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# Building Knowledge from Experience: Reflective Thinking as a Mediating Process for Collaborative Knowledge Building

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## **Building Knowledge from Experience: Reflective Thinking as a Mediating Process for Collaborative Knowledge Building**

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### **Abstract**

*This paper describes a model for analysing collaborative knowledge building (CKB) process during a group activity. Singh et al's (2007) model of CKB process is used for analysing the process using data from an educational case. The concept of CKB activity system is developed based on the constructs of activity theory for analysing the case. The analysis of the case used constructs from reflective thinking to highlight the processes used by participants to collaboratively build knowledge. The findings of the study identified four additional cycles of reflective thinking activities that have been used to modify the CKB process model. The four additional cycles represent the mediating processes and tools used by the participants to build knowledge. The modified model of a CKB process together with the CKB activity system can be used as the unit of analysis for developing a cohesive theory for understanding and analysing CKB.*

### **Keywords**

Collaboration, Knowledge building, Reflective thinking, Activity Theory

### **INTRODUCTION**

Collaborative knowledge building (CKB) refers to collective work for the advancement and elaboration of knowledge artefacts (such as theories and concepts) (Stahl 2006). The idea of collaboration as a basic form of human activity for building knowledge and cultural development has been argued for quite some time (Vygotsky 1930/1978). Researchers have noted the importance of collaboration as a means for knowledge building within organisational (Akkerman et al. 2007) and educational contexts (Stahl 2006). The emphasis on CKB within the literature has led to a renewed focus on the need to understand the process by which groups build knowledge (Stahl 2006).

Stahl (2006) in his studies on CKB presents a conceptual model for representing the process by which groups build knowledge. The process by which groups build knowledge is divided into a number of important sub-processes, including cycles of personal understanding and social knowledge building (Figure 1). The process of CKB involves individuals articulating and sharing knowledge, developing shared understanding through discourse and co-creating knowledge artefacts in joint problem solving activities. Disagreements however still exist regarding the nature of the CKB process (Singh et al. 2007). It is not yet clear as to how participants co-create knowledge and what mediates the process, what tools (conceptual and thinking) are used in the process, what is an appropriate unit of analysis for studying the process (whether to focus on the individual's or the group), and how to conceptualise the process (documenting the process).

A review of other studies in CKB also demonstrate the role of reflective thinking as an integral group process for building knowledge (For details refer Singh et al. 2007). The role of reflective thinking, though acknowledged and emphasized, has been scarcely investigated as part of the CKB process. The need to examine the underlying mediating processes and tools used by groups to build knowledge is voiced by practitioners (facilitators, teachers, knowledge workers), as well as researchers (Gros et al. 2005; Stahl 2006).

This paper addresses the above mentioned issues by documenting the process of CKB and highlighting the mediating role of reflective thinking activities as part of the process. This is achieved by building on Stahl's model of CKB described in Singh et al (2007). The CKB model is used as a conceptual framework for documenting and analysing a collaborative activity from an educational context. The paper describes the process of CKB by developing praxis between theory and practice. The praxis is developed by analysing an authentic collaborative activity (i.e. practice) and using CKB model and reflective thinking theory (i.e. theory) to provide a rich description of the process. The next sections introduce the CKB model and develop the rationale for

investigating reflective thinking activities as part of the process. The case and data gathering activities are then introduced and finally an explanation of the data analysis process is presented.

## THE PROCESS OF COLLABORATIVE KNOWLEDGE BUILDING

CKB is a multi-disciplinary field of study which draws on theory developed in education, psychology, activity theory and conversation analysis to develop its own theoretical framework (Stahl 2006). According to Stahl (2006) CKB is a process of communication in which groups of people construct new knowledge through interaction with their knowledge being preserved in artefacts (conceptual or written documents). Stahl (2006) in his study of CKB divides the process into a number of important sub-processes including cycles of personal understanding and social knowledge building (Figure 1). The arrows in the model represent transforming processes and the rectangles represent the products of the processes. The process of CKB moves through personal beliefs and knowledge which is articulated in the cycle of personal of understanding, to the interaction of those beliefs in the social knowledge building cycle for developing shared understanding and knowledge artefacts.

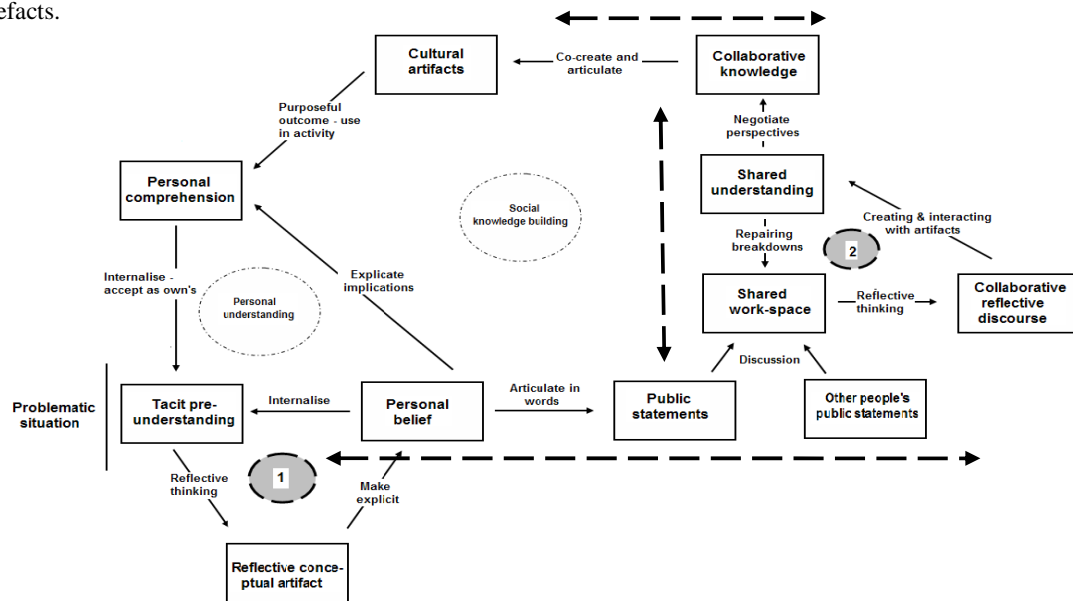


Figure 1: CKB model (Singh et al. 2007)

A review of other studies in CKB demonstrate the role of reflective thinking as an integral group process for making explicit one's own cognitive orientations in relation to the group goal (Sherry and Myers 1998), and as a core group process for developing shared understanding (Yukawa 2006). Reflective thinking is described as an active thinking process for monitoring one's own learning process to bring about an effective conceptual change. Many researchers have identified that reflective thinking is an important capability that needs to be cultivated in knowledge building activities (For details refer Kim 2005). A pilot study (Singh et al. 2007) conducted to analyse the CKB process showed that participants use reflective thinking as a tool for articulating knowledge and developing shared understanding. The pilot study used Stahl's model as a starting point for analysing the CKB process and modified it by incorporating two cycles of reflective thinking processes to account for the role of reflective thinking in the CKB process (Figure 1). The nature of these reflective thinking processes needs further investigation to develop a better understanding of the CKB process.

Further study of the mediating tools and the underlying reflective processes used by participants to co-create knowledge artefacts is required. A similar point is made by Lipponen et al (2004) in their critique of the existing studies in CKB. They argue for highlighting the mediating nature of the CKB process and note that collaborative activities are organised around shared objects of activities mediated through dialogue and knowledge artefacts. Here the word mediating implies the tools and other means that are used by participants at the individual and group level to achieve their objective. This study focuses on the following sub-processes as part of the CKB model (indicated by dashed arrows in Figure 1). These are presented as research questions (RQ):

- How do participants articulate knowledge and develop shared understanding in CKB (RQ1)?
- How do participants collaboratively build knowledge from experience (RQ2)?
- What is the role of reflective thinking activities in the CKB process (RQ3)?

A better understanding of these underlying CKB processes can aid the design of technological scaffolds for group activities, develop better facilitation techniques for group problem solving, and improve design of educational curriculum based on collaborative learning. The next section describes the educational context from where data was gathered as a case. This is followed by an explanation of the four step method for data analysis using cultural historical activity theory (activity theory hereafter) as a descriptive tool (Boer et al. 2002). Activity theory is suited to study the CKB process as knowledge building can be conceptualised as an activity system that involves subjects and mediating artefacts (conceptual and physical) that act to transform particular objects of activity in-to an outcome. Activity theory allows for providing rich description of the mediating tools and the processes used as part of the CKB process, and conceptualising CKB as an activity system (described in data analysis section). An integrated model of CKB process is presented at the end of the analysis. The integrated model borrows perspectives from reflective thinking theory (Eraut 1995; Yukawa 2006) to account for and explain the mediating role of reflective thinking processes in CKB process.

## THE CASE

The data for the paper was gathered from a collaborative activity involving a group of nine post graduate students enrolled in a knowledge management course. The research design is presented in table 1. The group activity forms an integral component of the curriculum and contributes to the final assessment for the course. Thus the collaborative activity described here is truly an authentic task and as such is ideal for investigating the process of CKB.

Table 1: Research design

Group activity	Tasks	Followed by an electronic focus group	Educational objective
Develop 4 categories of what should be included in Code of ethics for IT professionals	<ol style="list-style-type: none"> <li>1. Brainstorm ideas on what should be included in the code of ethics for IT professionals using ZingThing™.</li> <li>2. Evaluate the ideas and develop 4 broad categories for Code of ethics.</li> </ol>	The aim of this activity was to gather data from the participants on how the group activity tasks were completed (i.e. study CKB process using the group activity as the context)	Provide students with an experience in knowledge creation, and collaborative work using ZingThing™ groupware (referred to as Zing hereafter).

The group activity was followed by an electronic focus group activity. Focus groups utilise the interaction amongst the participants to generate rich qualitative data (Rezabek 2000). The rationale behind using a focus group was to create a context in which the group could jointly reflect back on their group activity experience, thus providing a real life context for gathering data on the CKB process. The CKB model (Figure 1) was used as heuristic tool for developing the focus group questions. Zing groupware was used to gather data and allowed the group to work collaboratively on their activity. The use of Zing helped in obtaining diverse viewpoints from the participants anonymously and succinctly. The output from the focus group was recorded within the groupware allowing for the generation of a report which was used for analysis. The primary source of data used for analysis in this study was participant responses to the focus group questions captured using Zing. The interactions in the focus group session were audio recorded and transcribed to provide supplementary evidence of data.

## DATA ANALYSIS

The study uses activity theory as a tool to assist in data analysis. Activity theory is a descriptive theory of human thought and behaviour within the context of a specific activity. Engeström (2001) provides a descriptive model of human activity for capturing, analysing and presenting activity based data. His activity system model (For details refer Engeström 2001) is suited to study the CKB process as knowledge building is considered to be an activity system. The activity system involves subjects and mediating artefacts that act to transform particular objects of activity to achieve an outcome. The method used to analyse the CKB process is based on Boer et al's (2002) four step method for studying knowledge sharing. The method involves mapping the data on to the structure of the activity system and includes the steps described in Table 2.

Table 2: Data analysis steps using activity theory

Steps in data analysis	Data analysis process
1) Choose the organisational setting (identify context) & translate it into an activity system.	The student group activity was conceptualised as an activity system using elements of Subject, Object, Tools, Rules, Community and Division of Labor (Figure 2).
2) Define activity systems at other contextual levels of analysis.	The student group activity system was expanded to identify the interrelated activity systems at other contextual levels by differentiating between objects of activity (Figure 3). This helped in developing the unit of analysis and describing the interrelated nature of the 2 activities (i.e. group activity & focus group activity).
3) Describe the mediating processes between the components of each activity system by indicating the development of each component and the potential tensions within and between these components.	The tasks involved in the student group activity (i.e. brainstorming ideas and developing 4 categories for code of ethics) were related with the corresponding sub-processes from the CKB model (i.e. articulating knowledge and developing shared understanding). The sub-processes were then analysed using focus group data. Analysis of the focus group data involved inductively relating the data with theory (activity theory and reflective thinking) to identify the mediating tools used by the participants to achieve their object and provide rich descriptions for each of the CKB sub-processes.
4) Explore how knowledge building reveals itself within and between the activity systems by relating to the transformations of their objects and tools.	The results from the analysis in step 3 were integrated and mapped on to the CKB model. The integrated model presented at the end of analysis illustrates the mediating role of reflective thinking activities in the CKB process (Figure 5).

**Step 1 – the educational setting**

Figure 2 shows the student group activity as a set of interrelationships between the elements of the activity system. The subject of an activity represents the participant(s) who are the focus of an investigation (Boer et al. 2002) (i.e. the student group). The object of the activity refers to the “problem space at which the activity is directed” (Boer et al. 2002, p4) (i.e. develop 4 categories of a code of ethics for IT professionals and achieve the educational objectives). Tools represent the mediating physical and conceptual artefacts that are used to transform the object. The tools used by the participants included Zing, group discussion and language (such as social interactions within the group) as it allowed participants to communicate with each other, articulate knowledge and develop shared understanding. The rules for the collaborative activity were based on the principles of social constructivism such as multiple perspectives being discussed and authentic problem solving. The community includes the facilitator who is also the researcher investigating the CKB process. Division of labor defined the responsibilities in the group activity.

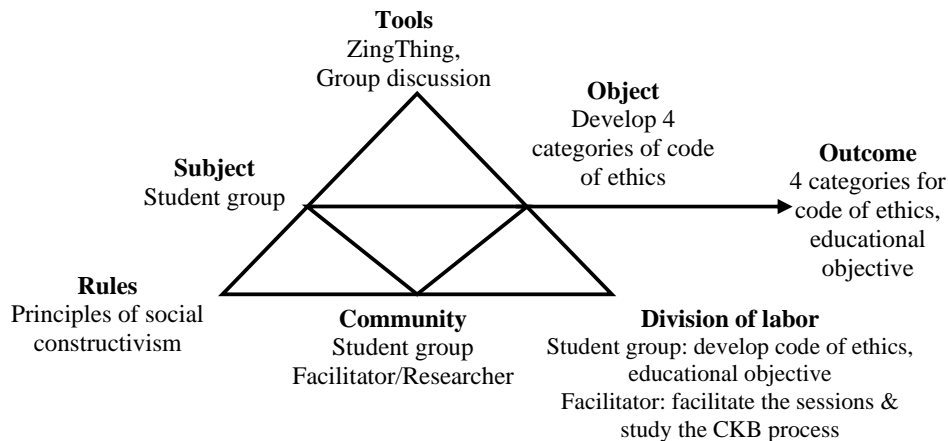


Figure 2: Student group activity system (Adapted from Engeström 2001)

### Step 2 – developing the CKB activity system & unit of analysis

Step 2 involved identifying more detailed activity systems at different contextual levels by describing the interrelated relationship between the group activity and focus group (Figure 3). This allowed the researcher to focus on a particular level and then identify the mediating processes at that level. Activity systems at different contextual levels were identified by differentiating between the objects of the activity (Engeström 2001). For example the object of the group activity was to develop a code of ethics. The outcome from the group activity (experience of developing a code of ethics) was used as a reflective experience in the focus group activity whose object was to achieve the educational objectives (for students) and gather data to analyse the CKB process (for facilitator/researcher).

Engeström (2001) and Gros et al (2005) propose the use of collective activity systems for studying collaborative activities. The unit of analysis for this study is the interacting activity systems shown in Figure 3. In other words, the unit of analysis is the collaborative activity which corresponds to the sub processes in the CKB model (i.e. articulating knowledge, developing shared understanding, building knowledge). Using CKB activity system (Figure 3) as the unit of analysis allowed the analysis to identify the tools used at the individual and the group level of the collaborative activity as discussed in step 3.

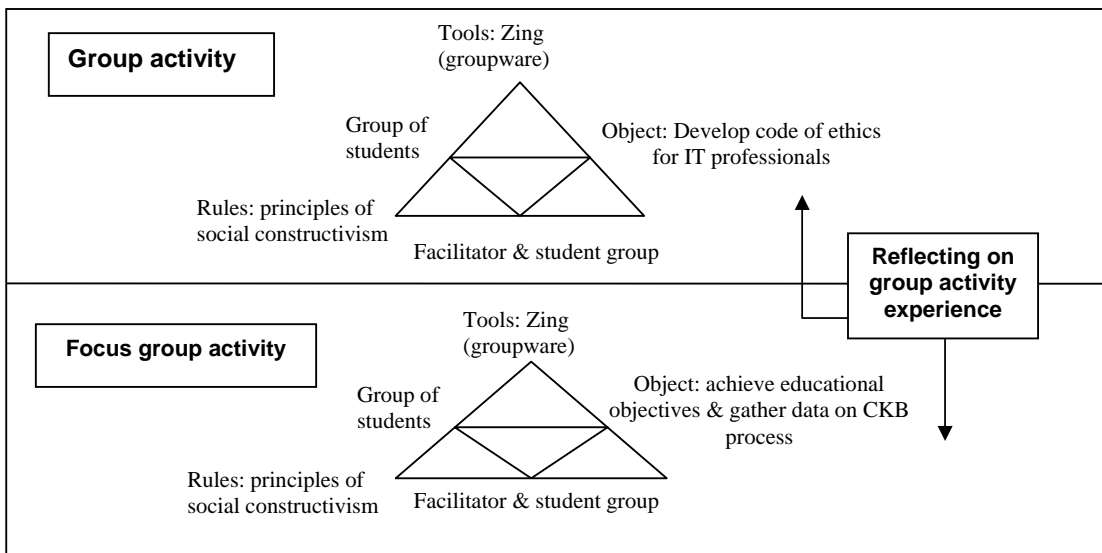


Figure 3: CKB activity system at different contextual levels

### Step 3 – describing the mediating processes

This step involved analysing how the group activity tasks were completed using the focus group data. The objective was to use participants' experience of the group activity (made explicit during focus group) and identify the mediating processes and tools used to complete the group activity. Specifically this step was aimed at answering the research questions.

#### Articulating knowledge at individual and group level

The first task in the group activity was to brainstorm ideas on what should be included the code of ethics for IT professionals. In terms of the CKB model, the sub-process of brainstorming ideas is identified as articulating tacit knowledge. Articulating tacit knowledge involves making explicit experiences, beliefs and perspectives in a specific context through social interaction (Nonaka 1994). These existing beliefs and perspectives can be in the form of practical know-how or knowledge gained from previous experiences. The participants were asked the following question in the focus group activity: How were ideas generated during brainstorming? The responses (captured using Zing) are shown in table 3.

Table 3: Knowledge articulation at individual level

1. Participant 1: discussion in the lecture	7. Participant 5: from the exposure of the industries in the previous experience
2. Participant 2: previous knowledge and experience triggered through discussion	8. Participant 6: relating the ideas from past project experience to this group activity
3. Participant 3: general understanding and a bit of homework ...we had all these idea in our mind and just went codifying it...and put them in words 4. Participant 9: reading the articles and general subject knowledge 5. Participant 5: We have experience in the past. which trigger in this situations	9. Participant 7: putting what i have read into practice today  10. Participant 8: previous experiences, reading books, practical experiences, random ideas...comparing previous similar experienced situations to current experience situations
6. Participant 6: by listening to others and group discussion	11. Participant 4: coming up with ideas based on what the group said

Analysis of Table 3 data shows that the tools used by participants to articulate knowledge were: (1) use of previous experience and resources (quotation 1-5, 7-10) and (2) use of other participants' ideas (quotation 2, 6 and 11). The first of these emerging themes was further probed by the facilitator: How did previous experience help in generating ideas? The responses are shown in table 4.

Table 4: Role of experience & reflective thinking in knowledge articulation

1. Participant 1: We just recall back whatever we did in the past, and we were just thinking, and then we got these ideas.	5. Participant 3: You compare this situation to past situation, and it automatically comes to you that what you did at that time. What have you heard ...
2. Participant 2: comparing similar situation from the past and from the present, and just giving it as a new idea	6. Facilitator: And so you think through your past, you think through your past, is it?
3. Participant 4: previous experience triggered it at this point of time	7. Participant: Yeah (everyone together).
4. Facilitator: Okay. One thing is coming out from this thing is that past experience and something triggering, the word 'triggering'. Can you explain how that happened? How does that trigger happen?	8. Participant 8: When you ask something and you are supposed to answer about it, and then you relate all those activities, and you think about the past times, you want to know about what people say, and then you answer that. That's what triggering is, I think

Table 4 data illustrates participants using reflective thinking process of reflection-in-action as a mediating tool for articulating their knowledge. The process involved "thinking at a meta level about the process one is engaged in a particular context" (Eraut 1995, p15). In this case the context was provided by the group activity and the process was made explicit during the focus group activity. The reflective process used by participants to brainstorm ideas (i.e. articulate knowledge) involved: carefully examining the current activity (quotation 1), contrasting and comparing the current activity with past experiences (quotation 2, 5), and taking action in the form of articulating tacit knowledge using language and social symbol systems (quotation 3, 8).

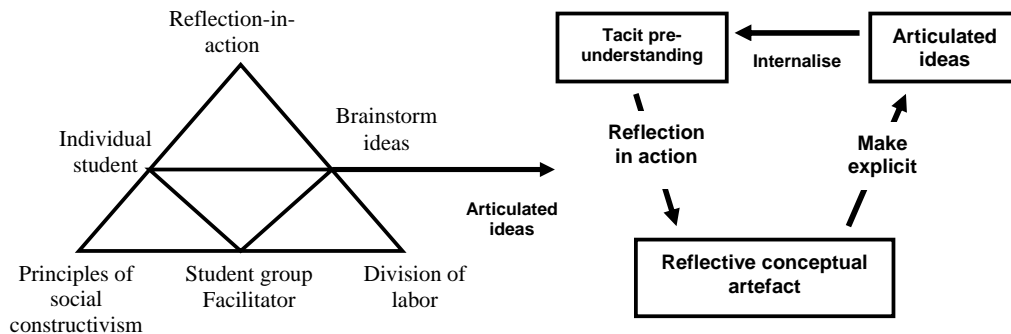


Figure 4: Idea generation by individual participant

Figure 4 conceptualises this process as an activity system and maps it on to the CKB model. The participants were able to articulate tacit knowledge by actively evaluating past experiences in context of the ongoing activity (Table 4, quotations 1 to 8). Table 4 data also sheds some light on how knowledge artefacts were created. The word "triggering" was used to identify the process by which participants actively compared previous experiences in context of their group activity to draw out the relevant knowledge. Drawing out the relevant knowledge by using reflection-in-action as a tool is described as developing a reflective conceptual artefact. Reflective

conceptual artefacts exhibit tool like characteristics and helped participants to create knowledge artefacts. This discourse in the focus group activity also helped in developing a common terminology and allowed participants to understand what “triggering” meant in context of their group activity. Therefore, the reflective conceptual artefact can be defined as a metaphor explaining the development of a knowledge artefact by engaging in and using reflection-in-action as a tool in the activity (Figure 4).

The second theme (use of other participants’ ideas) was probed by asking: How were other participants ideas used in generating ideas? The responses are shown in table 5.

Table 5: Knowledge articulation at group level

<i>1. Participant 1: I was listening to others, it was something like what I've done in the past with my group members, and that's what I done. So I was trying to identify and just relating... We captured the knowledge from others.</i>	<i>3. Participant 4: Like, when you listen to an idea you just get a point, and that point getting modified by others and you ... in a better way.</i>
<i>2. Participant 3: what happens is sometimes what we think does not come out of our mouth and when we listen to other people, then we collect, and that helps us</i>	<i>4. Participant 6: Hint from other's ideas...each person has a different experience and knowledge...each person needs to share their knowledge and their experience.</i>

Four of the participants used other participants’ ideas as a resource and a tool for articulating their knowledge, refining ideas and building new ideas based on already articulated ideas (Table 5). Using other participants ideas for developing further ideas helped participants to make comparisons, refine their own ideas (quotation 3), get a different perspective (quotation 4), and build new ideas (quotation 1, 2). The outcome of this process included a list of brainstormed ideas (captured by Zing) that were representative of the multiple and diverse perspectives held by the group. The ideas generated at the individual level were used as a resource at the group level to further build ideas. Table 5 data indicates participants using collaborative reflection as a mediating tool in this process of building more ideas. Collaborative reflection involved interacting with knowledge artefacts made explicit by other participants to build new knowledge from them. The process involved relating the articulated knowledge artefacts with one’s own knowledge and modifying them to build new knowledge using language. Participants were engaged in deliberately building knowledge with the entire process organised around the shared object of brainstorming ideas and using collaborative reflection as a tool at the group level.

### Role of group discussion in developing shared understanding

The next task in the student group activity was to evaluate the brainstormed ideas and develop four broad categories for code of ethics. This sub-process is identified as developing a shared understanding in the CKB model. The participants were asked the following question in the focus group activity to analyse how shared understanding was developed: How did the group narrow down the ideas to four categories? The responses are shown in table 6.

Table 6: Developing shared understanding

<i>1. Participant 1: common things are categorised</i>	<i>6. Participant 4: to come to a consensus</i>
<i>2. Participant 5: by evaluating the point one by one, understanding each idea</i>	<i>7. Participant 6: take everyone's opinion and come to a group decision</i>
<i>3. Participant 2: eliminating redundancy in meaning</i>	<i>8. Participant 8: reach to our destination by comparing ideas with each other</i>
<i>4. Participant 7: discussing among the group members</i> <i>5. Participant 3: understanding make sense</i>	<i>9. Participant 9: gaining knowledge through critical thinking and mutual understanding</i>

The tool used by participants to develop a shared understanding as indicated by the data in table 6 included: using group discussion which involved evaluating and understanding each idea (quotation 2, 4, 5), combining similar ideas (quotation 1, 3), and using shared object to guide the discussion (quotations 6 - 9). This emerging theme was further probed to analyse the nature of the tools used as part of the process: What was the role of group discussion in developing the four categories? The responses are shown in table 7.

Table 7 data shows that the group used collaborative reflective discourse as a mediating tool for developing a shared understanding. Collaborative reflective discourse involves (1) sharing experience and knowledge; (2) achieving intersubjective understanding through collaborative meaning making; and (3) synergy between collaborative reflection and relationship building (Yukawa 2006). Each of these characteristics is present in the data (Table 7). It was through attending to individual perspectives, sharing multiple perspective with the group (quotation 1- 3), evaluating each idea, re-conceptualising the problem in relation to the group, getting feedback from other participants, and the resulting conceptual change (quotation 4-9) that helped the group to achieve a shared understanding. Participants shared knowledge with the group, evaluated and reasoned perspectives, and developed shared understanding by taking action. The action or the outcome of the activity was the development



of four categories. The participants were not merely trying to develop four categories, but were engaged in a collaborative reflective discourse to achieve a shared understanding of what the four categories would be and what was to be included in those categories. The data also shows a dynamic relationship between individual reflective thinking (Table 7 - quotation 1-3) and the social nature of collaborative reflective discourse (quotation 4-9). By individually engaging in reflective thinking, participants were able to articulate knowledge, bring forth individual perspective to the group space and create artefacts for discussion. Collaborative reflective discourse involved explicitly seeking feedback through social interactions for examining the multiple perspectives and co-creating knowledge artefacts (e.g. 4 categories). In other words, the outcome of an individual's reflective thinking activity contributes to the interactions taking place at the group level thus helping in sustaining the collaborative reflective discourse for developing shared understanding.

Table 7: Role of group discussion in developing shared understanding

<i>1. Participant 1: There was a debate on some characteristics... Whether it should be put in some particular category or some other category</i>	<i>6. Participant 4: Because we see a particular problem in a particular direction. But what other people think we don't know. I see my view point. It may be right, it may be wrong. But only when I see other viewpoints can I see I'm wrong.</i>
<i>2. Participant 3: Generally you share knowledge...a chance to cover topic in 360 view so we cover all the possible solutions</i>	<i>7. Participant 6: It's like, for example, I think that this idea should go under that topic. But then I hear someone else telling me that this can also go under another topic...</i>
<i>3. Participant 2: We try to understand other people's thinking, or their ideas. 4. Facilitator: And how did that change happen? 5. Participant 5: Because of the justification.</i>	<i>8. Participant 8: The statement from others made you change your opinion. 9. Participant 9: how they are thinking about same problem</i>

### Building knowledge from experience

The underlying educational objective of the group activity was to provide the group with a real experience in knowledge creation using technology (Zing). The group activity was important for the students in order to make the leap in conceptual understanding about the relevance and purpose of their group activity (i.e. relating the group activity experience with the theoretical concept of knowledge creation). The focus group activity ideally served this purpose as demonstrated by participant responses to the following question: From the group activity experience what can you tell about knowledge creation? The responses are shown in table 8.

Table 8: Defining knowledge creation

<i>1. Participant 1: knowledge creation means sharing ideas, getting different opinions and get better result</i>	<i>6. Participant 7: Knowledge development, taking out the knowledge from persons mind</i>
<i>2. Participant 2: merge the ideas and knowledge and get the best answer</i>	<i>7. Participant 8: Something new that we never knew before</i>
<i>3. Participant 3: transferring knowledge from the minds of the people in the group to the computer (codifying)</i>	<i>8. Participant 5: Receive someone else ideas</i>
<i>4. Participant 4: knowledge creation is based on past experience 5. Participant 6: we created knowledge in an efficient way by joining everybody's idea</i>	<i>9. Participant 9: sharing knowledge, sharing idea, getting different view, participation, brainstorming, and discuss critical question</i>

Knowledge creation is defined by Awad and Ghaziri (2004) as a process of updating new knowledge based on on-going experiences in a particular context and they described group-work as a mechanism for creating knowledge. Nonaka's theory of knowledge creation explains how knowledge held by individuals is enriched and enlarged through interaction between tacit and explicit knowledge held by individuals (For details refer Nonaka 1994). Even though the students did not use the same syntax as used by these authors, there explanations of knowledge creation (Table 8) aligned with the theoretical concept of knowledge creation. The students were able to identify and relate with concepts like interaction and sharing of knowledge leads to knowledge creation (quotation 1), role of interaction between tacit and explicit knowledge in knowledge creation (quotation 3, 6, 8), and how combining different perspectives leads to knowledge creation (quotation 2, 4, 5, 7, 9).

The focus group activity allowed participants to jointly reflect on their group activity by creating the context in which meaningful reflective interactions could take place, thus allowing the participants to build knowledge and achieve their educational objective. Participants were not only able to make meta-communicative statements about their group activity experience, but were also able to use the group activity experience to build knowledge by reflecting on their experience. The group activity became an artefact for the entire group to reflect on, thus turning it to a shared artefact (Hershkowitz and Schwarz 1999). The shared artefact was used by the participants as a reflective experience during the focus group activity thus making the group activity an explicit object for



the process of CKB and developing a cohesive theory. More data from different contexts (e.g. groups from organisational contexts, knowledge intensive group problem solving contexts) is needed to further corroborate the model and the underlying mediating processes involved as part of CKB.

Another important contribution of the paper is the method used for gathering and analysing the data to study CKB. The use of an electronic focus group to gather data helped the researcher to actively involve the participants in exploring their experience and perception of the group activity. The focus group activity helped the group to re-construct their experience and explore how they constructed knowledge. IT & IS education needs this type of authentic group activity experience to prepare students for real life work activities.

The focus group activity also served as a research tool to analyse the group activity, identify the tools used as part of the group activity (for e.g. reflection-in-action), and the mediating sub-processes used by the group to achieve their objective (for e.g. collaborative reflective discourse). The model and the focus group activity can be used as an evaluative framework by practitioners (facilitators, knowledge workers) for helping groups improve their knowledge building and collaborative work capabilities. In conclusion it can be said that the case presented in this paper showcases how research can be made relevant to practice by establishing praxis between theory and practice. The praxis is developed by analysing an authentic group activity (i.e. practice) with a theory based framework (i.e. CKB activity system and reflective thinking). The CKB model not only helps in furthering our understanding of real life practice and reducing its complexity but also in developing a research informed tool that can be applied by practitioners.

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