of creating and communicating knowledge is more effective when knowledge is represented in a non-linear manner [19]. Tremayne [29] studied the effect of web site structure on learning. He found that a website’s linear structure better supported the recognition measure of learning, while the nonlinear structure better supported the comprehension measure of learning. He used constructivism to suggest an explanation to this evidence: “The way that learning is conceptualized in constructivist theory suggests the importance of assessments that tap a deeper understanding rather than simple recall or recognition, as do the results of other studies” [29].

An important relationship exists between Ausubel's Assimilation Theory [25] and constructivist philosophers, regarding the importance of linking new knowledge to existing constructs of knowledge. Both see this linkage as essential in order to meaningfully and deeply assimilate the reconstructed mental model of knowledge. Following this constructivist approach, Ligilo's user experience is based on a nonlinear designed as a network of posts, in which a community member can, at any given time, retrieve all the posts directly related to the current read node (i.e., message or post). Those related posts are retrieved along with the tagged relations from the current post (e.g., “reminds me of…”, “makes me ask”, “for example”, “as opposed to…” and so forth). The tagged relations enable for a clearer comprehension of the information structured by community peers (see **Figure 2(a)**). In addition, Ligilo enables a zoomable map view of the emergent knowledge base (see **Figure 2(c)**) in order to better grasp the high-level context of the constructed model [31], the centrality and gravity centers of the subjects, and clusters of interest within the network. Technically, by enabling participants to add a new semantic relationship between two existing posts, the discussion topology is turned from a forest-like and hazardously haphazard structure of disconnected discussions, where relations may remain un-explained, into a unified semantically tagged networked structure.

Reconstruction of individual cognitions requires a profound and mutual understanding of the collaborators' perspectives and shared interpretations of the problem [31]. Tagging relationships among

[1] http://www.w3.org/standards/semanticweb

concepts in a network rationalizes the contributor's choice when adding a node of information specifically at that place and in that context. Salomon [32] stresses that knowledge is always part of a context. It is very important that cooperating subjects acquire a common frame of reference for the communication of their individual viewpoints. All objects of the shared cognition and all pieces of knowledge are meaningfully integrated into the cognitive structure of the collaborators and interpreted in the same frame of reference [31].

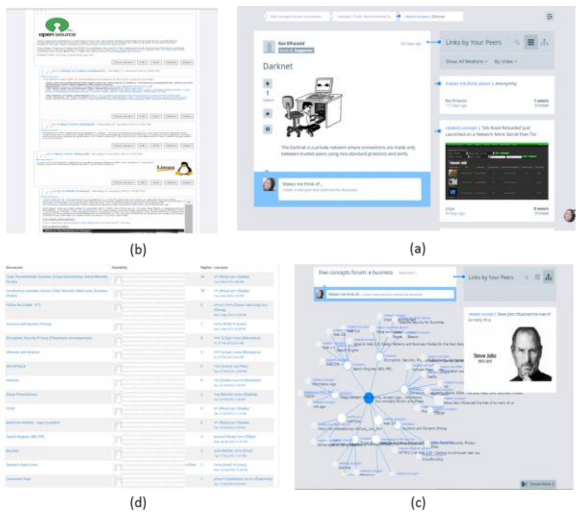

Figure 2: (a) Ligilo's basic view: posts at the left side of the screen are connected with blue tagged relations to posts on the right; (b) Moodle's forum basic view: posts are related in a threaded design, with no explicit relations; (c) bird's eye view of posts in Ligilo; (d) Moodle's bird's eye view.

Ligilo's analytics engine follows the participants' behavior in terms of content creation and in terms of content consumption [30, 33]. The analytics engine is based on a network-based approach, and thus it is based on graph analysis and semantic analysis. The set of metrics deduced for each community member reveals an image indicating the participant’s level of individual engagement, interactivity metrics, and some semantic analysis to classify relation types used, such as the proportion of the participant's relations that were associative (“makes me think of”), logical (“reduces”), hierarchical (“includes”), and positive (“I agree since”) or negative (“as opposed to”’).

The following section lays out our approach to operationalizing interactivity in the context of knowledge communities. Then we will present our field experiment and its results.

2. Method

Researchers have measured interactivity according to various criteria, among them feedback options, presence of website features (e.g., hyperlinks, chats, downloads), ease of navigation, and scale [34-35]. Research into interactivity as a process-related variable [5, 36-37] has focused on the process of message transition and reciprocity in a communication setting, mainly regarding responsiveness and interchange. In other words, this perception explores the ways in which participants transfer information to one another in a communication setting [38].

Our metrics of interactivity are based on Rafaeli and Sudweek's [3]: "It is the extent to which messages in a sequence relate to each other, and especially the extent to which later messages recount the relatedness of earlier messages". They offered an operationalization framework in the context of online discussions, based on the theoretical definition of Rafaeli [5]. This definition relies on the extent to which further messages correspond to earlier (other) participants' posts, and thus it reflects the importance of relating (hyperlinking) to others in a constructivist discussion. Rafaeli and Sudweek's central unit of interest was a thread of posts [3]. We follow a user-centered approach and shift to view the single participant's behavior as a co-creator, including his relations and impact on the community, as the central unit for analysis.

2.1 Operationalizing Interactivity

Shon [34] suggested that any interaction involving humans is a multi-layered process. "It is conceivable that interactivity may not be confined to any single layer of the process, but instead may occur at all … dimensions" [34]. Indeed interactivity has been considered as a multi-dimensional construct [39-41].

We examine interactivity as a two dimensional construct: (1) the access mode determines whether an interactive behavioral pattern is about creating content or about consuming it [42]; (2) the level of granularity will classify the unit of reference. We suggest looking at four levels of granularity of a discussion, its content, structure and participants: (a) the explicit content within a post; (b) the semantic or structural context of the post; (c) the social map that spans it: the network of community members as reflected in their contribution, readings, and interactions; and finally (d) interactivity with informational resources external to the discussion.

Table 1 depicts the two dimensions' layers along with some metrics Ligilo produces for each layer, all of which are log-based and automatically extracted (as opposed to manually coded). Our hypotheses are located in relation to the relevant metrics.

Table 1: Mapping of interactivity metrics

Access / Granularity	Content creation	Content consumption
Explicit post content	# of contributed posts **(H.1)**	# of views
	# of images attached to a post **(H.3)**	
Context	Depth of contributed posts **(H.4)**	Depth of viewed posts
	# of posts explicitly related from a certain post **(H.5)**	
	# of posts explicitly related into a certain post	
Social	# of posts with author X related to posts with author other than X out of all posts authored by X **(H.2)**	# of views by participant X on posts with author other than X
	Time elapsed from the creation of a post to the creation of related post	# of views by of participants other than X on posts authored by X
		# of followers
		# of votes
External	# of links (URLs) added to posts	# of clicks on links within posts
	# of files added to posts	# of clicks on files within posts

The explicit content post layer contains traditional log based metrics, such that do not overlook the single post's content and sensory view. The context layer offers structural metrics which depict networked based analyses [43] of the context of the single post: the nature of its inside and outside relations. The social layer analyzes the discussion's Interaction graph. Interaction graphs are containing all nodes of the social graph counterpart, but only a subset of the links [44]. A social link exists in an interaction graph if and only if its connected users have interacted directly through communication or an application [45]. Interaction of the constructed knowledge base with external resources is depicted in the fourth level. Distributed cognition does not posit a gulf between "cognitive" processes and an "external" world [46]. Mapping cognitive analysis outside the individual and outside the community invites for a better understanding of the boundaries of collaborative hyperlinked knowledge construction. Thus media artifacts might be seen as interactions between information and people within and outside of the community via external resources. In terms of knowledge construction, these kinds of outbound interactions might result in new inferences, insights and new knowledge. A holistic interactivity model thus, should also consider inter-community, not just intra-community, interactivity.

In the next sub-section we describe an experiment based on this operationalization framework.

2.2 Hypotheses and experiment

89 students, in 3 simultaneous identical blended MBA classes participated in a 14 week-long collaborative construction of a knowledge base during the semester. The course emphasis was on constructing knowledge structures that emerged from simple, basic concepts to more complex, newly inferred insights [25] in a moderated week- by-week process. The discussion was framed by the instructor by laying the ten syllabus subjects as the discussion's skeleton. The students were guided to gradually build a knowledge base of posts on top of the skeleton: first they had to define and map concepts learned in class to the ten subjects following their own relevance criteria. Then, the students were instructed to map academic sources they locate and read independently to the relevant mapped concepts. Finally, the students related their own insights on top of the network of concepts and academic sources developed, and managed a free-form discussion related to their peer students' previous contributions. Students were encouraged to (each) contribute at least 8 posts during the semester. 15% of their grade was based on overall participation in the course, including face to face class discussions, participating in other class's activities and our online discussions' experiment.

Discussion was conducted in parallel in two discussion platforms: Ligilo and a classic thread based Moodle forum[2] (Moodle is one of the two

[2] https://moodle.org

leading LMS platforms in terms of market share, and is the de-facto standard in the universities where we are conducting experiments). The work on both platforms was symmetric, such that the students had to map one concept within each platform, and then map one academic resource in each platform and so forth. Screenshots of the two discussion platforms are given in **Figure 2**.

2.2.1. Hypotheses

Both platforms allow for hierarchical structuring of posts. Moodle's forum structures the discussion in a forest-like design, where tree-like discussions are disconnected among them, while Ligilo structures the discussion in a networked design, where all posts are related, and cross relations (between two existing posts) are enabled. In addition, in the thread-based forum, relations between posts are implicitly inferred by the hierarchy, while in Ligilo the relations are explicitly and semantically tagged to guide the reader through the context of newly contributed posts. Content analysis was used in Rafaeli and Sudweeks [3] to mark whether a certain post is related to other post, while the analysis here is based on a structural or contextual log-based analysis. We assume that if a participant explicitly related a new or existing post to some other existing post, then these are perceived by them as related. Based on the socio-constructivist emphasis of interactivity, we focus in this work on the share of posts written by some community member, as related to posts written by other community members.

In [33] we showed initial results with regards to comparing both consumption and creational patterns between two communities using two different knowledge structures. In this paper, we compare only interactivity behavioral patterns regarding content creation between the two conditions, on the same group of subjects. Both conditions entail the same knowledge structure, same moderation and same subject matter. Thus the independent variable is the discussion platform, or more specifically its underlying discussion structure: tree versus network. Our hypotheses were:

H.1 The number of posts contributed by participants will be higher on average in the semantic networked design, than in the forest design discussion tool (i.e., participation level).

H.2 The share of posts contributed by participant X, related to posts contributed by participants other than X (which we termed as reactive posts) out of all posts contributed by X will be higher on average in the semantic networked design, than in the forest design discussion tool.

H.3 The number of attached media items (e.g., images, links) by participants will be higher in average in the semantic networked design, than in the forest design discussion tool.

H.4 The average depth of posts contributed by participants will be higher on average in the semantic networked design, than in the forest design discussion tool.

H.5 The average number of posts related from posts contributed by participants (which we termed connectedness) will be higher in average in the semantic networked design, than in the forest design discussion tool.

3. Results

A paired-samples t-test was conducted to compare the forest-like design and the networked design conditions. A significantly higher number of contributed posts was observed in the networked condition (M=4.32, SD=2.94) than in the forest design (M=3.66, SD=2.34); $t(87)=2.14$, $p < 0.05$, significantly higher share of posts with author X related to posts with author other than X (i.e., reactive posts) out of all posts authored by X was observed in the networked condition (M=0.65, SD=0.26) than in the forest design (M=0.36, SD=0.32); $t(87)=6.66$, $p = 0.000$, a significantly higher average number of images were observed in posts contributed in the networked condition (M=0.32, SD=0.39) than in the forest design (M=0.058, SD=0.14); $t(86)=6.81$, $p = 0.000$ (although the networked design has a limitation of no more than one image for a post, which the forest design platform has not posed). In addition, the contributed posts in the networked design were posted significantly deeper on average (M=2.18, SD=0.65) than in the forest design (M=2.04, SD=0.70); $t(85)=1.88$, $p < 0.05$.

In summary H.1, H.2 and H.4 were evidently supported, H.3 was partially supported since no significant difference was found in the number of links, and H.5 was not significantly supported.

4. Discussion

The opportunities for collaborative exchange, organization and development of knowledge online, are revealed, along with the design challenges imposed by what was termed as "Persistent Conversation" [47] over face to face conversations.

Sfard [48] proposed two metaphors for learning as gaining knowledge: acquisition and participation. The acquisition metaphor conceptualizes learning as the process of the acquisition of knowledge by the individual learner. In contrast, the participation metaphor examines learning as a process of participation. In this paradigm, the focus is on activities more than on outcomes or products [49]. Scardamalia and Bereiter [50] famously proposed the concept of ***knowledge-building***, which refers to collective work for the elaboration of conceptual artifacts (product plans, business strategies, marketing plans, theories, ideas, and models). In this aspect, it may point to a third dimension which is not focused on an individual's mind (as in the acquisition metaphor) nor on social processes (as in the participation metaphor), but rather on artifacts and objects that are collaboratively developed during the process of learning. This concept points to the central role the resulted knowledge base have within a collaborative process of knowledge construction. Specifically, in the online space, since the discourse is continuously being documented, activities of retrieval or inference on the resulted knowledge are of great importance to the process of knowledge assimilation and development. In that sense, semantic and structural hints, provided by the contributing participants could make retrieval and assimilation easier to consume.

In this paper we examined whether hyper-textuality or the nature of connectedness of information can have an effect on interactivity. It has been argued that non-linear presentation closely mimics the way that human beings think [51]. This is the "'structural isomorphism" argument [52]. If information in hypertext is organized the same way that information is stored in human memory, then perhaps such a text structure will be able to enhance knowledge construction**.** But does isomorphism holds for a collective model? Many interactivity theorists believe that content developed with a non-linear structure will provide the experience of interactive communication. Well-structured content presentation can both create a sense of continuity across nodes and improve comprehension of content, although the evidence of such relationship between interactivity and non-linearity is not yet definitive [53]. It has been found that user's perceptions of interactivity on websites were positively associated with the amount of hyperlinks embedded in the site [54].

In this paper, we suggested an operationalization framework for examining interactivity as a process taking place among knowledge community members in online discussions. Although we viewed interactivity as a process, and not as a medium characteristic, we did raise the assumption that the structure of information, namely a semantic networked topology of the discussion, will affect the process of interactivity. Based on a socio-constructivist approach, our assumption emphasizes the way posts are related to each other, semantically, socially or structurally. Specifically, we hypothesized that the metrics of interactivity, focusing specifically on content creation behaviors, will result in higher levels in the semantic networked topology than in linear, thread-based, traditional forum design.

The field study indeed provides evidence a higher participation level (H.1), higher level of social reactiveness (H.2) and deeper paths a participant browses (and presumably scans or reads) before making the decision of contributing new content (H.4) in the networked topology condition. Both the level of reactiveness and the depth of the browsing paths are indicators of 'listening' behavior, thus although we have not compared actual use ("consumption") patterns in this experiment, some new hypotheses may be raised as a result. The richness of media advancement of the networked topology (H.3) was partially supported, while the level of connectedness (H.5) did not yield a statistically significant difference. These both unresolved results are subject to future research, already taking place in other communities.

4.1 Limitations and Future work

Novelty and scalability are two major validity threats and challenges for future study in this field. Is our approach scalable to larger groups, and will effects on engagement, motivation, and learning prove stable beyond initial exposure? Both issues are common in constructing and evaluating knowledge management solutions.

Ligilo is based on a less-than-familiar structure of information, interaction and concept maps, and thus it requires that participants climb a learning curve, not required of students who use the better known, legacy Moodle forum. To overcome this bias we are conducting replications of this experiment with repeat classes and subjects of varying group size and experience.

In addition, Moodle's logs could not provide us with sufficiently rich logs and learning analytics in order to measure consumption patterns with the granularity level required by our model. We have conducted [33] and will conduct different experimental settings to further examine interactive content consumption patterns.

The work presented here, and the notion of collaborative semantic mapping as a computer-mediated form for knowledge construction, provide opportunities for further study based on the persistent semantic structure of the discussion. In terms of analysis, we will add a focal view on classifying the semantic relations tagged by community members for the benefit of other members following their own paths of posts' creation. Following Sohn [34], we stress that a concept map's nature of explicating the semantics of relations has the potential to ease the cognitive gaps between external and internal knowledge models; therefore, it might also ease the gap between different people's internal knowledge models and, as a result, affect their interaction patterns. Sfard [55] defined Discourse as a particular way of communicating that develops in response to certain kinds of tasks. According to Sfard, "the development of discursive uses of a word necessitates attention to all the discursive contexts in which the word may appear". Moreover, since uses of words create a tightly knit web of connections, we should probably consider this system in its entirety even when interested in just one of its elements [55]. Thus, we follow this approach and observe the semantics as driven by the whole map of relations beyond just disconnected glossary lists of words.

Not all relations are alike (or a "like"), and not all relations are born equal in term of semantic strength [56]. The semantic relation between concepts A and B (e.g., "is a kind of") might be perceived as much weaker than the semantic relation between A and C (e.g., "is identical to"). Thus, a concept map can be thought of as a weighted graph, each edge of which is weighted to reflect its perceived semantic strength (or other dimension). Thus, the perceived interactivity of paths (or of whole sub-graphs) can also be measured as a function of semantics. This further textures the study of interactivity. In the educational field, there have been attempts to analyze not only the existence of interactions but also a higher level of meaning [57]. Several researchers have developed models and tools to facilitate the analysis of content representing online interaction [58-59].

Ligilo's architecture [7] structures the discussion's content as a semantic graph's data-structure, in which content items denote nodes and the tagged relations denote arcs connecting those nodes. The social network of users' interactions lays on top of the network of posts and content related relations. This semi structure approach to discussion data invites for semantic network analysis, and the processing of natural language, based on the context and its semantics.

We are also planning on comparing interactivity through varoius discourse moderation styles, including an emergent or free-form discussions. This project borrows concepts from the learning design field ot inform knowledge management practice and systems. Our intention is to explore the delicate interplay between learning and computer mediated communication theories, in order to enrich both areas theoretically as well as practically.

Acknowledgments

We are grateful to the anonymous reviewers of this paper, to the Center for Internet Research (http://infosoc.haifa.ac.il) and the LINKS I-CORE at the University of Haifa for support of this study.

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