Concept maps: A tool for knowledge management and synthesis in web-based conversational learning

Ankur Joshi, Satendra Singh1, Shivani Jaswal2, Dinesh Kumar Badyal3, Tejinder Singh4

Department of Community Medicine, Gandhi Medical College, Bhopal, Madhya Pradesh, 1Department of Physiology, University College of Medical Sciences, New Delhi, 2Department of Biochemistry, Government Medical College and Hospital, Chandigarh, Departments of 3Pharmacology and 4Paediatrics, CMCL-FAIMER Regional Institute, Christian Medical College, Ludhiana, Punjab, India

Abstract

Web-based conversational learning provides an opportunity for shared knowledge base creation through collaboration and collective wisdom extraction. Usually, the amount of generated information in such forums is very huge, multidimensional (in alignment with the desirable preconditions for constructivist knowledge creation), and sometimes, the nature of expected new information may not be anticipated in advance. Thus, concept maps (crafted from constructed data) as “process summary” tools may be a solution to improve critical thinking and learning by making connections between the facts or knowledge shared by the participants during online discussion. This exploratory paper begins with the description of this innovation tried on a web-based interacting platform (email list management software), FAIMER-Listserv, and generated qualitative evidence through peer-feedback. This process description is further supported by a theoretical construct which shows how social constructivism (inclusive of autonomy and complexity) affects the conversational learning. The paper rationalizes the use of concept map as mid-summary tool for extracting information and further sense making out of this apparent intricacy.

Key words: Adult learning, concept map, conversational learning, process summary, web-based learning

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Introduction

A committed group of physicians (geographically at distant places) wanted to collaborate for shared clinical decision-making on patients, they encounter in their daily practices. The objectives of such intention lie in evidence-based collective assessment, management, and dissemination of information among peer group. These enthusiasts had initiated an E-mail discussion for an existing Type 2 diabetes mellitus patient who was on two drug combinations in maximum dosages. In spite of efforts made by both physician and the patient, the desired glycemic control could not be achieved. Whether to start a third oral antidiabetic drug or the insulin was the topic of interest among them. There were two schools of thoughts. The proinsulin group posted the result/links of some clinical trials which favored early use of insulin. Some participants were little unconvinced and they mailed another set of counter evidences in support of triple drug therapy. These evidences were further blended with their own personal experiences with patients, compliances issues, fear of hypoglycemia, and economic concerns. The issue became more convoluted when some of them started commenting on the methodical part of clinical trials. Several alien terms such as number needed to treat, factorization, and effect modifiers were liberally exchanged;

Address for correspondence: Dr. Dinesh Kumar Badyal,
Department of Pharmacology, CMCL-FAIMER Regional Institute, Christian Medical College, Ludhiana, Punjab, India.
E-mail: dineshbadyal@gmail.com

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this apparently linear discussion slowly turned out into multifaceted conversations with several offshoots. When this flow of E-mail became inundated with due course of time, the poor physician (to whom the patient was connected) was in a little miserable condition. The “sense-making” from this constructed information turned into a herculean task for him.

Web-based conversational learning through E-mails has proven its value in knowledge exchange among participants and in creation of cumulative knowledge base. \(^{[1,2]}\) Several electronic mailing list software such as Listserv have further facilitated this exchange mechanism. \(^{[3]}\) This exchange mechanism is operated through sharing the information (both experiential and evidential) to interested participants interconnected asynchronously through world wide web. The information is processed at receiving end and then it is attempted by receiver to integrate into his existing knowledge base. Hence, he has to either rearrange the pattern to “fit” this new information or has to reject the information (as his knowledge base refuses to accept it) partially or completely. This acceptance/rejection leads to the generation of further conversational arguments/endorsements among participants on the topic of interest. \(^{[4]}\)

Participants in conversational learning have the freedom to assimilate and interpret the information in reference with their own learning context and experiential background. Similarly, they pass on their own share (background knowledge mixed with new information) by creation of their own connotations to fellow participants. Moderators usually “set” the learning outcome in advance, but the direction of discussion and the proceedings may take any turn as per building discourse. The influencing factors for shaping a discussion may be understood as a function of socioculturalism of learner, individual, and cumulative stance to topic, prevailing group dynamics and assigned spontaneity in conversation itself. This unanticipated (to moderators) abundant, multifaceted, and apparently chaotic emerging information places an additional challenge before the moderators as to how to condense it and to put it before the participants in between the ongoing discussions and thereafter. This article is an attempt to provide one of the strategies designed and implemented for this perceived problem (during online interactive academic discussion in CMCL-FAIMER). This article first describes the process and then offers a commentary which attempts to rationalize this approach by describing the epistemology of conversational E-mail learning in context with creation of concept maps.

**Process Description**

The CMCL-FAIMER regional institute fellowship is offered annually to health professional educators with an aim to cultivate good teaching–learning practices and educational leadership qualities in participating fellows. \(^{[5]}\) In addition to attending the residential sessions, fellows are expected to participate and contribute on the preselected topics related to Medical Education Technology (MET) and education researches through an internet-based discussion forum. The topics and months are selected by fellows in a democratic process. The selected topic for the month is moderated by a team of designated fellows with inputs from faculties on a rotational basis. \(^{[6]}\) The team initiates discussion about the learning goals, possible delivery modalities, and underlying subtopics/subthemes well in advance before the actual start of their topic discussion. Each identified subtopic/subtheme constitutes an E-mail thread on the electronic mailing list software (Listserv) for a prespecified duration. Several such threads are launched during the month. Technically, the number of participants in this online-learning program (specially in discussions) vary from time to time as all the E-mails on the FAIMER-Listserv platform go to all the CMCL-FAIMER fellows since its inceptions apart from faculties, yet the most active participants belong to current and 1 year senior batch (18–20 fellows from each year).

After going through these processes of participation, a common observation of the authors was that as the E-mail discussions progressed gradually and new information started generating in the due course of time; sometimes, it became difficult for them to arrange and retain the information into a meaningful manner. This issue became more intricate when one tried to extract key-information from each thread and subsequently attempted to connect the knowledge received from all threads to visualize the broader scenario for system thinking. Thus, a need was perceived to introduce a “process-summary pictograph” after each thread for a visual depiction of salient learning point in the thread. It was further proposed that concept — map may be well explored as a tool to depict process summary. The E-mail conversational discourse for the same is shown in Figure 1.

The actual conversational discussion was initiated by moderators by implanting some hypothetical but contextual scenarios related to the assigned topic (feedback as learning tool) for the month. Participants then started sharing their views and commented on other’s views. Learning environment as mentioned earlier was essentially according to the principle of andragogy. The construct thus crafted (with the aid of scenarios) was instituted further on a broader theoretical framework by the participants with the aid of the moderators. This initial construct was defined and refined in due course of time through peer responses, critiques, and comments and in light of new information received. Concurrently, the E-mails of the participants were extensively scrutinized by
moderators for emerging keywords and agreeable statements. The emerging arguments and consensus statements at the end of thread were further refined and restructured for sense-making. This “extracted” sense-making and the process adapted to attain the same was pictorially depicted by interactive infographics on concept map scaffolding as process summary for each learning thread. Open aid software such as Compendium (http://compendiuminstitute.net) FreeMind map software, EDraw (https://www.edrawsoft.com/freemind.php), and smart art graphics (MS Words) were used for building concept maps. Six concept maps were prepared as process summary pictograph, one for each thread. Two such process summary diagrams are shown for the interested readers [Figure 2a and b]. For example, in thread one where moderator had launched it by a hypothetical example of Dr. Mahajan a professor of obstetrics and gynecology who had adapted a casual and nonspecific approach while providing feedback to his resident doctor on colposcopy. This nonspecific feedback created perplexity in resident mind. The conversational construct built on this scenario was summarized into three points as depicted in Figure 2. Apart from this anticipated learning, some informal learning also took place as offshoot of the discussion. While preparing the scenario for the beginning of new thread…this may serve as foundation for a new thread.

Figure 1: Initial conversational discourse among moderators (denoted by M) and faculties (denoted by F) for structuring moderators for emerging keywords and agreeable statements.

The “complex” and “unpredictable” words are preferentially used by authors to describe the learning environment in an E-mail forum which is essentially supposed to be less structured and liberal in terms of informational exchange. The reason for the above is rooted in assigned freedom of expression, equity in relationship among participants, and creation of own connotation by participants through connecting the learning symbols. The whole process led to emergence of multiple meanings and conflicts/convergence among these perceived meaning. Another pertinent issue at this juncture is related with participant’s background characteristics. It is observed frequently that in a conversational forum participants having fluency in the medium of expression, having assertiveness in expression, and having a thought process in alignment of the maximum people (regressive to mean) may tend to direct the flow of discussion and their voices usually represent group voices. On the other hand, unorthodox or outliers thinking may not be given due emphasis. Similar observations were made in an online faculty discussion group which did not work.[7] When “processes” are also taken into the account while reforming the knowledge, there may be more chances of inclusion of outliers and divergent.

Joshi, et al.: Concept map for conversational learning summarization

This whole process was driven by the felt need of participants and concept maps took shape based on the conversational discourse of participants. Moreover, this peer community had expertise and interest in MET. These two facts motivated the investigators to analyze the operational value of this concept qualitatively through thematic analysis from participant’s perspective. These perspectives were available in the form of several E-mails (sent by participants as informal feedbacks) received on concept maps. These perceptions were read and re-read for explicit understanding. After this initial familiarization, keywords from these mails were identified independently by two investigators (in vivo codes). Some of the key words extracted are visually appealing, summarizing tool, easy to recapitulate, bird-eye view, helping to retain, enabling to think coherently, complete, aid to think on a larger plane, etc. Words with similar meanings were grouped into emergent major codes. The major codes were further classified into two categories related with organization of information and sense making from a border perspective [Figure 3]. This categorization consequently led to the emergence of major theme which labeled concept map as the tool for summarization and synthesis of informational epistemology - visual tool for assimilation and summarization of informational epistemology.

DISCUSSION

The “complex” and “unpredictable” words are preferentially used by authors to describe the learning environment in an E-mail forum which is essentially supposed to be less structured and liberal in terms of informational exchange. The reason for the above is rooted in assigned freedom of expression, equity in relationship among participants, and creation of own connotation by participants through connecting the learning symbols. The whole process led to emergence of multiple meanings and conflicts/convergence among these perceived meaning. Another pertinent issue at this juncture is related with participant’s background characteristics. It is observed frequently that in a conversational forum participants having fluency in the medium of expression, having assertiveness in expression, and having a thought process in alignment of the maximum people (regressive to mean) may tend to direct the flow of discussion and their voices usually represent group voices. On the other hand, unorthodox or outliers thinking may not be given due emphasis. Similar observations were made in an online faculty discussion group which did not work.[7] When “processes” are also taken into the account while reforming the knowledge, there may be more chances of inclusion of outliers and divergent.
Figure 2: (a and b) Process summary pictogram showing the process description and drawn inference
Concept map may structure the whole process in a meaningful manner and may facilitate the process of making sense from this chaos.[8] Somewhere in the process of discussion, participants gradually become able to recognize a sequence in thoughts, perceive a pattern, and offer an explanation around the phenomenon of interest.[9] If they try to describe these abstract thoughts, patterns, and explanations through labeling them objectively in a figurative form, a concept emerges. Subsequently, when two concepts are connected by linking words, this becomes the semantic unit of concept maps.[10]

These interlinked concepts are then displayed visually as per the nature of the interrelationship. The relative places of several concepts in a concept map (degree of proximity/remoteness and interlinking) are determined by the sequence of emerging information in discussions, and further integration of this emerging processed knowledge with current knowledge. This allocation of several concepts promotes further the arrangement of concepts into a cognitive logical structure and ultimately to find contextual answer of focused questions raised during E-mail discussions.[11] Thus, this graphical tool for organizing and representing knowledge may serve as stimuli for a higher level of cognitive thinking (analysis/synthesis) and proposes a ground for brain-storming for further enhancement. This tool may be seen as a visual communication tool among participants for integration and optimization of emerging knowledge. Thus, concept maps may serve as both foundational platform and tangible output for rather dynamic, multidirectional, and emergent learning in web-based e-learning platforms (FAIMER-Listserv, NPHE). Concept mapping as a learning strategy has been used in nursing course and as asynchronous interaction in web-based conferencing among preservice teachers.[12,13]

The inference we could draw from this intervention can be summarized. First, frequent process summarization of emerging information is essential for recapitulating and for facilitating the sense-making by participants. Concept maps may well be utilized for above as they provide a visual stimulation or provocation for the immediate/recent memories of the participants.[11] Second, this tool may serve as “validation tool” for individual knowledge.[14] This statement may be further understood in terms of construction of knowledge. During the process of E-mail exchanges among the cohort, there is a construction of two types of knowledge in principle-group cumulative knowledge and individualistic knowledge.[13] There may be some degree of concordance/discordance in between these two knowledge bases (which may not be even known to an individual at that point).[14,17] A participant may notice after going through the concept that certain emerging ideas are according to his “gain in individualistic wisdom” and hence substantiate his knowledge. On the other hand, some impressions received through maps may seem little bizarre to him, and he may not find himself in alignment of his then existing knowledge. This perceived bizarreness motivates him further to seek “the truth” by asking an explanation or by sharing his nonconformist thoughts with the group.[18] This whole process may lead to further emergence and refinement of collective wisdom. Third, these concept maps may facilitate the process of all-inclusive system-based thinking.[19] The concept map presents the nonlinear less structured emerging information to a structured and sequential manner in a logical fashion. Thus, it offers the “big-picture” to the participant. These three benefits from a higher plane may be certified as a stipulation of knowledge management.[20]

In a conversational discourse, analysis and synthesis take place conjointly and in spontaneity. An important deduction drawn through this experience is if moderators may foresee the multidirectional flow of information during the ongoing discussion and then arrange the mined knowledge; accordingly, the synthesis emerges which can be understood as the supreme purpose of any conversational discourse.

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