

Intelligent Conversational Channel for Learning Social Knowledge Among Communities

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Abstract. Recent studies have shown two approaches in building learning system. Each corresponds to the two types of knowledge which are the content knowledge and social knowledge. The former is knowledge about knowing how to perform a task while the latter is more about best practices. Intelligent Conversational Channel (ICC) is built to support for learning social knowledge. In this paper, the two types of knowledge are explained and how ICC can be used to support learning among communities.

1 Introduction

There are numerous types of learning system being used as the technology for learning such as the Intelligent Tutoring System, Computer Aided Learning, Microworld and Computer-based Learning [4]. Expert system was also used to train general practitioner to be specialist [1]. These systems support learning for a specific domain of knowledge. In the last decade, study has shown that learning through social process has becoming an integral learning method besides the conventional self-learning. Community of Practice is a social learning theory that describes one's learning through participation and reification through the community activities. Collaborative learning supports learning by sharing knowledge through mutual contribution [2]. Social Knowledge-building (SKB) describes a collaborative knowledge building by a community [3]. Researchers claim that story-telling as an effective mode of knowledge sharing and knowledge transfer [5]. The type of knowledge that suits learning using this approach is so-called social knowledge.

Our approach to enabling knowledge sharing for social knowledge has three prongs which are to facilitate communication through virtual community, to analyze social interaction through discourse analyzer and building social knowledge through story-telling. Intelligent Conversational Channel (thereafter, ICC) has been developed that support this approach through three main components which are the Discourse Communicator, Hyper-media Learning Space and Discourse Analyzer. These three components are built on a community channel as the main venue for knowledge sharing. In section 2, a descriptive analysis is given to differentiate between content knowledge and social knowledge, section 3 describes the ICC components and the life cycle model of social knowledge and section 4 is the conclusion and future work.

2 What Is Social Knowledge?

In our daily life activities, there are two types of knowledge frequently used. First is the content knowledge. Content knowledge is all about learning how to perform certain tasks in a professional manner. It may be derived from basic principles learned from formal education such as tertiary institution or learned from an experienced expert. Many learning tools support the learning of content knowledge as that reflects one's in-depth knowledge about his/her skill and professionalism. The current tools that are known are such as the expert system, intelligent tutoring system, intelligent computer aided-learning, microworld etc. In a simple example, a medical doctor is called specialist when he/she embarks on specialized course and training in order to be an orthopedist or pediatrician. His/her knowledge accumulated after a long years of experience. This type of knowledge is static, rigid and stable. However, the second type of knowledge is called social-knowledge (or socially-derivable knowledge) which may not be obtained through formal learning or experience but rather through community interactions. Knowledge about the current epidemics and which medical center has the best treatment can only be obtained through interaction with the community. Knowledge about the best practices in conducting staff appraisals by the blue chip company can be known through social interactions. This type of knowledge is dynamic, fluid and unstable in the sense that it may change from time to time and its validity can easily be superseded by the most current ones. In the other scenario, Denning [6] describes how the problem in Pakistan's highway was solved at instant after contacts with colleagues who had experience solving the similar problems in South Africa. The knowledge exchange was not on the content knowledge (about fundamental theories in engineering course) but rather a social knowledge which can only be derived through acquaintance.

Due to the differences between content knowledge and social knowledge, the development tool in facilitating the learning is also different. The content knowledge which contains facts and fundamental theories can be learned using courseware or computer-based learning software; while experience can be learned through expert system or intelligent tutoring system. Nevertheless, social knowledge requires community as the integral part of knowledge source. The process of building the system that support learning for social knowledge requires consideration given to the following factors [7]:

- Multiplicity in learning objects – knowledge in the real world is delivered or obtained in different forms. The objects, which are used as part of the learning whether directly or indirectly is called learning, object as described by Community of Practice [8]. Radio, television or LCD screen used for advertising are examples of broadcasting system that contribute to one's knowledge. Newspaper, magazines, leaflets or brochures are pieces of information, which transform into one's knowledge when he/she reads them. Other forms of learning objects are the working colleagues, animated or unanimated artifacts such as the copier machine, pets at home, video movies and neighbors whom one socialize with. In this respect, the expert knowledge does not come from a single source as well as the multiplicity in

methodology for delivering the knowledge. Expert's talk in the open seminars or television are examples of learning objects.

- Open-world assumptions – assumption is needed when one designs a system to be used as problem-solver. The assumptions are perspective that draws the boundary of the intended world in order for the system to work successfully within the specified limit. In modeling the content-knowledge, close-world assumption is always used. Unlike the content knowledge, social knowledge does not specify the assumption as the knowledge is not modeled but shared in its original form. The knowledge contains the description about the real world problems and solution rather than the hypothesized.
- Rapid knowledge-building – content knowledge requires a system builder to analyze and study, to model the solution, to build the system and test its performance. These processes are rather time-consuming and costly. On the other hand, the social knowledge is built by the community in a progress manner and can be learned immediately without the need of highly mechanistic and sophisticated process. Knowledge is presented in a human-readable format rather than machine-readable format.
- Unorganized, ubiquitous but retrievable – content knowledge built in an expert system is structurally organized and frequently validated by the truth maintenance technology. The purpose is to avoid conflict of facts and retain consistencies in delivering solution. The retrieval of the solution depends on the reasoning technique employed in the system. Social knowledge is rather unstructured and ubiquitous. The knowledge allows conflict solutions to a single problem as it can be treated as having choices of different perspectives. Learners are not confined to solution of a single expert in this case as knowledge is contributed by several experts or non-experts who is involved in the knowledge construction process. The social knowledge is retrieved through social interactions and dialogues with the communities.

In the following section, we discuss the technology built on ICC as a tool in supporting learning social knowledge.

3 Components of Intelligent Conversational Channel

The technology of ICC is built to enable the operation of the upper stream of the knowledge management which is at the user or community level. There are researches about building techniques in extracting knowledge from resources such as documents, images, videos, audio, data warehouse using intelligent information retrieval or human expert through knowledge acquisition. Our claim is that these systems are not flexible to allow the knowledge to be shaped up by the community who are the main beneficiaries of the knowledge. For example, several educational softwares are designed according to the specifications of the pedagogy theories which are rather predetermined by the designer. The design of an expert system takes consideration of small scope of human users while its application is expected to be wide. In all cases, the design is known and fixed before its development. ICC approaches towards knowledge shaping is flexible such that the community will determine what knowledge will be placed on

the knowledge repository, the content of knowledge is extracted through “mix and match”¹ process by the community, the shaping of knowledge process is resilient and destined by the responses and arguments posted into the community channel and knowledge externalization is done through dynamic interaction with the virtual community. These ideas are illustrated in Fig. 1.

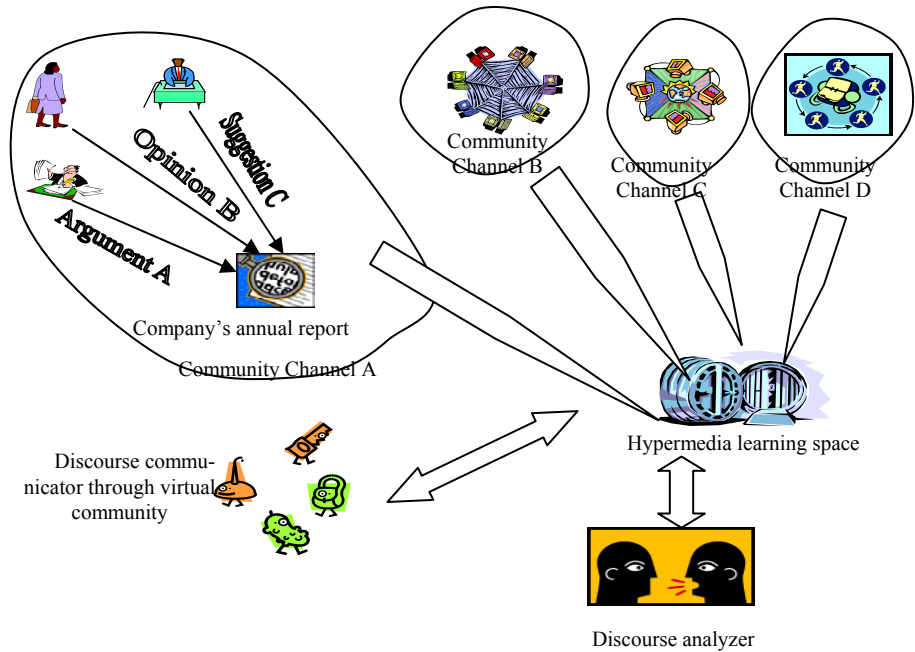


Fig. 1. Components of Intelligent Conversational Channel

3.1 Community Channel

In the community channel, two forms of knowledge can be presented using narrated text typed in the story object and also uploading of multimedia objects such as video clips, images, documents, html files.

Fig. 2 shows a user expressed his/her concern about school delinquency problem and uses an image file to share the reality. Other members have the choices of replying to the above message or submit a new story object as shown in Fig. 3. The text on

¹ Each member of the community has his/her own way of extracting (match) the gist of knowledge he/she is interested in from a single source. The combination (mixing) of these knowledge collections gradually builds the community knowledge base.

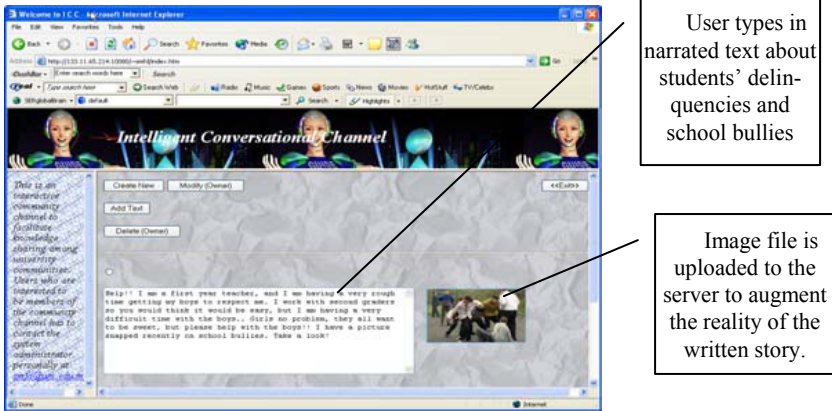


Fig. 2. Community channel that supports two forms of knowledge representation

the left box is submitted by the user who wants to start with new subtopic about canning system practiced in school. The right text box contains responses of another two members who respectively support the earlier statement and suggest a new solution. The taggers <<Support and <<Suggest label the intended semantic meaning of the sentence.

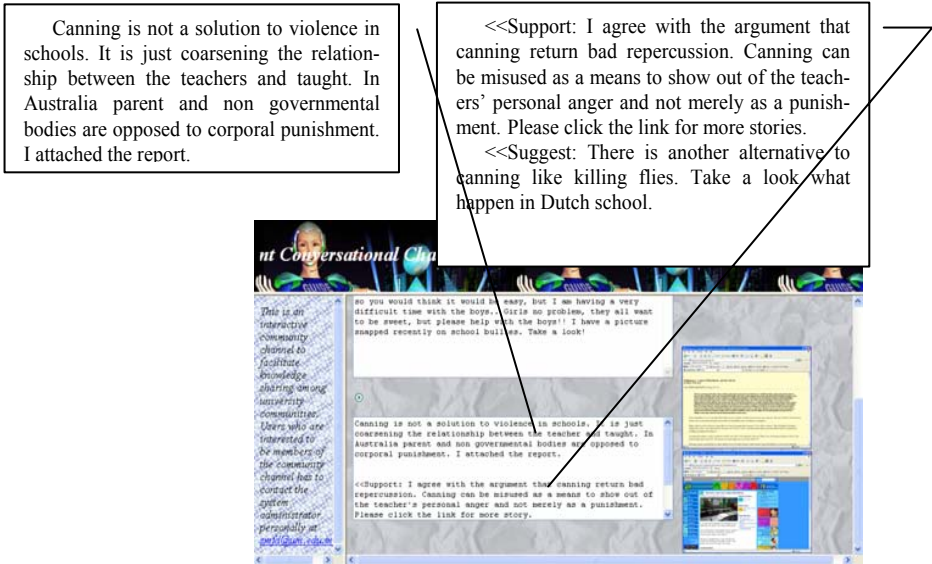


Fig. 3. Members' responses in the form of support and suggestion

3.2 Discourse Communicator

Discourse communicator provides simulated community discussion using software agents. Fig. 4 shows an interaction session with agents. A member posted a query

“What do you think about canning practice in school?”. Using keyword searching method, the system activates the discourse block that has the highest relevancy.

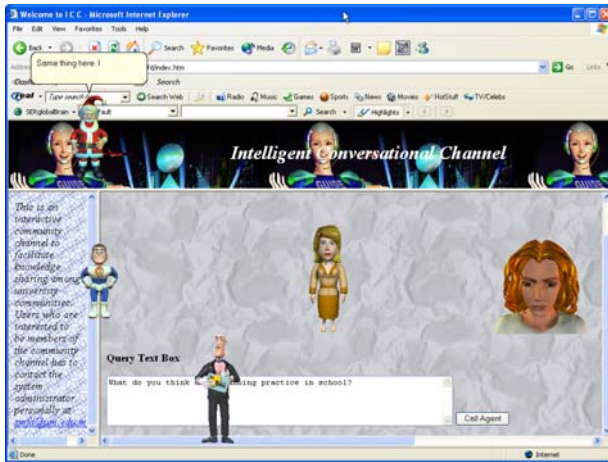


Fig. 4. Interactions with agents session

3.2 Discourse Analyzer

In order to stimulate the social knowledge building, discourse analyzer plays the role of monitoring and analyzing the dynamism of group interaction and topic of discourse. These are done based on four factors which are 1) intensity of participation - measures the ratio between the numbers of participated activity of a member against the numbers of participated activity by all members 2) multiplicity in existence - describes the versatility of a member in participating different subject matter 3) interactivity of the subtopic – uses standard deviation to measure the popularity of each subtopic and 4) social identity recognition – analyze the density of social interaction between all members (for detail refers to [9]).

3.3 Hypermedia Learning Space

Members build the association between the story objects and the multimedia objects which are stored in the hypermedia learning space. Therefore, each object is indexed by the brief text description entered in the story object. They are linked together by the main keywords to form a complex network association of knowledge units (knowledge unit is a composition of story object and the multimedia object). The network of knowledge unit enables the retrieval of a discourse block when one of the user's query texts matches the keywords.

4 Conclusion and Future Work

In this paper, it is argued that there are significant differences of knowledge namely the content knowledge and social knowledge. The content knowledge is very specific

knowledge that requires a specific design in capturing its content. The type of knowledge representation for content knowledge may be different from domain to domain. However, for social knowledge, the knowledge can be presented simply using natural language while for a more elaborative description, it can be presented using several other knowledge media. While we do not deny the importance of the content knowledge, social knowledge requires equal attention and system that supports the learning is necessary. ICC has been proposed as the tool for learning social knowledge on the basis that the virtual community is created as representative to actual community in catalyzing community interaction, community knowledge is kept in the hypermedia learning space for future retrieval and reuse, and the community interaction is kept alive through monitoring members participating profile. The system can be enhanced in several ways. One of the chosen future works is modeling the agents so that can be embodied with personal characteristics. At the moment, the agent is generic and its actions such as gestures are predetermined. The agents are not capable to produce original response, as they are not equipped with personal knowledge. In order to make the conversation dynamic and malleable to the user's response and behavior, the agent should be allowed to make their own responses and reactions.

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