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THOUGHT-BOUNCES AS A COLLABORATIVE INTERACTION FEATURE FOR CO-CREATION OF NEW IDEAS

Master's Thesis in Education

FACULTY OF EDUCATION
Master's Degree Programme in Learning Education and Technology

2015
Abstract

Collaborative learning does not happen just by merely assigning tasks to students in groups. One of the factors identified for the success of collaborative learning is the interaction among the working members. When it is said interaction, it is not any type of interaction, but a particular type of interaction. Dillenbourg (1999) mentioned three criteria for the particular type of interaction as ‘collaborative interaction’. These three criteria based on Dillenbourg’s intuition, have been the fundamental grounding on which this research paper stands. In an ordinary conversation, people often bounce their ideas, and this notion of ‘ideas being bounced’ is an informal expression in the English language.

The main aim of this research is to identify the interaction pattern, and the distinctive feature that is used to co-create new ideas, in other words collaborate successfully. Successful collaboration is referred to, at least in this research paper, the interaction of learners when they actively co-create new ideas. A detailed literature review begins on the successful collaborative learning and collaborative interaction. The notion of language, identity and epistemic modality further explored through a sociolinguistic perspective. It was postulated that the usage of language could actually influence the co-creation of new ideas. The importance of co-creation of new ideas were discussed.

This paper is based upon mixed methodology namely: Observational study and Qualitative Content Analysis (QCA), which later narrowed down to Conversational Analysis (CA). As the QCA was chosen, thus made this study to be based upon the inductive reasoning philosophy. The data was collected by the PROMO research team from the Faculty of Education, University of Oulu, Finland. The collected data consists of 12 postgraduate university students working in three groups of which each group with 4 participants respectively. The assigned group task was an open-ended, problem-based question which enables the participants to engage in epistemic reasoning by predicting, rationalising, and proposing possible solutions for the identified core problem. The entire three hours of each group work were video recorded, total amount of nine hours of video data. Every group’s conversations were categorised to ‘on-task’ and ‘off-task’ talks. The on-task category were later sub-categorised to ‘epistemic’ and ‘metacognitive’ talks. A micro analysis (CA) was conducted to the group’s conversations to identify the interaction pattern, and the distinctive feature that lead to successful collaboration (co-creation of new ideas).

As the result, this paper has identified, and reports on the distinctive feature of the collaborative interaction that could lead to successful collaboration. It was found that thought-bounces is the distinctive feature identified when participants co-create new ideas. It is believed that the implications of a continual investigation along the collaborative interaction and thought-bounces prototype, would definitely open up other possible research pathways which definitely be an advantage to the larger education, and learning sciences community.

Keywords collaborative learning, successful collaboration, collaborative interaction, thought-bounces, co-creation of ideas, creative collaboration, good collaborator, conversation analysis, sociolinguistics
TABLE OF CONTENTS

1 INTRODUCTION ..................................................................................................................... 4

2 LITERATURE REVIEW .......................................................................................................... 6

2.1 What is collaborative learning and successful collaboration? ........................................... 6

2.2 Collaborative interaction .................................................................................................. 10

2.3 Interaction and identity ................................................................................................... 11

2.4 Language, epistemic modality and co-creation of new ideas ........................................... 12

3 AIMS AND RESEARCH QUESTIONS .................................................................................... 17

4 METHODS .......................................................................................................................... 18

4.1 Data collection method and participants ......................................................................... 23

4.2 Procedure ........................................................................................................................ 23

4.3 Task ................................................................................................................................... 25

4.4 Method of analysis .......................................................................................................... 27

5 RESULTS ............................................................................................................................. 30

5.1 Orange group .................................................................................................................... 30

5.2 Yellow group ..................................................................................................................... 32

5.3 Blue group ........................................................................................................................ 34

5.4 Thought-bounces during epistemic talk ........................................................................... 39

5.5 Factors promoting thought-bounces ................................................................................. 47

6 CONCLUSIONS AND DISCUSSION .................................................................................... 51

7 LIMITATIONS, IMPLICATIONS AND FUTURE DIRECTIONS ........................................... 58

8 VALIDITY, RELIABILITY AND ETHICAL ISSUES ................................................................ 62

REFERENCES ......................................................................................................................... 66
List of Tables

Table 1. Grouping details. ........................................................................................................... 23
Table 2. Categories and codes .................................................................................................. 29
Table 3. Orange group’s first round discussion ....................................................................... 30
Table 4. Orange group’s second round discussion .................................................................... 31
Table 5. Yellow group’s first round discussion ......................................................................... 32
Table 6. Yellow group’s second round discussion .................................................................... 33
Table 7. Blue group’s first round discussion ............................................................................. 34
Table 8. Blue group’s second round discussion ........................................................................ 35
Table 9. Instances of talks according to the identified categories ............................................. 37
Table 10. Thought-bounces instances during epistemic talk ..................................................... 40
Table 11. Top five phrases containing 4 words during 30min of epistemic talk ......................... 48
Table 12. Top short phrases/word used during the 30-minute epistemic talk ............................. 49
Table 13. Comparing Dillenbourg’s criteria with thought-bounces ........................................... 54
List of Figures

Figure 1. The Method Onion....................................................................................................................... 19

Figure 2. Stages in problem-solving. ........................................................................................................ 26

Figure 3. The Analysis Hourglass............................................................................................................. 28

Figure 4. Instances of talks according to the identified categories. ............................................................... 38

Figure 5. Top short phrases used during the 30min epistemic talk.............................................................. 50
1 INTRODUCTION

Collaborative learning is one of the main pedagogical methods used in the current education setting (Craft, 2008; Dillenbourg, Järvelä, & Fisher, 2009). Dede (2010) explains “collaboration is a perennial capability, always valued as a trait in workplaces across the centuries.” There are many studies have been conducted within the collaborative learning context, predominantly in the primary education (Beghetto, 2007; Kangas, 2010; Rojas-Drummond, Mazón, Fernández & Wegerif, 2006; Vass, 2007; Wegerif, Littleton, Dawes, Mercer & Rowe, 2004). The productiveness of collaborative learning could be dependent on the variety of knowledge and skills of which heterogeneous group members bring to the group and put together (Lou, Abrami, Spence, Poulsen, Chambers, & D'apollonia, 1996; Pluut & Curșeu, 2013; Tolmie et al., 2010).

However, collaborative learning is not just about students working in groups, but there are more factors for a successful collaboration to occur (Dillenbourg et al., 2009; Fiore & Salas, 2004). Thompson (2013, p. 158) said “collaboration and collective thinking don’t happen by magic. In fact they follow several rules” in order to make it a success. Dillenbourg (2002) stated that free collaboration does not systematically promote knowledge construction. The success of collaborative learning could not be gained just by assigning group work to learners or by grouping them (Cohen, 1994; Dillenbourg et al., 1996; Kollar, Fischer, & Hesse, 2006; Vuopala, Hyvönen, & Järvelä, 2015).

Considering what the academics have said, it is obvious that collaborative learning is not just group work but there are other factors for successful, and effective collaborative outcomes. Since, previous studies (Beghetto, 2007; Dillenbourg, 1999; Kangas, 2010; Rojas-Drummond et al., 2006; Vass, 2007; & Wegerif et al., 2004) have acknowledged the benefits of collaborative learning, and therefore it is highly regarded within the educational setting. However, several previous studies (Cohen, 1994; Dillenbourg et al., 1996; Kollar et al., 2006)
have identified, and pinpointed of possible failures whenever this method being applied in the educational context. Thus, as researchers of the learning sciences, it is now pertinent to think what successful collaboration is, and how it could be facilitated well for the betterment. It is vital now to study what makes collaborative learning successful.

We are not able to study collaborative learning without thinking of the social elements, and their role in determining the effectiveness of collaborative learning. When we think of the social elements; interaction, and the use of language as a medium of interaction often regarded as the social element mentioned. Thus, a further clarification on the social elements namely: interaction and language were further explained in the literature review part of this paper. This paper is based upon a sociolinguistic perspective of language usage that forms a particular type of interaction during collaborative learning situations. Having said that, the main aim of this research is to further investigate the nature and elements of successful collaboration, and particularly how new ideas are being co-created, especially among post-graduate students. These students majoring in education, were from one of the universities in Finland.

Hence, it is now relevant to understand what we actually mean, when we say ‘collaborative learning’ and ‘successful collaboration’, if these words do not merely refer to a group of learners working physically (or virtually) proximate. This understanding is vital before proceeding with our quest on what type of interaction that actually makes the collaboration successful.
2 LITERATURE REVIEW

2.1 What is collaborative learning and successful collaboration?

Defining collaborative learning would be a relevant disposition, before understanding what is regarded as successful collaborative learning. Roschelle and Teasley (1995, p.70) stated collaborative learning as follows: "... a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem". The definition provided by Roschelle and Teasley on collaborative learning has been influential in Dillenbourg’s (1999, p. 12) works, of which Dillenbourg himself confessed. It should be noted here that this research is mainly based upon one of Dillenbourg’s works on collaborative learning. Dillenbourg claimed that the word ‘collaboration’ is being used ‘abusively’ as the word becomes more fashionable. Based on his own review, Dillenbourg defined 'collaborative learning' as “a situation in which two or more people learn or attempt to learn something together.” (p. 1-2). Dillenbourg claimed that this the broadest, and unsatisfactory way of defining collaborative learning. In order to avoid misinterpretation, the definitions for the keywords were directly taken from Dillenbourg as below:

- "two or more" may be interpreted as a pair, a small group (3-5 subjects), a class (20-30 subjects), a community (a few hundreds or thousands of people), a society (several thousands or millions of people)... and all intermediate levels. 2

- "learn something" may be interpreted as "follow a course", "study course material", "perform learning activities such as problem solving", "learn from lifelong work practice".

- "together" may be interpreted as different forms of interaction: face-to-face or computer mediated, synchronous or not, frequent in time or not, whether it is a truly joint effort or whether the labour is divided in a systematic way

(Dillenbourg, 1999, p. 1-2)
This definition further explains that the collaborative learning does not merely refer to two or more people working in groups; it is in fact, the notion of them trying to learn something together. In other words, it could be said that they construct new knowledge together. As learning or knowledge construction is a vital aspect of collaborative learning, it would be wise to further understand the conditions that would promote the shared knowledge construction.

For the shared knowledge construction to occur during a collaborative learning situation, all members in the group will work on a common goal (Dillenbourg, 1999; O’Donnell & Hmelo-Silver, 2013; Roschelle, & Teasley, 1995). Having a common working goal, it actually the basis of which all members could further navigate on the particular task that they are about to accomplish together. Fransen, Kirschner and Erkens (2011) mentioned that ‘task interpretation’ is one of the important elements in collaborative learning. In their study, they highlighted the importance of shared task interpretation in order for learners to be on-task. The notion of understanding task correlates with earlier studies (see also Butler & Cartier, 2004; Fransen et al., 2011; Nastasi & Clements, 1992) where they all agreed that learners negotiate, and integrate each other’s views, generate their ideas, and collaboratively try to make sense of a task. Shared-regulation is another important element in collaborative learning. Shared-regulation here mainly referring to emotional, motivational and metacognitive aspects that learners in a collaborative working group co-regulate each other during the process of them achieving their shared goals. Studies (Järvenoja & Järvelä, 2009; Hadwin, Järvelä & Miller, 2011) have proved the relevance of shared-regulation in terms of emotional, motivational and metacognitive terms.

On the other hand, Resnick, Levine and Teasley (1991) claimed that knowledge co-construction involves sharing, transforming, and integrating knowledge through conversational interactions. Rojas-Drummond et al. (2006) have explained that learners use a
variety of communicative strategies to construct a shared understanding and therefore knowledge will be the product of the joint negotiation of the learners in a collaborative learning context. Jarvela and Hadwin (2013) have mentioned the relationship of successful collaboration and interaction. According to them, a successful collaborative learning depends on several points that they have had highlighted namely; ‘shared knowledge construction’ and ‘productive collaborative interaction’. Dede (2010) defined collaboration “is a situation in which learners interact in a collaborative way.” Here, Dede has highlighted the importance of the ‘collaborative interaction’. Thus, the type of interaction in a collaborative working group should pave the way, or at least develop in the direction of which it could promote collaborative co-construction of knowledge.

From the literature, I have summarised my understandings on what is collaborative learning, and what makes the collaborative learning successful. The essentials that determine the success of collaborative learning are:

- *shared goals* (Dillenbourg, 1999; O’Donnell & Hmelo-Silver, 2013; Roschelle & Teasley, 1995)
- *task interpretation* (Butler & Cartier, 2004; Fransen et al., 2011)
- *shared emotional, motivational and metacognitive regulations. (Hadwin, Järvelä, & Miller, 2011; Järvenoja & Järvelä, 2009)*
- *a particular way of interaction that promotes shared knowledge construction* (Dede, 2010; Dillenbourg, 1999)
From this summary, I deduce that above all the identified essentials, *interaction* is the most crucial element in any successful collaboration to take place. Having said that, it does not mean ‘shared goal’, ‘task interpretations’ or ‘shared-regulations’ are least important, but all of these elements are very much dependant on the type of interaction is going to take place in a particular working group. Hence, I am of the opinion that interaction is fundamental for all the other identified elements within the collaborative learning paradigm. Here, I would like to shed light on Dillenbourg’s (1999) claimed:

...the words 'collaborative learning' describe a situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms, but there is no guarantee that the expected interactions will actually occur. Hence, a general concern is to develop ways to increase the probability that some types of interaction occur. (p.5)

Therefore, it could be seen that collaborative learning requires a particular way of interaction, and that, as mentioned by Dillenbourg himself, has several criteria which will be further discuss in following part 2.2.
2.2 Collaborative interaction

One of recent academic, Dede (2010) has acknowledged the significance of collaborative interaction in shared cognitive construction. Here again, not all interactions could promote the desired outcomes of collaborative learning. Dillenbourg (1999) identified three criteria namely; interactivity, synchronicity and 'negotiability' that makes interaction collaborative. Here are the exact explanations given by Dillenbourg in regards to his three intuitive criteria on his collaborative interactive notion:

**Interactivity:** “A first and intuitive criterion is that a collaborative situation should be quite interactive. The degree of interactivity among peers is not defined by the frequency of interactions, but by the extent to which these interactions influence the peers' cognitive processes.”

**Synchronicity:** “A second intuitive criterion is that 'doing something together' implies rather synchronous communication, while cooperation is often associated with asynchronous communication.”

**Negotiability:** “Another feature of collaborative interactions is that they are negotiable. A main difference between collaborative interactions and a hierarchical situation is that one partner will not impose his view on the sole basis of his authority, but will - to some extent - argue for his standpoint, justify, negotiate, attempt to convince.”

(Dillenbourg, 1999, p. 8-9)

I am interested to find out what Dillenbourg (1999), mentioned as a particular way of interaction that occurs for successful collaboration to take place. Here, it would be good to emphasise how successful collaboration being viewed, at least in this research, since the literature has a broad way of defining collaborative learning. For the purpose of this research, I have set the parameters of which the ‘successful collaborative learning’ refers to the emergence of new ideas by co-creation (Eteläpelto & Lahti, 2008; John-Steiner, 2006). Coming back to Dillenbourg’s view on collaborative interaction, if that particular way of
interaction could determine the entire success of collaborative work, then what is the particular way of interaction? I have used these three criteria as my fundamental reference, of which I have used to compare the findings of this research. Before further investigating the ‘particular way of interaction’, it would be wise for us to understand what interaction is from the sociolinguistic lens.

2.3 Interaction and identity

The Cambridge Dictionaries Online defines Interaction (n.d.) as “an occasion when two or more people or things communicate with or react to each other”. Based on this definition, it could be said that good communication is vital for good interaction, and for effective communication; spoken language is definitely a tool (Burling, 1993; Ellis & Beattie, 1986; Ochs, 1993; Stivers, 2015). One of the prominent sociolinguists and academic, Gee (1990, 1999, 2014) claimed that language not only allows us to do things, he further explained that language allows us to be things. Meaning to say, through language we are able to take ‘socially significant identities’. By taking these significant identities, we are now able to accomplish various tasks in various contexts. Gee (2014, p. 2) explained this through an analogy where he said:

We can speak as an expert - as doctors, lawyers, anime aficionados, or carpenters - or as “everyday people”. To take on any identity at a given time and place we have to “talk the talk” and “walk the walk”. When they are being gang members, street gang members talk a different kind of talk than do honor students when they are being students. Furthermore, one and the same person could “talk out” and act out both things at different times and places.

Gee claimed that making ourselves and our actions visible and recognizable, always involves “a great deal more than just language.” He further explained that it involves “acting-interacting-thinking-valuing-talking- (sometimes writing-reading) in the “appropriate way”
with the “appropriate” props at the “appropriate” times in the “appropriate” places.” (Gee, 1999, p.17). Gee referred such socially accepted relationships “among ways of using language, of thinking, valuing, acting, and interacting, in the “right” places and at the “right” times with the “right” objects that can be used to establish one’s identity with a ‘socially meaningful group’, as “Discourses” with a capital ‘D’.” (Gee, 2014, p.24)

From Gee’s explanation, we could say that form the use of our language (spoken or written), we could ‘be things’, or in other words, we are able to construct our identity according to the context we are in. Based on this, I would say that in a collaborative team work, there should be, or at least some distinct ways of the use of language which enables us to create the particular way of interaction. A good collaborator should have or should take a particular identity in order to establish a particular way of interacting, so that collaborative knowledge construction could occur. Here again, when we talk about the particular way of interaction, the role of language used in order to enact those preferred identities

2.4 Language, epistemic modality and co-creation of new ideas

Language and epistemic modality

Besides a particular identity, the language used during a conversation to express a particular opinion could actually determine how convince one person is towards their opinion. This is known as the ‘epistemic modality’ (Papafragou, 2006; Papafragou, Choi & Han, 2007). Halliday (1970, p.349) explained epistemic modality “is the speaker’s assessment of probability and predictability. It is external to the content, being a part of the attitude taken up by the speaker: his attitude, in this case, towards his own speech role as ‘declarer’.” Based on this, it is presumed that the extent of how strong a person is in expressing their personal epistemic reasoning, especially if it deals with any futuristic hypothesis, would definitely shape the interaction pattern when a group of learners trying to
construct new knowledge collaboratively. Here again, it could be said that the language used by a person to express him or herself would somehow shape the structure of the interaction, and shared knowledge construction. Also, by observing how members use of language during their group conversation, it could give some signification information of the speaker’s confidence of their epistemic reasoning, and the extent that they actually permit other’s to improvise it, or at least the extent of which they are able to modify based on other’s reasoning themselves. Therefore, language could be a scale to determine someone’s internal cognitive processes (John-Steiner, 1997, p.111), which could not be observed directly, but could be deduced by observing the group conversations, as well as when people think aloud.

It is also predicted that the nature of collaborative partners’ language use, and the extent of their perception towards their very own epistemic reasoning, would definitely play a vital role in the development of collaborative interaction in working groups. In an ordinary conversation, people often bounce their ideas, and this notion of ‘ideas being bounced’, is an informal expression in the English language. The Oxford University Press (2015) defined it as to ‘share an idea with (someone) in order to refine it’. Thus, considering all the literature groundings, and linking to this informal English expression, I strongly believe that there may be some interesting patterns of interactions when learners actively construct new knowledge via talking in working groups.
Co-creation of new ideas

Though the word ‘co-creation’ is just an ordinary word, or at least not a very technical term, and could commonly understood as creating something and the prefix ‘co-’ gives the ‘collaborative’ness in the process of creating something new. The notion of co-creation of new ideas are among the most used notion within the business paradigm in recent years. This notion was made based on the current literature in the business and management field, often mentioning about ‘co-creating new ideas and innovations’ (Moth, 2012; Ordanini & Pasini, 2008; Prahalad & Ramaswamy, 2004a; Prahalad & Ramaswamy, 2004b; Vargo, Maglio & Akaka, 2008).

It could be seen that the notion of co-creating new ideas, innovations and knowledge is very much prevalent in the business and entrepreneur world, as this seems to be the current commencement of which today’s business and entrepreneur organisations have begun to focus on (Moth, 2012; Vargo et al., 2008). Here, it was noted that the current mass-collaborative environment, via the social media for instance, shaping how people today could get access to information, construct and maintain knowledge (Désilets, 2007; Tapscott & Williams, 2010). Tapscott and Williams further explained how mass collaboration happening virtual platforms such as Wikipedia and YouTube, and how conventional businesses have embraced technology to incarnate a new life into their existing enterprises. From these cross-disciplinary references, it could be said that the notion of co-creating new idea and knowledge is being valued, and has its very own place, at least in the world of business and entrepreneurship.

Just like the business and entrepreneurial field of study, similar concept has been studied in the educational and learning sciences field. It could be seen similar concepts, and quests on how collaborative learning environment could further enhance the co-creation of new
knowledge are emerging. Recently, there are few studies on the integration of collaborative learning, interaction and co-creation of knowledge (Beghetto, 2007; Craft, 2008; Eteläpelto & Lahti, 2008; Kangas, 2010; Vuopala et al., 2015). Also, when we think of co-creation of new ideas, the notion of creativity should be addressed as well. This is based on the idea of coming up something new collaboratively is indeed a creative process (John-Steiner, 1997, 2000). Stein (1974) says that creativity is a process, and consists of three stages namely: hypothesis formation, hypothesis testing and communication. Stein has mentioned communication as one of the stages of creative process. Hereby, it could be inferred that communication, or in other words the particular type of interaction is indeed vital for collaborative creativity (co-creation of new ideas).

**To sum up**

As a brief review of the literature framework, the notion of what actually collaborative learning means was unfolded. Later, the idea of not all interaction could actually promote shared-knowledge construction, but a particular type of collaborative interaction was understood. When talking about interaction, the idea identity, language and epistemic modality come into context. The sociolinguistic explanation these terms showed on how the usage of language could actually shape any interaction. The epistemic modality that was projected by learners would actually determine the extent of which those learners in any particular learning groups allow their peers to change their epistemic reasoning. As successful collaboration, at least in this paper, was defined as the extent of which learners co-create new ideas collaboratively, it was thought that notion of co-creating of new idea would be relevant to be discussed here. It was understood that the notion of co-creation of new ideas are highly valued in the business and entrepreneurial field, and has gain interest among the researchers in the education and learning sciences field as well.
Hereby, this has ignited my interest in investigating the particular type of interaction that leads to the emergence of new ideas that are co-constructed collaboratively. In regards to this, I have hypothesised that a good group discussion should be coherent and possess a certain kind of conversation feature that attributes the particular type of interaction. If so, what is the feature that makes the interaction is successful collaborative groups distinctive? I further postulate that, for such type of interaction to occur, the group members should have a particular way of interacting which definitely depends on the type of identity the group members establish during their group talk.
3 AIMS AND RESEARCH QUESTIONS

Based on the postulation made earlier, the main aim of this research is to investigate and identify the particular interaction that happens when working groups of university students co-create new ideas in collaborative problem-solving situations. For such collaborative interaction to occur, the group members should have a particular way of interacting, in which definitely depends on the type of identity the group members establish during their group talk. Having this as the main foundation of this research, three research questions were constructed to further investigate the particular way of interacting. They are:

1. What is the ‘particular way of interaction’ that promotes successful collaboration?

2. What is the distinctive feature of the ‘particular way of interaction’ in which new ideas are co-created collaboratively?

3. How useful is the distinctive feature of the ‘particular way of interaction’ in establishing the ‘identity of a good collaborator’?
4 METHODS

The mixed method

Mercer (2010) has clarified that sociocultural researchers in the education field often use both qualitative and quantitative methods to study classroom talks. This is not uncommon as the literature on qualitative research has an explanation for such circumstances. Morgan (1993), has clarified that when qualitative data coded into distinct categories, analysed statistically using quantitative research method; this technique, as claimed by Morgan, could be mentioned as quantitative analysis of qualitative data. Mercer referred this as a mixed method in the classroom talk analysis. This correlates to Creswell’s (2003) opinion on mixed method research whereby both qualitative and quantitative methods are utilised. There are other scholars have argued the relevance of the mixed method by the integration of both qualitative and quantitative methods, especially with the intention to provide a better perspective within any qualitative research (see Creswell, 2003; Creswell & Clark, 2007; Kelle, 2005; Thomas, 2006). Having inspired by the Research Onion by Saunders, Lewis, and Thornhill (2009), I have illustrated, and termed the modus operandi of which this research was based upon, as the ‘Method Onion’ (refer figure 1).
The Method Onion (Figure 1) illustrates the several methodologies that I have chosen, and placed them one in another from the broadest methodologies to specific methods, which were deliberately selected and formed the entire mixed method of this particular research.

*Linking methods to theories*

To comprehend the Method Onion that was designed and used in this research, it would be relevant to understand the reasoning philosophies that were held in mind while designing this Method Onion. The Method Onion was designed in such a way where the methods used in this research could actually link to the fundamental theories of which this research is grounded. Each layers of the Method Onion represent a particular methodology whereby they were placed according to their coverage. In other words, the Method Onion used this
research represents the inductive philosophy of reasoning whereby the data were collected, observed, and then theorised (Thomas, 2006).

As such, the observational study represented on the most outer and larger layer of the Onion. The observational study method is one of the research methods often used in the medical field. (Black, 1996; Carlson & Morrison, 2009). Carlson and Morrison mentioned that observational studies extract inferences about the effect of an “exposure” on participants, without the researcher's direct influence. They further stated that observational studies involve “the direct observation of individuals in their natural setting.” In the social sciences, there are at times where the researcher would want to observe a particular scenario, especially when the researcher has no control over the experiment. Thus, it was believed that an observational study would be the best way for studying such circumstances. However, one of the weaknesses of this method is when the researcher will never have control over the experimental group. Since this method is all about observing participants in their real life situation, one particular study might not be relevant for other scenarios (Carlson & Morrison, 2009). For my research, this method fits the best since the main aim of this study is to observe how new ideas emerge during group discussions, and also to discover the particular way of interaction. The participants in this research were not given any explicit guidance on ‘collaborative interaction’. This is because; the aim of this research is to observe the conversation patterns, and to discover the interaction feature that enables co-creation of new ideas.

Next, I will now narrow down the way of working from the observational studies to the qualitative content analysis method. Due to the fact that this is predominantly a qualitative research, the Qualitative Content Analysis (QCA) was chosen as it would fit the best for analysing the conversations in all three groups (Hsieh & Shannon, 2005). Hsieh and Shannon
further clarified that the QCA is “a research method for the subjectivist interpretation of text and data through the systematic classification process of coding and identifying themes or patterns” (p. 12). The QCA is an analysis way predominantly used in the medical and bioethics field (Forman & Damschroder, 2008, p. 39) The QCA is an inductive in nature whereby the categories for analysis the data is determined from the data itself (Forman & Damschroder). Forman and Damschroder provided three phases in the QCA namely; “immersion”, “reduction” and “interpretation” (p. 46). They identified the problem with the QCA method is that, the QCA often involve a huge amount of data and often becoming challenging for the researcher to study. However, Forman and Damschroder prescribed researchers who work with the QCA method to ‘engage’ with the data, so that the possible ‘patterns’ could be visible. This is known as the ‘immersion’ phase where researchers will engage by viewing the entire raw data. This, eventually could lead the researcher to identify the relevant categories for their study. Thus, the following phase of which the categories are identified, and narrowing the focus down to the particular scope is known as ‘reduction’. The ‘interpretation’ phase is the phase where the identified patterns were being interpreted, and implications were drawn at a larger perspective. The QCA is heavily structured based on the inductive reasoning philosophy. Since research is investigating the particular way of collaborative interaction, and its distinctive feature, thus, the QCA fits well within the theoretical framework of this study.

This research began with an observational study, and later narrowing down to conversational analysis (CA). The CA is one the specific methods where could be used within the QCA (Forman & Damschroder, 2008). CA is widely used to study the nature of language used in a particular social context, and it is also one of the nature of qualitative content analysis method (McTavish & Pirro, 1990; Tesch, 1990). Stivers (2015) acknowledged that the CA is a ‘dominant approach to the systematic study of social
interaction’. The CA, could be further used to understand how discourses and identities in social groups are enacted. Gee (1990) defines discourse as a socially accepted ways of language use to think and act in order to identify oneself as a member of a socially significant group, or to indicate a socially significant 'role'. As a part study the discourse and identity of participants who collaborative successfully, a word/phrase analysis was conducted with the conversations that took place in all three groups respectively. For that, all conversations were transcribed verbatim, and the instances of which new ideas emerged, were further analysed.

Though it was mentioned earlier that this is a qualitative study, the word and phrase analysis were carried out by literally counting the frequency of those particular words or phrases. The core of the Method Onion represents the micro-level analysis which is the core analysis method that is used in this research. As it could be seen from Figure 1, word or phrase analysis is the core micro-analysis method that has been used in this research. This further supports the notion of the micro level analysis whereby the conversations of the three groups were analysed as the main aim of this research is to identify the collaborative interaction pattern and the interaction feature when participants co-create new ideas collaboratively. As all previous micro-analysis researches deals with analysing the smallest feature of interaction (see Eder, 1981; Marks, Huston, Johnson & MacDermid, 2001; Marks & MacDermid, 1996), word/phrase analysis is the narrowest among all the analysis methods that have been chosen in this research.

Thus, the word or phrase analysis placed as the core of the Method Onion. At the same time, it could be seen that the core word/phrase analysis is not the only analysis method used, but rather one of the few methods chosen. This is mainly because to link the bridge between the theories and methods of this research in such a way where the main aim of this research could be achieved. It is also worth mentioning briefly here that the structure of the Method
Onion in this research is inductive in nature. The inductive approach will be discussed again in part 4.4, the method of analysis.

4.1 Data collection method and participants

The main data was collected in the form of video recording, as a part of the PROMO research team’s data collection. Participants were recorded while they were working in groups. There were a total of 12 participants (N=12) of which made up by 7 females and 5 males, aged from 23 to 35, took part in the data collection. All participants were from a similar master’s degree program of the faculty of education, and in the first and second year respectively. Though they were in different years of their master’s degree program, they have had worked together before during other courses in their master’s degree program. Thus, this was not their first time working together. Socio-culturally these groups were heterogeneous whereby there were students from Brazil, Canada, China, Finland, Italy, Russia, Turkey, and Uganda. Some of the students have previous teaching experience while some do not.

4.2 Procedure

Table 1. Grouping details

<table>
<thead>
<tr>
<th>Group names</th>
<th>Participants</th>
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<tbody>
<tr>
<td>Orange</td>
<td>Marja, Ann, Lee, Johnny</td>
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<tr>
<td>Yellow</td>
<td>Paula, David, Anna, Sarah</td>
</tr>
<tr>
<td>Blue</td>
<td>Felix, Lily, Mamat, Jesu</td>
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</tbody>
</table>

Participants were grouped in three working groups respectively (Table 1), and they were assigned with an epistemic question in the form of a ‘problem’. Each group were required to work collaboratively to solve the problem. Each groups were supplied with the same reading
materials, iPads, building blocks and stationeries. Each participant were given handouts consist of the elaboration of the task, what is expected and some guiding questions. The task was divided into three parts. During the first one and half hour, students were discussing and finding solutions to the given problem. After lunch break, they finalised their task by producing their thoughts in textual form, which of a duration of another one and half hour. Overall, a total of three hours were allocated for the entire task. Participants were given the autonomy to use any medium, or method of their choice to present their findings. The final part of this study was a reflection part which is known as the ‘aquarium’ where by participants reflect on the entire group task and the process of which their embarked to solve it.
4.3 Task

The task that was assigned for these groups is an open-ended, problem-based task where each group should discuss and come up with possible solutions. The epistemic problem that was used this data collection is:

‘How does teachers’/educator’s role will change over the next 20 years?’

For this task, participants are required to predict the possible core problems that will be faced by teachers or educators in the next 20 years to come. This task, obviously, requires the participants to predict and rationalise their predictions by justifying them using relevant literature. Each group's’ task was to analyse the problem and determine their own solution to address the problem. All members were given the same instructions printed. Participants were also provided with guidelines the process of collaborative problem-solving. This guideline was exclusively designed by Hyvönen and Impiö for the PROMO research team.
Figure 2. Stages in problem-solving (Hyvönen & Impiö, manuscript).

Figure 2 shows the stages in problem-solving that was given to the participants during the in-group task for the data collection. Participants were highly advised to follow the guidelines so their entire group working could proceed well and idiosyncratically.
4.4 Method of analysis

I have adopted a hourglass-shaped way of analysing (Figure 3) whereby I started with the broader element, narrowing down to the most micro-analysis which consist of word-level analysis. Then, I zoomed out again to the larger perspective, like discovering the conversation patterns through the word and discourse analyses, and followed by the implications to the teaching and learning field. I created categories and codes to analyse my data. I used two main category namely; ‘on-task’ and ‘off-task’. Under the ‘on-task’ category, there are two sub-categories namely: ‘epistemic talk’ and ‘metacognitive talk’. The epistemic talk is when the participants talk related to the epistemic activities. Fischer, Bruhn, Gräsel and Mandl, (2002) refers epistemic activities when learners deal with the learning task. For instance, during epistemic activities, participants define new ideas with the goal to construct, deconstruct and reconstruct knowledge (Fischer et al., 2002; Weinberger, 2003; Weinberger et al., 2005). Conversations related to the task itself (e.g., about the group work, ways of working and the task expectations) are sub-categorised as ‘metacognitive’ talk. The ‘off-task’ category encompasses all other conversations that do not fall under the ‘on-task’ category. For every five minutes interval, the nature of the talk was categorised based on the codes in Table 2.
The top part of the analysis Hourglass (Figure 3) represents the mixed methods starting from observation to more specific, micro level analysis, which is the word/phrase analysis. On the other hand, the lower of the analysis Hourglass is based on the inductive reasoning philosophy, of which moving from specific observation (word/phrase analysis) towards making broader generalisations (Thomas, 2006; Trochim & Donnelly, 2008). The Analysis Hourglass is a representation of the three phases in the Qualitative Content Analysis method namely: immersion, reduction and interpretation identified by Forman and Damschroder (2008, p.46) earlier. The upper part of the Hourglass is the ‘immersion’ (observing, video viewing, transcribing) and ‘reduction’ (categorising and coding), and the latter part resembles the interpretation part (word/phrase analysis, discovering the pattern, implications).
<table>
<thead>
<tr>
<th>Categories</th>
<th>Characteristics (Codes)</th>
<th>Example</th>
</tr>
</thead>
</table>
| ON-TASK       | Epistemic talk                                                                         | • suggesting ideas for the problem  
• negotiating and improvising existing idea  
• providing alternatives views  
Anna: Probably I think, that the main point would be, since we cannot predict exactly how the situation would be in 20 years, maybe we can, ah...The main point is education should become more agile, so maybe decision...What we should think of, more adaptable kind of education? |
|               | Metacognitive talk                                                                      | • goal setting  
• clarifying the task requirement  
• ways of working/task division  
• timekeeping  
• role-taking  
Marja: How will we present our final results? I think it’s coming together but i don’t want to keep it in like papers. Should we make a big drawing on the... Can we make that? Use that board? |
| OFF-TASK      | • neither epistemic nor metacognitive talk                                              | David: Okay, what’s that? It’s cloudberry?  
Sarah & Paula: No.  
Sarah: That’s something...  
Paula: But these are, awesome, like chocolate, chocolate, and chocolate. |
5 RESULTS

Based on the observation, it was noticed all the three groups have different pattern respectively. Though all of these groups did worked and complete the problem-solving task; they have interacted differently. For instance, the Yellow group did not engage in epistemic talk during the first round. They spent their first round mostly on silent reading. As such, to depict the entire pattern, the groups’ conversations were coded and categorized according to the types of talks namely; epistemic, metacognitive and off-task talks. The following tables (Table 3, 4, 5, 6, 7 and 8) show the findings;

5.1 Orange group

Table 3. Orange group’s first round discussion

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<thead>
<tr>
<th>Time (min)</th>
<th>Epistemic</th>
<th>Metacognitive</th>
<th>Off-task</th>
<th>Notes</th>
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Table 4. Orange group’s second round discussion

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From Table 3 and 4, it could be seen that the Orange group has equal coverage of epistemic and metacognitive talk in both first and second rounds of their group discussions.
### 5.2 Yellow group

*Table 5. Yellow group’s first round discussion*

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Table 6. Yellow group’s second round discussion

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<th>Time (Min)</th>
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</table>

The Yellow group did not have any deep discussion during the first round (Table 5). They just spent mostly in reading articles. Most of their metacognitive and epistemic talk were condensed during their second round of their group discussion (Table 6).
5.3 Blue group

Table 7. Blue group’s first round discussion

<table>
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<tr>
<th>Time(Min)</th>
<th>Epistemic</th>
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Table 8. Blue group’s second round discussion

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Table 7 and 8 show the distribution of the Blue group engaged in the types of talks in both rounds respectively. It could be seen that the Blue group had completed their first round before the allocated time.
**Findings**

From the findings, it could be noticed that there are some variation in the conversational pattern that took place in all three groups respectively. Though every group has completed the task by the end of the session, their ways of working were all different. Based on three types of ‘talks’ that have been distinguished, the ‘epistemic talk’ is when the group members purely discuss the problem and try to co-construct the possible solutions for that problem. On the other hand, the metacognitive talk referred to conversations about the task. The metacognitive talk is vital for group members to find solution and mutually agreed way to represent their final product, which is the product of their ‘epistemic talk’. This finding correlates with the previous studies (Fischer et al., 2002; Weinberger, 2003; Weinberger, Ertl, Fischer, & Mandl, 2005), where the researchers have had studied the role of epistemic and social scripts in various collaborative learning contexts.

In this research, though all three groups were not explicitly received instructions on these types of scripts, the conversations of all three groups exhibited the presence of, especially the epistemic and metacognitive talks. It is observed in the conversation of all three groups predominantly consist of both epistemic and metacognitive talks. This is because as adult-learners, all group members could regulate their learning well compared to children as there are existing studies on this (Veenman, Hout-Wolters, & Afflerbach 2006; Whitebread et al., 2009). Also, adult learners could be aware of the importance for the groups to solve the given problem, and complete their task while spend very little time doing off-task activities (Johnson & Johnson, 1998). Though the instances of on-task talks (epistemic and metacognitive) are relatively higher than the off-task talk, but there is a difference between the amount of both epistemic and metacognitive talks respectively. This is regarded as
something valuable to be reflected upon, and could be relevant to further investigate the interaction for successful collaboration.

In order to get a better perspective, knowing the exact amount of each talks would help. However, counting the type of talks was rather complicated and tricky. Therefore, I decided to use a simple method whereby, for every five minutes, the type of talks was noted and marked as *instances* in the respective column (as presented in Table 3, 4, 5, 6, 7 and 8). The sum of instances was then tabulated in table 6, and represented in figure 4. From the findings, it could be said that all three groups have had balanced coverage of both epistemic and metacognitive talks. All three groups completed their assigned task by the end of the session. Based on the categorization, all three groups exhibited dissimilarity in terms of the epistemic, metacognitive and off-task talk ratios. The Blue group has the highest instances for epistemic talk, which means they have had engaged in epistemic talk the most, compared to the rest of the groups. The Orange group has the highest instances of the metacognitive talk, but the Blue group has the least metacognitive talk instances. In other word, the Blue group has talked very little about the task, and on how to complete their given task.

*Table 9. Instances of talks according to the identified categories*

<table>
<thead>
<tr>
<th>Talks</th>
<th>Number of instances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orange</td>
</tr>
<tr>
<td>Epistemic</td>
<td>11</td>
</tr>
<tr>
<td>Metacognitive</td>
<td>31</td>
</tr>
<tr>
<td>Off Task</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 9 displays the amount of instances of talks by all three groups respectively. For better illustration of the distribution, they were represented as Figure 4.
Figure 4. Instances of talks according to the identified categories.

From here (Figure 4), it could be concluded that though all three groups had worked and completed the task, there is a difference in the conversation, which presumably have had shaped the interaction within each groups differently. As the main of this research is to study the ‘particular way of interaction’ that promotes successful collaboration, I now further zoomed into the epistemic talk.
5.4 Thought-bounces during epistemic talk

From the observation, an interesting feature that is prevalent in all of the three groups’ conversation was found. When group members discuss, they often think aloud, and share their thoughts to the rest of the members. There were several instances where the person who is thinking aloud could reach a point where they could not further develop their thinking, and they tend to ‘bounce’ their thinking to another member of their group to continue the thinking process. I named this distinctive feature that occurred, especially in the epistemic talk, as the thought-bounce.

Based on the overall observation, thought-bounces sighted in all epistemic, metacognitive and off-task talks. This is because bouncing of ideas are normal and not something new but often happens in our everyday daily conversation. I find this rather interesting to see this occurring in the epistemic talks and new ideas get improvise and emerge. The epistemic talk is the part when group members actually talk about the problem and give all possible solutions based on their reasoning abilities. Having said that, as my second research question focusing on the emergence of new ideas during collaborative learning, thus my reason for zooming in the epistemic talk of each group. Counting the number of thought-bounces was rather tricky. However, I have identified a way of which the instances of thought-bounces could be determined. Meaning to say, I marked the thought-bounce instances, (as it is noticed) for every five minute of each groups’ epistemic talk.

In the epistemic talk of all three groups, there were instances thought-bounces, but amount was not the same (Table 7). The Orange group tend to have the highest instances of thought-bounces, followed by the Yellow group. The Blue group had a least. Though Blue group has the highest count on epistemic talk, but they had the least thought-bounces among all these groups. The members of the Blue group did talk about a variety of issues regarding the task, but had very little negotiations and improvisations of other’s idea. The members of
the Blue group were mostly sharing their own ideas respectively, and did not attempt to accept, further magnifying, and bouncing ideas to the rest.

*Table 10. Thought-bounces instances during Epistemic talk*

<table>
<thead>
<tr>
<th>Groups</th>
<th>Epistemic Talk</th>
<th>Thought-bounce instances during the Epistemic talk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Yellow</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Blue</td>
<td>16</td>
<td>6</td>
</tr>
</tbody>
</table>

Though the Blue group have had the most epistemic talk (Table 10), their ideas were not co-constructed collaboratively. The Orange group, on the other hand, have had co-constructed their ideas collaboratively since they have had the most thought-bounces. Hereby, even though the Orange group did not engage in epistemic talk as much as the Blue group, the epistemic decisions and ideas of the Orange group were co-constructed collaboratively. This is because the Orange group’s development of ideas was done by every member in that group, as all of them given or modify the initial idea with their own perceptions.

Also, I believe that, even though the Blue group has the highest instances of epistemic talk, they have less collaboration in constructing those ideas. In other words, the new ideas emerged as the epistemic outcomes in the Blue group were just raw ideas suggested by a particular member of the group, which did not undergo the improvisation and rectification process by other group members. Thus explains the reason for the Blue group to have the highest epistemic talk, but the least thought-bounces instances. Hereby, I postulate that the thought-bounce instances during the epistemic talk could actually determine the degree of collaborative shared knowledge construction.
Several excerpts were drawn from the conversations that depict the thought-bounces instances from each group. As it could be seen here, thought-bounces were clear (e.g. in Orange group) when group members continuously contribute, and support each other’s ideas. Ideas were developed in a smooth flow.

Example 1: Thought-bounces from the Orange group

<table>
<thead>
<tr>
<th>Ann:</th>
<th>I am not judging that, i just saying that the virtual relationship is increasing. So maybe in 20 years, it’s even more like that... even maybe we will have those.... how do you say that in English?... like when you see the image like...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marja: Holograms?</td>
<td></td>
</tr>
<tr>
<td>Ann:</td>
<td>Holograms! Maybe we will be talking to holograms? Interacting with them? Maybe teachers will be holograms?</td>
</tr>
<tr>
<td>Marja: But i think having only one hologram, would be as boring as having just the front of teaching because it doesn't change much and am wondering if now children are needing more and more, and not just children, it's also us, more and more stuff to do at the same time or not at the same paradigm but.. like having stimuli all over.. all around.. coz otherwise its just boring.. and.. having different kind of stuff</td>
<td></td>
</tr>
<tr>
<td>Lee:</td>
<td>Hmm..</td>
</tr>
<tr>
<td>Lee:</td>
<td>Yeah so after 20 years, the population will be.. will be increased and it's very crowded. If you go to school you should spend maybe longer time than now. So sometimes it’s better to stay at home and then to study with some technology. and it can save time, save the money, save the energy.</td>
</tr>
<tr>
<td>Marja: Nice</td>
<td></td>
</tr>
<tr>
<td>Lee:</td>
<td>and you can do more work at home. yeah...and maybe just for the friends, if we want to have face to face meeting, or discuss or get along with friends we should spend longer time on the road, so maybe sometimes its ok we can meet online...(laughter).. to discuss or talking..</td>
</tr>
<tr>
<td>Johnny: So teachers should know how to use this sort of technologies and... and how to connect with students when they are not face to face..</td>
<td></td>
</tr>
</tbody>
</table>

The thought-bounces could be seen when every participant here engage in a conversation, and actually listening to what their peers need to say. The proof of them listening could be seen through the nature how they respond, and improvise other’s ideas.
Example 2: Thought-bounces from the Yellow group

Anna: At least one solution we have about the question is teaching can be flexible. But there’re so many factors that are involved.

Paula: Yeah. I found it was confusing when a solution is tied only to one side, like teachers should be flexible or school should be flexible.

Sarah: Kids should also be something.

Paula: Yeah. Whatever efficient learning is, it won’t work if only one part is trying.

Anna: Yeah, that’s true.

Sarah: So what could be done?

Paula: I’ve got no idea.

Sarah: What is it, the fun learning? Anything?

Paula: A lot, definitely, I think.

David: Well, the reason I think, Finland is successful is that education can’t be separated from the fact that very high social mobility. It’s like, they are all middle class, no extremes.

Paula: Yeah.

David: So, I think it transforms to equal access of information. Because we know that socioeconomic status is a big advocate for success in school. So, regardless of whatever you teach or how you teach it, what it counts or matters is how much money you make at home. So in Finland, because it’s relatively equal, so is education.

Sarah: Yeah.

David: I don’t know if it’s a reason, or yeah, it’s said that in Finland it’s not common to show off and even you earn a lot you don’t show it by buying expensive things or whatever.

Sarah: Well you can see yourself.

Paula: Yeah, and in Russia, it’s like everything is different.

Sarah: Yeah, you have to show off.

Paula: Yes, so...

Sarah: Hmm?

Paula: Yeah, what was I going to say...Well yeah, I guess it just points to equality and understanding in a more or less stable economic situation. Like everyone can find a place to bargain.

Sarah: So our solution could be...make each country like that. (laugh)

Paula: Yes! (laugh)

David: It’s not like making everything Utopia, because we know that’s impossible. But it’s addressing issues that equity outside of the classroom makes equal access and stop hurt other kids.
In Example 2, the similar nature of interaction (thought-bounces) could be seen in the Yellow group whereby, every participant are corresponding on a similar idea at a time, but bouncing and refining it along the way. Listening seems to be important in order for the participants to be able to bounce a particular idea initiated by their friends.

Example 3: Thought-bounces from the Blue group

Felix: Could you write, I am thinking about ecology
Mamat: Ecology?
Felix: Would be important after 20 years
Mamat: Yes.
Felix: How do you think we have these articles important or necessary, how many trees were cut to bring these and this and this (pointing at the articles), and how many/much air could be cleaned by these trees, we are not thinking about these yet.
Mamat: I think so
Felix: Isn’t it the same important the fresh air
Mamat: I think There are recent studies shows that the air is getting more thinner than it used to be, we are just, I mean, we have the most carbon, I mean CO2 been into the air, the layer zone, we have this climate change, I think we did not look at that yet.
Felix: do you think there was one tree or many, how many small plants could be grow by this tree. Now this is not important now, maybe it maybe be important in 20 years, if we destroy now what is important, and we cut more trees and more and more and more. We should be respectful to nature and responsible for doing this paper even.
   Now we just print it and throw it away and we burn it... in the best case.
Lily: You do that? (laugh)
Felix: I am not
Lily: I recycle (laugh)
Felix: Just ideas which came to my mind now
Lily: Just kidding
Felix: because now it is not important later, it might be.
Lily: It is so ... very important to me, for future. If we are discussing about educator’s role after 20 years, nature is more important than, so we can leave
Mamat: Nature out of it
Lily: so we have to think about it more
Mamat: I think that is the ... the knowledge comes in like they should be like I mean, this
awareness, you know, it because just as I said earlier, people do not understand like they don’t, they think knowledge is just something you store, it’s not what you, it is not a process, but it is a process when you understand when is a process, people understand is a process then you have the this innovation, you know innovation comes in that is way ##, we think that ok, we are born, I mean, we are cutting down trees. Then, I think there should be an authority (?) instead of making papers with trees, if the knowledge is passive as being the process, so, there is a way they could make adaptation to how they go about (you know) they set a number of trees that should be cut, they think, so what I am trying to say in a sense, it’s been be a process, you there is you come about having the innovation, then, the innovation brings about, you’re thinking forward, not holding for that opinion, you kill of the trees just for the sake of making the books, the innovations comes (you know) if we do another way instead of holding the way we believe, I don’t know if that make sense.

Felix: Yes
Lily: For you online education is better solution for protecting environment, tree ##
Mamat: Yeah. What I am saying is for us for protect the environment, there is a kind of need of awareness, the awareness is not done without having knowledge, like, if we don’t know, if we just believe that, just having to store your knowledge, I believe that is all, not you know, trying to disseminate what you know to people so what I am saying is, you know, you store the knowledge, but still is a process because is process in a way what you know, you don’t know it when you don’t put it into practice, like I don’t know like to put it you know, if you ### drive your car, you might know it, ohh I can do it, it is like ## I know how to drive it, but in reality you can’t drive it, it is just something or the (leds?) I know you just press this and this, but in reality you can’t do it. so, what I mean it’s a process you make people aware that these are the things you need to do and these are these things that you know, when they notice, then there is this balance, this checking balance, where there is gift of respect to nature, they don’t go beyond to what they have been doing before.

In Example 3, it is also could be seen that being the group with the least thought-bounces, members in the Blue groups did not equally contribute to the group’s epistemic talk, or at least in this particular example, Jesu is not expressing his thoughts. This type of thought-bounces happen was prevalent in the Blue group, as the participants somehow tend to speak and negotiate in pairs rather than in bigger group.
Example 4: Potential moment for thought-bounces but failed

Paula: I’m thinking, I don’t see any problem in this question. I mean, it’s just a question. Like, how does teacher’s role changes over the next twenty years.

Sarah: I’m thinking that I agree. Is it a problem or is it just a normal situation, because everything changes, and, you just have to be prepared, to everything changing.

Anna: Probably I think, that the main point would be, since we cannot predict exactly how the situation would be in 20 years, maybe we can, ah...The main point is education should become more agile, so maybe decision...What we should think of, more adaptable kind of education?

David: Have you guys read the articles?

All: No.

Anna: They are here. Should...

Sarah: Should we have a look?

Anna: Yeah. Of each we have two copies, so we can share.

David: Four articles?

Example 4 is a typical example of which the epistemic talk could have further developed. Anna’s views was not utilised efficiently, and thus the significant instance was wasted due to the fact the absence of thought-bounces.
Example 5: Epistemic talk with no bounces

**Felix:** My father, he is a scientist, and he made his thesis, maybe 15 years ago, 15 not 50, when I was a child I saw his thesis, it was printed by typing machine (VOX typing machine VOX), and every list was of this was important because he could not copy/paste and if I print and something goes wrong and just copy paste and print it again and again. Each phrase that was in his thesis was important because he understood he had not too much space, but now it is easy to make print, to worse it is getting not important anymore. we could type, we could try anything, internet give us the opportunity to share anything what we want. Science is getting not so important as it was before, because I can print everything (Reading the article aloud)
(coming back to normal voice) Discover, if this tree was murdered by two #### (?)

**Lily:** I feel like electronic dust is more important now, more than paper, because we are all the time using like mobile phones, people changes it every year, and it is like a waste a lot of waste now, also I think it is not the solution to keep them in soft environment.

**Felix:** My ideas that I want to reflect, we are talking about role of the teacher and then we can discuss it wider as role of the education and even role of science, it should not be like this, like now, everything could learn... If I want to learn something, I simply go and pay money so and I simply is getting not so valuable as it was before, so education should not be for everyone, if should be proper of your level, proper of your opportunity, about a proper of your skill and knowledge, so science should be more close, now like everyone could type (tape) whatever what he or she wants.

**Mamat:** I think the problem now, it may be a problem that we know the world is changing, like it is not never going to be like it was in the past, it is just something we are just kind moving away from what people tend to do in the industrial age like you know people go #### you work and you know, now like the quality of knowledge society, knowledge of economy.

Example 5 is one of the many instances where learners engage in an epistemic talk without any thought-bounces, and a closer look to this excerpt of conversation could actually depict an interaction that does not flow well and smooth. There were not connections to the ideas discussed, and often the ideas are unrelated. Participants were just throwing in huge amount of ideas, but little improvisation on a particular idea via thought-bounces.
5.5 Factors promoting thought-bounces

To further investigate what actually cause the difference in the thought-bounce instances, I have carried out a simple word analysis. I selected a 30-minute of transcription of the epistemic talk from each group, and identified the top phrases used by the members in each group respectively. The top five phrases were identified and listed as in table 8. All three groups have used various phrases, and these phrases represent the nature of epistemic talks that have taken place in all of the three groups. The Orange group’s top five phrases inform us the possible reason why there were more thought-bounces during the epistemic talk. Based on the top five frequently used phrases, it could be said that the language usage has provided room for thought-bounces to occur. For instance, the phrase ‘what kind of skills’ has shown the highest occurrences and, the phrase itself is interrogative in nature. This interrogative nature could actually illicit personal opinions from every other members in the Orange. In other words, the group members are reciprocally providing a platform to contribute, and eventually improvise new ideas collaboratively. Besides that, “does the teacher need” is another phrase that could have acted as a catalyst for the thought-bounces to occur. Here again, the interrogative nature of the phrase “does the teacher need” could enable other members to share their thoughts to the subject matter.
Table 11. Top five phrases containing 4 words during 30-minutes of epistemic talk

<table>
<thead>
<tr>
<th>Groups</th>
<th>Top five phrases containing 4 words</th>
<th>Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>“what kind of skills”</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>“the teacher needs to”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“the problem is that”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“does the teacher need”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“maybe just for the”</td>
<td>3</td>
</tr>
<tr>
<td>Yellow</td>
<td>“you don’t have to”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“but you have to”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“I don’t know if”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“I don’t know what”</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>“about problem solving skills”</td>
<td>2</td>
</tr>
<tr>
<td>Blue</td>
<td>“and more and more”</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>“if you want to”</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>“grow by this tree”</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>“small plants could be”</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>“more trees and more”</td>
<td>2</td>
</tr>
</tbody>
</table>

The Yellow group on the other hand, tend to exhibit lesser thought-bounces instances compared to the Orange group, but more than the Blue group. Based on the word analysis, it could be said that the Yellow group tend to be rather uncertain about their ideas. The uncertainty during the discussion could be seen from some the top five phrases (e.g.: “I don’t know”, identified within the 30-minutes of epistemic talk. On the other hand, the Blue group members engaged in a very informative discussion as it can be seen from the highest epistemic instances compared to both Orange and Yellow groups (Table 7). However through the word/phrase analysis, there was no interrogation among the group members sighted, or at least not as frequent as the Orange and Yellow groups.

In addition to that, there were significant amount of idea-lost has been sighted in the Blue group as discussion proceeded. This is because the group members of the Blue group
members did not utilise, and further develop the new thoughts expressed by their peers respectively. In other words, there were no thought-bounces noticed. This happened most likely because the Blue group members asked less opinions and suggestions from their group mates, which was not the case in the Orange group. As noted before, interrogative phrases like “what kind of skills” and “does the teacher need” in the Orange group further supports the previous assertions that I have made in regards to thought-bounces.

Another phrase analysis was carried out to further understand the thought-bounces instances. This time around, analysis was carried out by analysing shorter phrases. At this point, I would like to rationalised the intention for halting the analysis at the shortest phrases (at least consisting two words), as analysing single words might not depict the contextual meaning during the conversation. The top short phrases used by all groups respectively were identified in Table 12.

Table 12. Top short phrases/word used during the 30-minutes epistemic talk

<table>
<thead>
<tr>
<th>Top short phrases/word used during the 30-min epistemic talk</th>
<th>Frequency in each group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ORANGE</td>
</tr>
<tr>
<td>“I think”</td>
<td>30</td>
</tr>
<tr>
<td>“I don’t know”</td>
<td>-</td>
</tr>
<tr>
<td>“I don't think”</td>
<td>4</td>
</tr>
<tr>
<td>“should be”</td>
<td>-</td>
</tr>
<tr>
<td>“would be”</td>
<td>11</td>
</tr>
<tr>
<td>“maybe”</td>
<td>24</td>
</tr>
</tbody>
</table>

It could be drawn that the frequencies of phrases most uttered somehow correlated to the amount of thought-bounce instances occurred in each of these groups. For instance, the phrases “I don’t know” and “I don’t think”, are interesting to be further interpreted. From Table 9, it could be seen that the only group used ‘I don't think’ compared to the rest of the
groups. On the other hand, the other two groups (Yellow group particularly) have used the phrase “I don’t know”, where else this phrase was not noticed from the Orange group within the 30 minutes of epistemic talk sample. Looking back to the whole conversations, it was discovered that when members say “I don't think”, there is most likely to be a reasoning that comes after the phrase “I don’t think” as in ‘I don't think that because etc.’ On the other hand, when participants say “I don’t know”, there might not be a further explanation, but the conversation most likely to end there.

![Top phrases](image)

**Figure 5.** Top short phrases used during the 30min epistemic talk.

Another significant occurrence that appeared in the Orange group is the phrase “I think” and the word “maybe” (Figure 5). The phrase “I think” shows that the participants in the Orange group had shared their thinking the most, where else the highest utterance (Figure 5) of the word ‘maybe’ further proofs that they were not certain of their epistemic reasoning. This less-dogmatic nature of the Orange group members towards their views could be a reason for the most thought-bounces in this group compared to the rest two. In short, even the use of short phrases could shape the overall conversation, and interaction could be intriguing indeed. Here, I postulate that the use of language during group work, could actually influence the ‘collaborative interactive’ as proposed by Dillenbourg (1999).
6 CONCLUSIONS AND DISCUSSION

Based on the findings, it could be concluded that groups that work collaboratively indeed have a particular way of interaction as postulated by Dillenbourg (1999). And for a successful collaborative to occur, *thought-bounces* could be viewed as the distinctive feature that was identified when participants co-create new ideas together. I would now further discuss on the relevance of my findings, and how well the findings have answered the three research questions (RQs) that was constructed at the beginning of this study.

**RQ1: What is the ‘particular way of interaction’ that promotes successful collaboration?**

All three groups’ conversation consist three categories namely ‘epistemic’, ‘metacognitive’ and ‘off-task’. Even though all participants were not given any overt instructions on these three types of talks, all the three groups’ conversation had all these three elements during their conversation. I would say that whenever learners come together to work on a particular task, their conversation will definitely consist of these three elements namely; epistemic, metacognitive, and off-task talks. However, the ratio between all the three elements will determine how well the group has progressed in achieving their socially-agreed goals. Here again, I believe the distinctive feature that present during the group conversation, especially during the epistemic talk, determine whether the emerging new ideas are constructed collaboratively. The discovery of the distinctive feature answers my second research question.
RQ2: What is the distinctive feature of the ‘particular way of interaction’ in which new ideas constructed collaboratively?

From the data of this research, it was observed that new ideas emerged during the epistemic talk. However, mere epistemic talk does not necessarily guarantee group members to co-construct ideas collaboratively. Based on the results found from the conversation pattern, it is known that new ideas are collaboratively constructed during epistemic talk when there are instances of thought-bounces. This *bouncing-of-thoughts* is the distinctive feature of the conversational pattern that was identified when all group members create new ideas collaboratively. The number of thought-bounce instances differs in each group respectively, though all groups have had successfully completed the task. Thought-bounces are prevalent in the group that has use less-definite modal verbs and interrogate other group members to elicit each other’s thinking. When group members are less-dogmatic about their views, there are more tendencies for the rest of the group members to improvise their idea. This means group members are constantly (re)constructing knowledge (Fischer et al., 2002; Weinberger, 2003; Weinberger, Ertl, Fischer, & Mandl, 2005).

It is also noted that the improvisation of ideas through thought-bounces, could only occur when group members permit their ideas to be changed; take effort to change other’s ideas during their group interaction. When this happens, there are more likely for thought-bounces to occur with eventually could ensure the co-creation of ideas in the group. As it has been mentioned earlier, the literature on collaborative learning has been advocating that the success of collaborative learning is when knowledge been co-created. It also mentioned by the literature (Dede, 2010; Dillenbourg, 1999), that a particular type of interaction in needed for the co-creation of knowledge to happen. In regards to this notion, it is discovered that the thought-bounces instances during the epistemic talk could actually enable the co-creation of
new ideas. This, I would say, could be regarded as one of the distinctive feature of ‘the particular way of interaction’ in which new ideas co-created collaboratively.

The concept of thought-bounce during the epistemic talk seems to be beneficial for co-creation of ideas. This is because, if a particular working group that is striving to seek new solutions for future problems, could ensure that ideas get improvised while they are being bounced from one person to another within the group. The basic nature of thought-bounce is when everyone in a group shares their views and improvise the existing idea, based on their personal expertise and knowledge. In regards to this, I would like to draw attention to some of the previous scholarly assertions on collaborative learning, like Webb & Farivar (1999) for instance, claimed that learners may acquire knowledge as a result of being exposed to various perspectives and the need to refine their own point of view. The thought-bounce instances during epistemic talk could be regarding as one of the particular way of interaction which was mentioned by previous academics. In regards to this, a further comparison done based on the nature of thought-bounces that was identified in this research, to the three intuitive criteria proposed by Dillenbourg as collaborative interaction earlier.
Table 13. Comparing Dillenbourg’s criteria with thought-bounces.

<table>
<thead>
<tr>
<th>The collaborative interaction criteria by Dillenbourg (1999, p.8-9)</th>
<th>Thought-bounces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>interactivity</strong></td>
<td>“...collaborative situation should be quite interactive. The degree of interactivity among peers is not defined by the frequency of interactions, but by the extent to which these interactions influence the peers' cognitive processes.”</td>
</tr>
<tr>
<td><strong>synchronicity</strong></td>
<td>“...doing something together implies rather synchronous communication, while cooperation is often associated with asynchronous communication.”</td>
</tr>
<tr>
<td><strong>negotiability</strong></td>
<td>“A main difference between collaborative interactions and a hierarchical situation is that one partner will not impose his view on the sole basis of his authority, but will - to some extent - argue for his standpoint, justify, negotiate, attempt to convince.”</td>
</tr>
</tbody>
</table>
RQ3. How useful is the distinctive feature of the ‘particular way of interaction’ in establishing the ‘identity of a good collaborator’?

The finding of this research informs us the balance between epistemic, metacognitive and off-task talks is vital when learners collaborate to work on a particular task. In other words, conversations that are overly skewed towards one particular type of talk would not yield the desired collaborative outcomes. Learners should be aware that new ideas predominantly emerge during the epistemic talk. Thus, whenever learners are required to participate in a group mind-shower, they now could deliberately navigate their conversation so they could have sufficient epistemic talks. Depending on the group’s requirement, this conversation regulation could be better done when learners actually aware of the type of conversation that they are engaging at any particular point of time. For instance, when learners realise that their group has been engaging deeply in the epistemic talk, they could initiate the metacognitive talk by discussing the task requirement and their goals, as by doing so they all could be in the same development pace. Reviewing the task requirement every now and then could enable group members to be aware of their task interpretation and goals. Having said that, managing the conversation could be a vital skill that is vital in order to be a good collaborator.

Next, one of the most intriguing findings of this research is the thought-bounce instances, especially during the epistemic talk. As I have mentioned that new ideas predominantly emerge during the epistemic talk, thought-bounces during the epistemic talk was found to be a feature of more collaborative idea co-creation. This postulation was made based on the observation and conversation analysis. It was found, when there are thought-bounce instances during the epistemic talk, learners receive their peers’ thoughts, improvise and bounce it back. For that to happen, all members must be good listeners and everyone’s view should be respected. If anyone disagrees with their fellow group member’s views, he or she should bounce the idea by providing alternatives and reasons for the given alternatives. By doing so,
learners could ensure their interaction to be synchronised, and this eventually lead to more collaborative emergence of new ideas. This correlates to Dillenbourg’s (1999) three criteria defining collaborative interactions namely: ‘interactivity, synchronicity and negotiability’. A further comparison was made in regards to how these criteria support the nature of thought-bounces. As it was described earlier in this research, thought-bounce instances appeared in groups when they interact in a synchronized conversation, and when ideas ‘bounce’ from one person to another, which further supports the notion of ‘synchronicity’.

Furthermore, the criterion ‘negotiability’ could be linked to the use of epistemic modality (Coates, 1987) during the epistemic talk, as less-dogmatic epistemic reasoning, subtle modality in speech, could actually maintain groups’ positive emotions and mood. In regards to this notion, Newton (2013) found that emotions and mood influence creativity. By establishing the ‘negotiability’ criterion, group members could actually negotiate and improvise their initial ideas which eventually lead to the emergence of new ideas. Dillenbourg and Baker (1996) pinpointed that negotiation may only take place if there is room for negotiation. In order words, learners in a group work could only negotiate if there are something can actually be negotiated. Thought-bounces could actually provide the platform for negotiation, and ideas emerged by several thought-bounces most likely to be co-constructed.

Hence, I would say that interaction with decent amount of thought-bounces should be considered for a collaborative knowledge construction, since not all type of interaction could promote successful collaboration. This notion is further supported by Dede (2010) where he claimed the level of interactivity among collaborative members is not determined by the frequency of interactions, but by the expanse to which these interactions could shape members' cognitive processes reciprocally. This could be established by utilizing a particular way of language usage to create the conversation pattern and the distinctive feature as
discovered in this research. For instance, if there is a situation where no thought-bounces occur, a good collaborator would illicit other’s view on a particular the idea initiated. By doing so, I would say that learners are taking up the necessary identity that enables them to better perform in any collaborative group works. Thus, understanding the nature of thought-bounce through a particular way of language use, and manipulating it for the advantage of collaborative interaction should be one of the capitals to be owned by a good collaborator.

Here, referring back to the definition of collaborative learning by Dede (2010) where he defined collaborative learning as a situation where learners interact in a collaborative way. Therefore, understanding the nature of collaborative interaction is vital. This is because as learners with the 21st century learning skills, as Dede mentioned, knowing the language use in order to enact the identity of a good collaborator could be beneficial. Dillenbourg (1999) said that by mindfully creating room, monitoring and regulating a particular type of interaction would eventually increase the probability of the desirable interaction to occur. I would interpret the ‘desirable interaction’ what Dillenbourg meant here is the interaction which promote the successful collaboration, or co-creation of new ideas. This type of productive collaboration that leads to the emergence of new idea is known as the collaborative creativity, and there are several studies on this area (Craft, 2008; Curşeu, 2010; Eteläpelto & Lahti, 2008; John-Steiner, 2000; Moth, 2012; Ordanini & Pasini, 2008).
7 LIMITATIONS, IMPLICATIONS AND FUTURE DIRECTIONS

Process versus product.

Here again, I would like to highlight the overall nature of this research is to investigate, and identify the type of conversation patterns in all these three groups. Once the conversations were identified, I went on to identify the features of each group’s conversation during the time of which new ideas emerge. Therefore, the finding of this research is not to judge the best pattern, or the groups that came out with the most creative ideas. In other words, I would say this research is predominantly focusing on the process, and the type of conversational language used when learners construct new ideas collaboratively. I have drawn significant, and meaningful information from all three groups’ conversations which later used to identify the qualities of which, if possessed by learners, could contribute in constructing ideas collaboratively in any group tasks. The findings of this research could be questionable if it is judged by all three groups’ products. Therefore, further research is needed to investigate the relevance of thought-bounces, and the identity of a good collaborator against the quality of the final product.

Also, this research neglects the participants’ reflection on their participation, and their feedback on the task. In other words, this research neglected participants’ opinion on how they actually developed new ideas and solutions for the problem that they were working on. The reason for this exclusion is due to the fundamental method on which this research was based upon. As an observational study, the research questions were constructed as to study within the predetermined parameters that is to observe, interpret, and make sense on how a collaborative interaction could be. Hence, a further research is needed in regards to understand how the participants feel about the emergence of new idea in their groups respectively. It should be noted that all participants of this research have given their feedback
and reflection on this task during the aquarium session. Since participants’ reflection was not used, or at least not in this research paper, further investigation considering participants’ feedback could provide a more wholesome perspective. However, as I have mentioned earlier, being a mere conversation analysis, attention was just given to the process when participants engaged in group discussion, and thus the reason behind for giving importance to the language used during the conversation.

**Participants English language proficiency and their body language.**

Speaking of the use of language, I am aware that the participants’ English language proficiency could be something to ponder upon. This is because from all twelve of the participants, only one of them speaks English as first language. The rest eleven participants either speak English as second language or as a foreign language. Since this research is solely based upon the language used during conversation, there might be some concerns in regards to the reliability of the use of words, and what actually meant by the speaker. However, it should be noted that all these participants are postgraduate students who have undergone the student selection council and met the international English language criteria. Under such conditions, I strongly presume that the participants’ language proficiency does not affect the outcomes of this research. Even if there are spoken language errors identified, they are insignificant and thus, are null and void. This research excludes the role of body language and nonverbal (Barron, Pea, & Engle, 2013). The para-lingual elements projected by the participants during the group work sessions were neglected. As it could be seen that this research is mainly based on interpreting and making of the interaction via conversation analysis, the participants’ actions and body language during their group task was not taken into considerations.
Hetereogeneous versus homogeneous group.

In addition to that, I believe that there could be more than just the issue of English as second or foreign language. Since this is a socio-culturally heterogeneous group, the issue of cultural diversity could be a factor in the participants’ collaborative work (Pluut & Cursu, 2013). The cultural diversity and heterogeneous group could affect the way of expressing and working. In regards to this, I presume that the individuality and way of speaking of a person would affect the modality of spoken language, collaborative mood, and later the instances of thought-bounces. Having said that, I infer that there could be a variance in the conversation pattern between groups that come together to work for the first time, compared to the conversation pattern of a group of friends who have been working in groups for a longer period of time.

In this case, I would say the data used by Eteläpelto and Lahti (2008) on studying creative collaboration in a long term learning community could give a larger perspective on the conversation pattern, features or even the thought-bounce instances. As Eteläpelto and Lahti’s research based on university students working for duration of three years, a comparison could be made between the conversation patterns during the initial stage when the group just started to work, to the conversation pattern during their final year of studies. Such comparison could be drawn from this study of mine, as the entire group work was just three hours long.

However, I feel the findings from my research was just purely incidental, as I begin my research by questioning Dillenbourg’s claim. I interrogated what Dillenbourg said as a “particular way of interaction” that promotes shared knowledge construction. However, due to time factor, I have limited the scope so that I could stay focus within my predetermined parameters. Hence, I feel my prototype findings, and the terms I coined could be further studied through more variables and conditions. I believe that further research is needed on the
thought-bounce instances and its implication to collaborative creativity and epistemic modality.

Another identified limitation of this study is that the participants from which the data were collected, were all from the same faculty and from the similar field. Therefore, the interaction feature (thought-bounces) during the co-creation of new ideas might, or might not be the same in a group of students from a different faculty of studies. Here, I presume that learners from different disciplinary field might possess different way of interaction and epistemic modality. As this study was done only on students from the humanities background, therefore, the findings of this study might not be relevant for every other group of students from various disciplinary fields. Hence, it might be interesting to further research on collaborative interactions, and the nature of which new ideas emerge within a group of students from various disciplinary backgrounds.

**Implications and future directions**

The main implication of this study is to shed light on other possible ways to conduct research in the area of collaborative learning and collaborative creativity. That is through understanding collaborative interactions via the sociolinguistic lens. Besides opening alternative ways, it is believed that the perspective of this paper could an add-on to the existing studies within the collaborative learning paradigm. It would be also important to mention that this research has open up my personal understanding on collaborative learning and co-creation of new ideas. However, this paper is only the beginning of my research pathway towards creative collaboration paradigm, particularly understanding the dynamics of people co-creating new ideas. Personally, this topic of interest is highly regarded by me, and I firmly believe that further exploration on collaborative creativity would definitely be useful. Hereby, it is believed that the implications of a continual investigation along this line, would definitely open up other possible research pathways which definitely be an advantage to not
only business and entrepreneurial settings, but also for the larger education and learning sciences community.

8 VALIDITY, RELIABILITY AND ETHICAL ISSUES

Validity and reliability

The validity and reliability should be taken into consideration in any research, as both of these could determine the research to gain scientific acceptance (Carmines & Zeller, 1979, p. 15). Carmines and Zeller defined validity as the level of the instrument measures what is intended to measure. The validity of the measuring instruments is vital in order for the results of any research to be valid; predominantly in the quantitative research. ‘Reliability’ on the other hand, as defined as Carmines and Zeller, refers to the extent where the measuring procedure would yield consistent results on repeated trials. In this research, there were no quantitative instruments, such as questionnaire, used as a form of data collection. Having said that, this does not mean that validity and reliability are insignificant in qualitative studies. Golafshani (2003, p.597) proclaimed “reliability, validity and triangulation, if they are relevant research concepts, particularly from a qualitative point of view, have to be redefined in order to reflect the multiple ways of establishing truth.”

The validity of this research has been managed through the design of the problem-solving task. As the task was in the form of open-ended question, it enabled the group members to engage in the epistemic talk by thinking aloud, reasoning and justifying their ideas. This open-ended, epistemic talk, at least for the purpose of this research, had provided sufficient data where the collaborative interactions during the co-creation of new ideas could be observed and studied. Billett (1996) provided an account of how situations influence the co-construction of knowledge. Billett discovered that learners' participation-in-goal-oriented
activities is essential to a mutually constructive process of learning. Taking this into consideration, it could be said that the assigned problem-based task that requires substantial epistemic reasoning, is a valid instrument in measuring the main postulations made in this research.

Here, it should be highlighted that during the categorisation and coding of the conversation data, the validity and reliability were taken into consideration. As the main aim of this research is to study the interactive conversation during the co-creation of new ideas, the focused was narrowed down to the epistemic talk, as it was noted that new ideas actually emerge when group members have epistemic discussions. The conversation could have been difficult and challenging to be discerned between ‘epistemic’ and ‘metacognitive’ talks. It should be mentioned here that the categorising and coding was indeed challenging, and time consuming.

However, since the task given to participants were well scripted, it actually helped the groups to proceed with their task idiosyncratically. The figure on the problem-solving stages, and prompting questions along with the task helped participants to complete the task, and that shaped conversation during the group work. This actually lessen the burden of categorising and coding of the transcription. As this research was carried out, and written, there were peer-evaluations whereby those who are using the similar data, acted as opponents when the other person presenting their research respectively. This, somehow enhance the reliability and validity of the categorisation and codes used in this research; since there were ample room provided for feedback, and cooperation among those researcher who were working on the same set of data.

Besides that, as this research is a based on the three intuitive collaborative interactive criteria postulated by Dillenbourg (1999), the exact words of his were quoted. This is to
ensure Dillenbourg’s exact notion, and to avoid any misconceptions. Also, previous researches and literature were quoted and cited, in order to avoid unintentional academic dishonesty, and plagiarism. In short, as Golafshani (2003) said that ‘reliability and validity are conceptualised as trustworthiness, rigor and quality in qualitative paradigm’, any qualitative research is definitely depends on the researcher’s credibility, and this research paper is not an exception.
**Ethical issues**

Any research that deals with human beings is obliged to adhere to the ethical requirements (Wolfensberger, 1967). The National Bioethics Advisory Commission (2001) has proclaimed that protecting the rights and welfare of anyone who volunteer to partake in the data collection is the fundamental principle of any ethical research. The National Bioethics Advisory Commission (p. II) has asserted that many researchers treat human participants who volunteer as mere objects, which definitely an ethical issue that must be rectify. One of the examples of research that was highlighted by The National Bioethics Advisory Commission deals within the medical field such as studies on the testing of new treatments.

However, even though the severity on health and wellbeing mostly in the medical research, there are ethical issues that need to be aware of, and handled well within the social science paradigm. Monette, Sullivan and DeJong (2008) mentioned that ‘informed consent’ is important in social science research. For this research, all participants were aware about the data collection as they were informed in advance. This is to ensure that the participants’ identities are protected. The identities of the participants were not revealed, and they were all referred using pseudonyms. As the data for the purpose of this research were collected in the video recording form, the videos are well kept, and must not broadcasted elsewhere, or in any form.

This research was carried out based on the data collected by the PROMO research team from the Faculty of Education, University of Oulu, Finland. Data collected as video recordings using the LeaForum facilities (LeaForum, 2013). As such, publishing papers without acknowledging the research team is unethical.
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