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# Analyzing My Students' Face-to-Face Philosophy Classroom Discussions: An Exploratory Study

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## Abstract

We will be using content analysis to further the understanding of teaching and learning in two philosophy classroom discussions that adopt the 'community of inquiry' approach. Our sample consisted of 35 high ability students (aged 14) from one class in an all-boy high school in the central part of Singapore. For the purpose of this study, a video recording of the discussions was used. The students' responses were categorized quantitatively, and interrater reliability determined using the percent agreement statistic. The implications and key learning points will also be discussed in this paper.

*Keywords:* Content analysis, community of inquiry, philosophy

## INTRODUCTION

The Philosophy for Children programme aims to make children more reasonable – “the fourth R” – and helps foster empathy and pro-social behaviour. The central practice of the programme is called “community of inquiry”. This practice requires them to “share their own perspectives, listen to one another, read faces, challenge and build on one another’s thinking, look for missing perspectives and reconstruct their own ideas” (IAPC, 2005a). The introduction of the community of inquiry methodology will better equip students with important cognitive skills, such as “creating hypotheses, clarifying their terms, asking for and giving good reasons, offering examples and counter examples, questioning each other’s assumptions, drawing inferences” (IAPC, 2005a).

Children face an unpredictable world and will need to gain critical and creative thinking skills to give them control over their lives and learning. In school, they face the omnipresent danger of

putting aside what they think in order to reproduce what their teachers and peers think. Philosophy offers children the opportunity to move beyond routine thinking and to think critically and creatively. It aims to counter uncritical thinking and helps to strengthen judgement through the use of reasoning.

Philosophy also includes the discipline of ethics and the community of inquiry has proven to be an ideal context for fostering moral development. One way to teach moral judgement is to dictate certain core values. However, values taught didactically may not become internalized. Rather than teaching what is 'right' and 'wrong', the community of inquiry encourages children to think what it is to be reasonable and to make moral judgements; to justify moral viewpoints in reasonable, coherent and informed ways. Moreover, the community of inquiry's commitment to social forms of reasoning and of respect for others helps cultivate the social habits essential for good moral conduct (IAPC, 2005a).

During the implementation of the community of inquiry approach in the school curriculum, there have been many research projects conducted about the philosophy classroom learning environment (IAPC, 2005b). Thus far, local research conducted about using the community of inquiry approach in the context of philosophy has been limited (Lim, 1994a, b) It would be beneficial to use Fisher's checklist of discourse skills (Fisher, 2003) to analyze how local school students communicate and negotiate their ideas as they carry out their inquiry.

## **LITERATURE REVIEW**

The field of content studies has undergone remarkable development and growth. Berelson (1952) characterized content analysis as primarily a descriptive technique. Content studies described, organized and summarized what was occurring in a discussion. Over the years, researchers extended the purpose of content analysis from simple description to inferential hypothesis testing. Borg and Gall (1989) talked about this development in the context of educational research: "Whereas most early studies employing content analysis relied on simple frequency counts of objective variables (e.g., spelling errors), recent studies more often aim at using content analysis to gain insights into complex social and psychological variables." They added the following caveat: "Such studies are much more difficult to carry out than the simple frequency studies and often depend on a researcher's high level of sophistication."

Riffe, Lacy and Fico (1998), Holsti (1969) and Berelson (1952) concurred that the requirements of scientific objectivity dictated that the target variables to be identified and categorized be restricted to manifest ones – variables that reside on the surface of communication and are thus easily observable. However, Bales (1951) rejected mechanist counting of manifest variables in favour of latent variables in interaction analysis. Latent variable analysis involves “the imputation of meaning, ‘the reading in’ of content, the inference that the behavior has functions(s) either by intent or effect” (Bales, 1951).

Critical evaluative processes were some of the latent variables that had been investigated. Marttunen (1998) studied levels of argumentation and counterargumentation in students’ face-to-face and e-mail discussions. He combined the content analysis technique with inferential hypothesis testing and used the message as the unit of analysis. Fahy *et al.* (2000) looked for evidence of critical thinking in computer conference transcripts using the sentence as the unit of analysis. This study was entirely descriptive and displayed satisfactory interrater reliability.

In Marttunen’s study (1998), 11 university students had to write at least three e-mail messages a week for eight weeks. The remaining two weeks were set aside to give the students the chance to write supplementary e-mail messages in cases where they had not written all the messages required in time. If he had used the sentence instead of the message as the unit of analysis, the total number of cases would have been very much larger. This reveals a disadvantage of using the sentence unit. The number of cases produced by the sentence unit may be too large and therefore unmanageable.

The percent agreement statistic is one way of reporting interrater reliability. A formula for calculating this has been provided by Holsti (1969). Capozzoli, McSweeney and Sinha (1999) highlighted that the percent agreement statistic, if it was not obtained after discussion between coders, did not account for chance agreement among raters. Cohen (1960) offered a chance-corrected measure of interrater reliability which assumed two raters,  $n$  cases, and  $m$  mutually exclusive and exhaustive categories. However, Potter and Levine-Donnerstein (1999) argued that “Cohen’s kappa” ( $k$ ) was overly conservative, especially with content analysis tools and instruments which contained many categories, thereby causing chance agreement to be negligible. Hagelin (1999) stressed that “factors such as the number of observations, the number of categories, and the distribution of the data influence the kappa values in such a way as to make interrater agreement difficult to interpret.”

## **RESEARCH OBJECTIVES**

- (i) To assess the extent of student participation in two face-to-face discussions in a philosophy secondary classroom,
- (ii) To assess the extent of building ideas together in the two philosophy classroom discussions using content analysis, and
- (iii) To suggest strategies to address the problems that exist in the philosophy classroom.

## **SAMPLE**

The sample consisted of 35 high ability students (aged 14) from one class in an all-boy high school in the central part of Singapore. They were taught Philosophy throughout the year for 33 weeks and had previously studied the subject for one year. One period (one hour) was allocated per week for philosophy. The expected learning outcomes are:

- Demonstrate open-mindedness and objectivity together with the various skills and attitudes of critical appraisal,
- Be able to think critically about the questions asked and how they relate to their own life and the world around them,
- Assimilate, understand and demonstrate respect for the ideas of others,
- Recognize and critique arguments,
- Construct rational, sound and persuasive arguments,
- Communicate ideas with clarity and precision,
- Analyze and comprehend complex passages, and
- Formulate and articulate interesting and well-constructed essays and presentations

## **DISCUSSION TOPICS**

Between weeks 25 and 28, each lesson consisted of two discussions. During the discussions,

facilitation was done by students. The student facilitators could either choose one of the three discussion topics proposed by the teacher or come up with their own discussion topic. The final list of face-to-face discussion topics were:

- Should society be responsible for its least fortunate? (week 25)
- Should businesses be socially responsible? (week 25)
- Should there be equal opportunities for all? (week 26)
- Should we move towards a classless society? (week 26)
- Is war morally justified? (week 27)
- Should we be free to practise any religious practices? (week 27)
- Is polygamy morally justified? (week 28)
- Should euthanasia be legalized? (week 28)

The second, third and fourth topics were proposed by the teacher.

The discussion topics readily evoke different kinds of approaches and views to the issues and divide people into two camps – for and against. Being multi-dimensional in nature, they readily arouse conflicting views among the students, and hence effectively bring about discussion. For the two discussions in the present study, the topics were “Should society be responsible for its least fortunate?” and “Should euthanasia be legalized?” Thus, the two discussions were not from the same lesson.

## **PHILOSOPHY CLASSROOM LEARNING ENVIRONMENT**

### **Getting started**

The lessons were held in a special place in school, i.e. seminar room, for uninterrupted discussions.

### **A starting point for inquiry**

Stimuli were presented to provoke the discussions. The stimuli could be in the form of stories, pictures, artifacts, videos or pop songs, anything that arouses curiosity and is challenging enough to invite reflection and discussion. For the two discussions in the present study, the stimulus for “Should society be responsible for its least fortunate?” was a story and the stimulus for “Should euthanasia be legalized?” was a skit.

### **Community of inquiry**

Each stimulus was followed by a face-to-face discussion of the question or issue. The discussions were oral and real-time in nature. Each member of the class was given the opportunity to express his own opinions and feelings about the question or issue for discussion, and each must listen to others, and consider their points of view and ideas. The central aim of the discussions was to develop the students’ thinking, reasoning and language skills.

### **A suitable sense of closure**

The teacher summarized the development of ideas after each discussion, and provided feedback and comments about the discussion. Examples of questions to aid feedback and comment included ‘Did we have a good discussion?’, ‘Did we try to answer the question?’, ‘Did we explain our ideas clearly?’ and ‘Did we listen to each other well?’

## **STUDENT-LED WHOLE-CLASS FACILITATION**

Facilitation by students who took part in the discussions was in face-to-face mode. There were three to five student facilitators for each discussion. Like the teacher, the student facilitator’s task was to lead the discussion through positive questioning in a philosophical direction, with the aim of progress towards truth. The function of the student facilitator was not just to make initial statements, introduce the problem or issue and ask for responses, but more importantly, to ask open-ended questions that were genuine invitations to inquiry and follow “a pattern, a

progression of follow-through questions that probe reasons and assumptions and which take the enquiry further” (Fisher, 2003). The eventual aim was that such questioning in time become internalized and come to be practised by them in daily life.

## **PREPARATION BY TEACHER**

A preparatory lesson was conducted in which two groups of student facilitators were randomly chosen to lead mock discussions of 15 minutes each, and the do’s and don’ts of facilitation highlighted by the teacher. The discussion topics were given impromptu and each group was given five minutes to prepare a list of guiding questions. Some of the do’s and don’ts highlighted included the correct body language when facilitating, not crowding around and blocking the participants’ view of the whiteboard, and not talking to each other when a fellow facilitator is speaking. Higher order thinking questions, from both the facilitators and the participants, were also highlighted and commended by the teacher.

## **APPROACH OF STUDY**

The study was descriptive in nature. Drawing on Speech-Act theory (Austin, 1962), we used the illocutionary act as the unit of analysis. We used the illocutionary unit instead of the message unit because the procedure of using the former overcomes the problem of suggesting that boundaries of the message can be equated with a single communicative act (Howell-Richardson and Mellar, 1996). In other words, a message does not necessarily involve one communicative act; it may consist of two or more communicative acts. We would not be able to analyze such a message in terms of multiple units if we used the message as the unit of analysis.

We analyzed the classroom discussions by applying three items in Fisher’s checklist of discourse skills, namely, extending, countering and reasoning (Fisher, 2003). The three items contains sub-categories which are not mutually exclusive. The checklist is divided into four broad, related categories. A more detailed list is found in Appendix 1.

The data of the study were collected during the discussions. The discussions were recorded on video tape and the recording transcribed. A protocol for identifying and categorizing the discourse skills was then created, and interrater reliability determined to check for excessive



infiltration of subjectivity and interpretive bias. In this study, the percent agreement statistic *after discussion* was calculated as a measure of interrater reliability. In other words, the reliability figure was obtained through discussion between coders. The coders were two philosophy graduates who had been trained in identifying the premises and conclusions of arguments. Cohen's kappa (k) was not used as it assumes mutually exclusive categories (Cohen, 1960). However, in Fisher's checklist of discourse skills, extending and reasoning are not mutually exclusive categories. For example, "adding detail" and "justifying" might both involve giving evidence.

## **FINDINGS AND DISCUSSIONS**

### **What is the extent of student participation?**

We observed that not all students took part in the discussions. For the discussion "Should society be responsible for its least fortunate?", 11 out of 33 participants spoke up for a total of 20 times. For the discussion on euthanasia, 15 out of 35 participants spoke up for a total of 20 times.

### **What is the extent of building ideas together?**

Tables 1 and 2 show the discourse skills we were identifying, their sub-categories and the actual usage.

	Discourse skill	Frequency
	Extending	20
1	developing the discussion	7
2	adding detail	9
3	translating	4
	Countering	10
4	raising objections	6
5	qualifying	2
6	self-maintaining	2
	Reasoning	20
7	explaining	1
8	justifying	12
9	comparing	0
10	hypothesizing	6
11	generalizing	1
	Total	50

Table 1. Summary of sub-categories of discourse skills and their usage for the discussion “Should society be responsible for its least fortunate?”

	Discourse skill	Frequency
	Extending	19
1	developing the discussion	7
2	adding detail	5
3	translating	7
	Countering	8
4	raising objections	6
5	qualifying	2
6	self-maintaining	0
	Reasoning	16
7	explaining	2
8	justifying	12
9	comparing	0
10	hypothesizing	2
11	generalizing	0
	Total	43

Table 2. Summary of sub-categories of discourse skills and their usage for the discussion “Should euthanasia be legalized?”

From the summaries listed in Tables 1 and 2, we notice that the main bulk was the students’ contribution in the form of “justifying” (24 times). “Developing the discussion”, “adding detail”, “raising objections” and “translating” also took place frequently (14, 14, 12 and 11 times respectively). “Comparing”, “generalizing”, and “qualifying” occurred rarely (0, 1 and 4 times

respectively). “Self-maintaining” only occurred twice. This is a good sign as it is an indication that the students had internalized the practice of giving judgements and opinions with reason.

Figures 1 and 3 show parts of the classroom discussions. We can redraw Figures 1 and 3 as trees to show the sub-categories of the discourse skills involved and the building of ideas. Figures 2 and 4 show this new view.

- Student G:* Actually we have to see this on a case-by-case basis. If we want to help the less fortunate, you look at the G8 which was just held to help Africa. Because the top five refugee countries, the people that run away from countries, are all in Africa. So if you want to help them, maybe you be reasonable, maybe you have to consider consequences also, like if you donate to NKF, where the money goes to. But I also do not believe that, I side to the one way – we are not responsible for these people. (*Justifying, adding detail*)
- Student H:* So the point he is trying to say I think is that there are no absolutes. So you can't say I give to this but say whether he will use it for what. Because the idea is not to give them to support their whole life but for their short term goal, to kick-start their future, like they start building up their own lives again. (*Raising objections*)
- Facilitator B:* So [Student H] explained that NKF is only an exception from all those associations in Singapore. (*Translating*)

Figure 1. A part of the classroom discussion  
“Should society be responsible for its least fortunate?”

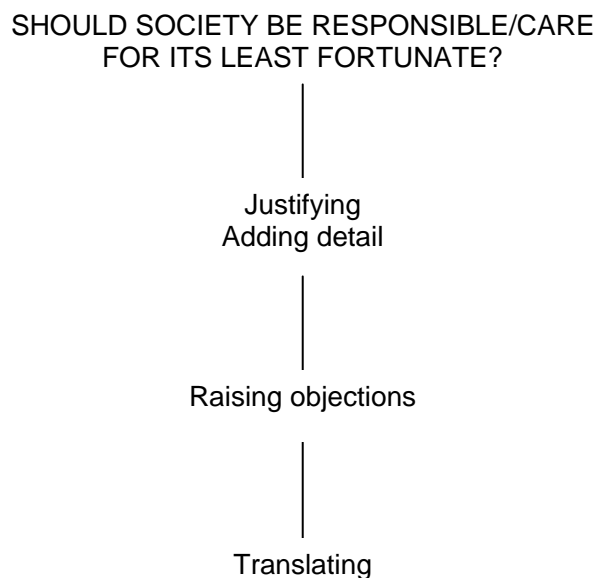


Figure 2. Building of ideas in the discussion  
“Should society be responsible for its least fortunate?”

*Student A:* No, because even if the patient is suffering and he wants to end his life in this way, he must think of the people around him or his family, the family that will be suffering. You must know that the parents take a lot of time and care, money, to raise the child. If the child wants to just die like that, he is disappointing his parents. (*Justifying, adding detail*)

*Facilitator A:* So essentially what you are saying is that by killing the patient, you are actually putting the burden, you are not alleviating the burden of the family. (*Translating*)

*Student A:* Yeah.

*Student B:* I think that first we have to ask ourselves, “What is the use of giving this patient the life?” So ask yourself, “What is the purpose of life?” I think for me the purpose of life is to affect others in a positive way – to live life. If you are just seeking out the bed and you are just existing, what is the use? Is your purpose of life being achieved? So that’s why I think that euthanasia should be allowed. (*Justifying*)

*Facilitator A:* So in essence, you are talking about the quality of life. So does anyone else have... (*Translating*)

*Student C:* I would like to rebut [Student A’s] point. Because he said that by killing the patient you may be causing the parents greater pain, but have you ever thought that if the parents see the patient, their child, suffering a lot, then they would have more pain? So by killing this patient, maybe the parents would feel, believe, that the child is now happy somewhere else. (*Raising objections*)

*Facilitator A:* So in essence, you are talking about catharsis. Catharsis is the removal of the burden, the emotional burden, the financial burden, etc. So does anyone else have a counterargument? (*Translating*)

Figure 3. A part of the classroom discussion  
“Should euthanasia be legalized?”

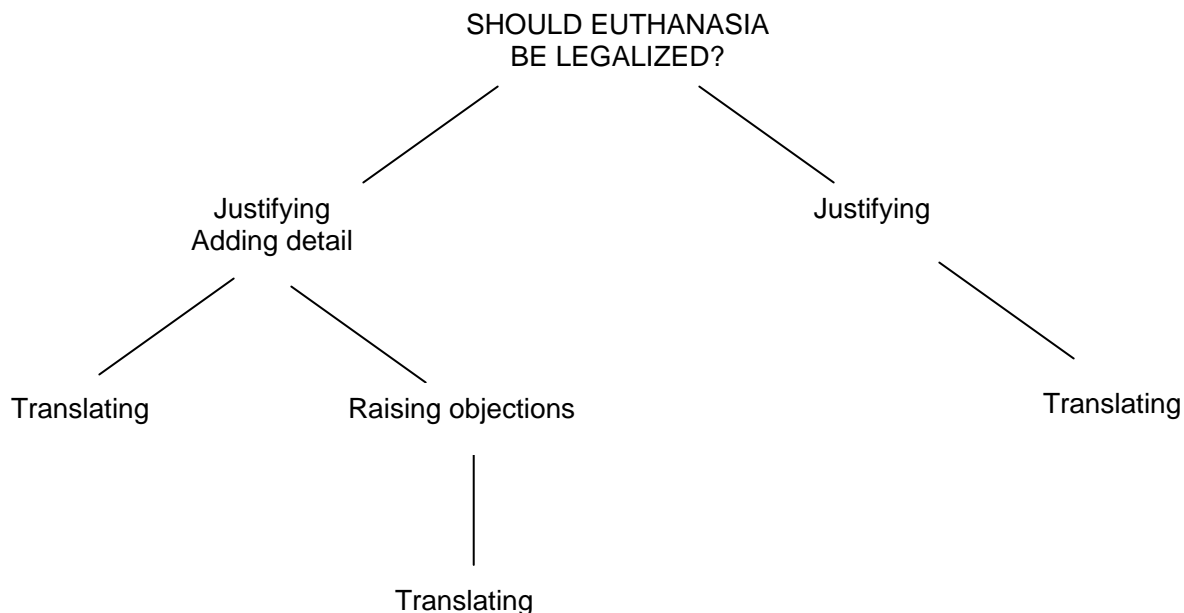


Figure 4. Building of ideas in the discussion  
“Should euthanasia be legalized?”

From Figures 2 and 4, we observe that students were building on others' ideas.

Generally, the extent of building ideas together was reflected in the fact that the students used the discourse skills of extending, countering and reasoning actively during the two discussions.

### **Interrater reliability**

Interrater reliability is presented in Table 3. The percent agreement statistic *after discussion* was calculated as a measure of interrater reliability. In other words, the reliability figure was obtained through discussion between coders.

No. of coding decisions upon which the two coders agree (m)	No. of coding decisions made by rater 1 (n <sub>1</sub> )	No. of coding decisions made by rater 2 (n <sub>2</sub> )	Coefficient of reliability C.R. (2m / n <sub>1</sub> + n <sub>2</sub> )	Percent agreement statistic <i>after discussion</i>
93	111	95	0.90	90%

Table 3. Interrater reliability (percent agreement statistic)

In Table 3, the interrater reliability was 90%. Riffe, Lacy and Fico (1998) have indicated that “a minimum level of 80% is usually the standard” in communication research.

### **LIMITATIONS OF THE STUDY**

The study only focused on two discussions in a class of high ability students from an all-boy school in the central part of Singapore. Hence, the findings of this study cannot be generalized to cover all community of inquiry classrooms, because of the small sample size. Differences in school ethos, traditions and environment would need to be taken into account.

### **IMPLICATIONS AND LEARNING POINTS**

This study set out to analyze two philosophy classroom discussions in an all-boy high school. Analysis tools that are efficient, objective, reliable and practical are a necessary prerequisite to

the empirical investigation of classroom discussions. In this study, we used Fisher's checklist of discourse skills. We also attempted to ask what the extents of student participation and building ideas together were.

To provide more opportunities for participation, one suggestion is to set up online forums where the students can extend their discussion beyond curriculum hours. Moreover, the teacher has more time to analyze the arguments on the online forums and offer the students considered feedback (Marttunen, 1998).

Evidence in the form of the discourse skills of extending, countering and reasoning indicated the students' active building of ideas in the learning process. All in all, the evidence shows that it is possible to achieve a high degree of idea construction in a community of inquiry. In order to enhance the building of ideas, the students should be encouraged to counter by qualifying, to compare and contrast, to draw analogies and to form generalizations. One way is to develop a semi-structured online forum platform, where the students choose the type of contribution they are making from a limited set of alternatives (Quek, 2005). For instance, the students post a message after selecting, among other things, the labels Qualification, Comparison or Generalization. This encourages them to make use of such sub-categories of discourse skills which, hopefully, would in turn be used in the face-to-face classroom. However, during the online forum discussions, the students should also check the reliability of their analogies and generalizations. A reliability checklist should be used to check for these.

It was observed that some students put up their hands to speak when someone else was speaking. A useful method to help the students focus on what is being said is to lay down the rule that no one puts up his hand until someone finishes what he wants to say.

It was also observed that although there were three to five student facilitators for the discussion, only one of them was actively doing his job. An effective method for discouraging dominant facilitators would be to give each student of the facilitator group a turn to facilitate. When they use up the time allocated to them, they have to keep quiet.

Future areas of research include extending the reliability of the coding scheme from interrater reliability (two or coders agreeing with each other) to replicability (the ability of multiple and distinct groups of researchers to employ the coding scheme reliably). In future analyses, we can also examine the extent and quality of student-led facilitation, and explore whether there was any

development in the students' discourse skills and facilitation in the face-to-face community of inquiry.

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## Fisher's checklist of discourse skills (Fisher, 2003)

1. *Participation*
  - number of comments
  - response to teacher
  - response to another student
  - extended utterances
  - non-extended utterances
  - response to agenda (building on the discussion)
  - unclassified response (non-specific response)
2. *Organizing*
  - identifying task (e.g. problem/question to be discussed)
  - planning (e.g. organizing discussion)
  - directing (e.g. asking for responses)
  - concluding (e.g. summing up, last words)
3. *Collaborating*
  - active listening (giving serious attention, allowing each speaker to finish)
  - agreeing (specifying with whom/what view you agree with)
  - encouraging (showing verbal or non-verbal responsiveness to others)
  - turn-taking (yielding turns to others)
  - self-correcting (moderating one's views during discussion)
4. *Questioning*
  - asking initial question (identifying a puzzle or problem for discussion)
  - identifying kind of question (is it factual/philosophical/literary, etc?)
  - asking follow-up questions (seeking reasons, clarification, etc.)
  - self-questioning (rhetorical or genuine self-inquiry?)
5. *Initiating*
  - making initial statements (within a stage of the discussion)
  - setting new line of inquiry (introducing new problem or issue)
  - seeking justification (asking for reasons, proof, evidence)
6. *Extending*
  - developing the discussion (building on ideas, making connections)
  - adding detail (giving examples, evidence, instances, etc.)
  - translating (re-phrasing one's own or other's ideas or contributions)
7. *Countering*
  - raising objections (with reason, argument or counter-argument)
  - qualifying (clarifying, drawing distinctions, amending viewpoint)
  - self-maintaining (giving judgement or opinion without reason)
8. *Reasoning*
  - explaining (defining, clarifying, illustrating the meaning of...)
  - justifying (giving supporting reasons or evidence)
  - comparing (comparing or contrasting, drawing an analogy)



hypothesizing (suggesting a theory/explanation/possible consequence, etc.)  
generalizing (arguing from a particular instance to a general rule)

9. *Recounting*

using anecdote (is it relevant? coherent? illustrating a point?)  
paraphrasing (e.g. summarizing a text, event or an idea)  
describing (giving an account of a situation, experience or idea)

10. *Reviewing*

reviewing (analyzing progress of discussion or element of discussion)  
monitoring (checking understanding of one's own or others' contributions)  
evaluating (assessing quality of and contributions to discussion)  
judging (critical judgement of discussion or element of discussion)  
commenting (giving opinion on relevant features of context of discussion)

## REFERENCES

- Austin, J. L. (1962). *How to do things with words*. London: Oxford University Press.
- Bales, R. (1951). *Interaction process analysis*. Cambridge: Addison-Wesley.
- Berelson, B. (1952). *Content analysis in communication research*. Illinois: Free Press.
- Borg, W. & Gall, M. (1989). The Methods and Tools of Observational Research. In Borg, W. & Gall, M. (Eds.), *Educational Research: An Introduction*. London: Longman.
- Capozzoli, M., McSweeney, L. & Sinha, D. (1999). Beyond kappa: A review of interrater agreement measures. *The Canadian Journal of Statistics*, 27, 3-23.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46.
- Fahy, P. J., Crawford, G., Ally, M., Cookson, P., Kelly, V. & Prosser, F. (2000). The development and testing of a tool for analysis of computer mediated conferencing transcripts. *Alberta Journal of Educational Research*, 46, 85-88.
- Fisher, R. (2003). *Teaching thinking*. London: Continuum.
- Holsti, O. (1969). *Content analysis for the social sciences and humanities*. Don Mills: Addison-Wesley.
- Howell-Richardson, C. & Mellar, H. (1996). A methodology for the analysis of patterns of participation within computer mediated communication courses. *Instructional Science*, 24, 47-69.
- Institute for the Advancement for Philosophy for Children (IAPC) (2005a). What is 'Philosophy for Children'? [on-line] Available: <http://cehs.montclair.edu/academic/iapc/whatis.shtml>
- Institute for the Advancement for Philosophy for Children (IAPC) (2005b). Research in Philosophy for Children. [on-line] Available: <http://cehs.montclair.edu/academic/iapc/research.shtml>
- Lim, T. K. (1994a). Formative evaluation of the Philosophy for Children project in Singapore. *Critical and Creative Thinking*, 2, 58-66.
- Lim, T. K. (1994b). The Philosophy for Children project in Singapore. *Thinking*, 11, 33-37.
- Marttunen, M. & Laurinan, L. (1998). Learning of argumentation in face-to-face and e-mail environments. Paper presented at the International Conference on Argumentation, Amsterdam, Netherlands.

Potter, W. & Levine-Donnerstein, D. (1989). Rethinking validity and reliability in content analysis. *Journal of Applied Communication Research*, 27, 258-284.

Quek, C. L. (2005). Pre-service teachers' collaborative project crafting in computer-supported classroom learning environment. Paper presented at AARE 2005: International Educational Research Conference, Sydney, Australia.

Riffe, D., Lacy, S. & Fico, F. (1998). *Analyzing media messages: Quantitative content analysis*. New York: Lawrence Erlbaum Associates.

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