

SPEECH ACTS AND PEER LEARNING IN PRODUCT DEVELOPMENT CASE-STUDY DISCUSSIONS

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Abstract $\frac{3}{4}$ The case-study method of instruction is a powerful skill building exercise for engineers/managers that works best when combined with active learning discussions of the case. Instructor mediation is instrumental in the effectiveness of the learning process and the knowledge integration in the student. This study focuses on one classroom case-study discussion and analyzes the role of the instructor and the peer learning process involved. Utterances of the students and instructors are analyzed according to the speech act theory. Some new types of speech acts classifications have been found necessary and added. The intentions of the speakers and their utterances (illocutionary and locutionary aspects of the speech act) are assessed based on the perlocutionary effect in the context of the classroom. The results are presented and discussed. Inferences drawn from this analysis give insight into the dynamic nature of the interaction in the classroom and the learning process.

Index Terms $\frac{3}{4}$ case-study discussions, peer learning, knowledge integration and speech act theory.

INTRODUCTION

Case-study discussion is an important mode of active learning in many business and engineering classes [4,7,8]. In a product development class at UC Berkeley, cases reflecting real-life situations from organizations and product design teams are analyzed and discussed by the students to gain an understanding of the factors and the parameters involved, the underlying process and the implications of differing strategies and decisions [6]. The case-study method is essentially a skill building exercise for the engineer / manager and it focuses on peer learning through the discussions on the case. The discussion among the students is mediated through a set of thought-provoking questions that aid in the formulation and development of a clear picture of the underlying process of decision-making. During the discussion students argue, debate, take sides, bring up issues and reflect their thoughts on the case. There is a collective reflection that goes on in the discussion. The peer learning process is embedded in this activity of collective reflection. The utterances of the students and the instructor are key to the learning process. The students intend to bring up some issues and aspects of the case that

they feel are important to the point being discussed. The instructor is interested in ensuring that the students surface the relevant issues by fine-tuning the explanations given by the students. The instructor guides this discussion by asking questions and introducing topics for the discussion at different stages. Often, there is a temporal order of these questions and topics introduced. Only after the participants have discussed an issue at length is another topic / question introduced. This is important in the learning process. Consider the activity that goes on within the classroom. There is one speaker at a time and others are listening. The listeners are rational judges in the sense that they rationally evaluate the utterances of the speaker. The instructor may record the points of the argument / explanations on the board. An utterance by one participant could trigger another response (interactional activity). The instructor and the students make utterances; they have intentions in making the utterances, they communicate through these utterances and they perform certain activity in the classroom through these utterances. This suggests that utterances of the discussion participants qualify as *speech acts* and would benefit from an analysis using speech act theories [1-3, 10-13].

During case-study discussions, students bring out different explanations, hypotheses and arguments on the various issues in the case depending on their knowledge and experience. During this process of discussion, they get their explanations / hypotheses evaluated by the instructor and peers and also listen and evaluate other speakers' explanations. This process is crucial in the knowledge integration in the student.

The aim of the present research is to study the dynamic interaction in a classroom case-study discussion on product development and gain insight into the learning process and the role of the instructor in the discussion and the knowledge integration in the student. The role of speech acts in such an analysis is explored.

THEORETICAL IMPLICATIONS

Language is a representation of thought. We use language to communicate our thoughts to others. But language is not just limited to the act of communication of one's thought. We do many more things with language. A lawyer, through the use of language, is able to convince the jury to convict / acquit a suspect in a crime; a salesperson is able to persuade a

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potential customer into making a decision to purchase or sign a contract; and a supervisor uttering “You are fired!” terminates the service of an employee. These are examples to show how the use of language brings about certain effects and change in the environment. Language can be viewed not just as a system of representation but also as a vehicle for all sorts of social activity. Austin [1] and Searle [11] describe language as a form of *verbal activity*. Many linguistic theories study the use of language and its effect. Speech act theory [1-3, 10-13] offers an effective theoretical framework for the functional analysis of language. It is by far the best analytical instrument so far developed in descriptive interpretative pragmatics [14].

The basic theory of speech acts was first outlined by Austin [1] and further extended by Searle [12]. Speech Acts theory is partly explanatory and partly taxonomic. Speech Acts theory takes a holistic view of the utterances and captures the intentions of the speaker, the meaning of the utterance, the attitude of the speaker and the actions that are produced by the utterances. Searle [12] distinguishes three different types of speech acts: an *utterance act*, a *propositional act* and an *illocutionary act*. Later on others have included *perlocutionary acts* to the above types of speech acts. Searle goes on to say that these types of speech acts are not independent and spatio-temporally discrete but mutually interdependent *sub-acts* of the complete speech acts that are performed simultaneously. Bach [2] defines three levels of speech acts; *locutionary act* (the act of saying something), *illocutionary act* (what one does in saying something), and *perlocutionary act* (what one does by saying something).

While most speech act theorists have concentrated on illocutionary acts, there is very little attention paid to perlocutionary acts. Van Eemeren and Grootendorst [14] have extended the speech acts theory and applied it to analyze the resolution of disputes in argumentative discussions. They have dealt with defining perlocutionary aspects in the context of argumentative discussions. Two aspects of use of language in discussions have been differentiated: *communicative* and *interactional* aspects. Communicative aspects of language are expressed in attempts to bring about illocutionary effects and the interactional aspects in attempts to bring about perlocutionary effects.

Many theorists have developed different taxonomies and terminologies. Austin [1] was the first to define and classify speech acts and his classification has *constatives* and *commissives*. He also uses *verdictives* and *expositives*. Searle [12] identified *assertives*, *directives*, *commissives*, *expressives* and *declaratives*. Searle in [12] defines the concept of *illocutionary negation* and differentiates it from *propositional negation*. Bach and Harnish [3] have developed a detailed taxonomy, combining that of Austin [1] and Searle [13], of each type of illocutionary act individuated by the type of attitude expressed. Their

nomenclature of the four broad categories is *constatives*, *directives*, *commissives* and *acknowledgements*.

We use the above broad categories as a basis for our classification but modify it to suit the specific context of classroom discussions. *Acknowledging* in our context is agreeing to another person’s point of view and it amounts to agreeing or accepting. The speaker acknowledging another person’s point of view renders his/her stand committed to that explanation. Hence, acknowledging with a tone of agreeing or accepting is termed *commissive* in this paper. This is consistent with the line of reasoning of Van Eemeren and Grootendorst [14]. On many occasions in our study, the participants narrated an incident or a story. In order to capture this speech act we find it necessary to include a separate classification of *narratives*. There are other instances where the participants expanded on a previously stated explanation or a point of view. We classify these utterances as *expositives*. We did not find the use of *declaratives* during the discussions, consistent with patterns for argumentative discussions. Hence we limit the broad categories of our classification to *constatives*, *directives*, *commissives*, *narratives* and *expositives*.

Van Eemeren and Grootendorst [14] have applied Searle’s taxonomy in understanding the role of speech acts in the resolution of disputes in formal argumentative discussions. They define the illocutionary acts and perlocutionary acts in the context of argumentative discussions and study the practical and normative use of language. In this study, we similarly define the different speech acts used in a case-study discussions, the illocutionary and perlocutionary acts of the students and the instructor in the classroom. We identify the nature and extent to which argumentation takes place in such discussions and the extent to which Van Eemeren and Grootendorst’s analysis and rules are applicable. We also study the types of speech acts that are responsible for the learning and knowledge integration in the student.

CLASSROOM STUDY

The College of Engineering and the Haas School of Business at the University of California at Berkeley and the California College of Arts and Crafts jointly offer a team-taught course on New Product Development [6]. The course includes about 10 cases from organizations and product development teams in the course reader. The 40-50 students in each class are expected to read these cases and come prepared for a classroom discussion.

The present study uses a transcription of the video capture of one such case-study discussion in the classroom. The case discussed is the Microsoft Multimedia Publications case from the Harvard Business School [5].

ANALYSIS OF UTTERANCES

Using the transcription, we identify a total of 110 utterances with 55 utterances from the instructors. Some utterances are

split into multiple utterances to distinguish the different apparent intentions of the speaker. During the case discussion, the instructor records the important points brought out by the students on the whiteboard. These whiteboard recordings are noted and the corresponding utterances are also noted down. These are the actions that take place in the classroom as a result of the utterances. The utterance text is then analyzed with reference to the context and the actions they produce. The speaker is identified and classified as instructor or student. The action that takes place based on this utterance is recorded. The utterance that leads to a point being written on the whiteboard and the text of what is written on the whiteboard is also recorded. The semantic and lexical cues in an utterance that lead to other utterances by other speakers are recorded. These are the interactional perlocutionary effects discussed in the previous section. All these data are recorded on a spreadsheet. Then the intentions of the speakers and the type of speech act are recorded. The type of speech act is analyzed at two levels. The first level indicates the broad category of the speech act as in *constative*, *commissive*, *directive*, *narrative* or *expositive*. The second level describes the speech act in greater detail. The taxonomy used in the second level definition is a detailed one and an extension of the top-level classifications. The extensions used in the second level are inline with those used in Bach [2] and Searle [12]. They provide more insights into the speaker's intentions and the meaning. The explicit performative utterances in the sense used by Austin [1] are marked up where possible and applicable.

RESULTS AND DISCUSSIONS

The total number of students that participated in the discussion by speaking is 25 out of class strength of 35 present on the particular day of discussion. This percentage of participation of 70% is quite high for a class of this size and is mainly attributed to the moderation by the instructor.

Level 1 Speech Act Analysis

Table 1 shows the number of utterances, in order of frequency, by the instructors and students and their classification of the type of speech act at level 1.

TABLE I
LEVEL 1 SPEECH ACT ANALYSIS

| | Instructors | Students |
|--------------|-------------|----------|
| Constatives | 34 | 52 |
| Directives | 13 | 1 |
| Commissives | 9 | 1 |
| Expositive | 5 | 0 |
| Narratives | 2 | 1 |
| Declaratives | 0 | 0 |

Although the students are not restricted from making expositives in a classroom discussion, it turns out that the expositives are used solely by instructors in this case as the instructor expands on the explanations made by students. There are some narratives in the discussion, but no use of declaratives. Declaratives are normally used with the precondition of institutional or social power [13] and the lack of declaratives reflects the egalitarian setting for discussion in the classroom.

The final closing of the discussion utterance by the instructor is a compound utterance and includes *narratives* for the narration of what actually happened in the case, *constatives* for stating of the facts and instructors own judgements and most importantly the closure which ties in all the arguments and points put forth in the discussion.

The instructor uses *directives* throughout the discussion to moderate the discussion, persuade communication, introduce new topics / questions and direct the attention of the participants to a particular issue. Many other non-verbal cues are also used for persuasive communication as directives but are outside the purview of this study. Students consecutively utter constatives in many parts of the discussion and this is done as a result of the non-verbal directives of eye contact and subtle signaling or gestures of the instructor. These are not included in this analysis but we recognize that they do play a role in the moderation of the discussion.

The instructor uses many different types of speech acts (constatives, directives, commissives, expositives and narratives) whereas the students use mostly the constatives and narratives. However, they could use directives which they do in their rational evaluation of other's hypothesis / explanations to request clarification / argumentation and use commissives in their assertion of the point of view taken. Analysis of the intentions of the speakers discussed in subsection "Illocutionary Act Analysis" will provide some insights into this distribution of speech acts.

Level 2 Speech Act Analysis

A second level of classification proposed here uses some extensions to the general speech act classifications of [1-2,12]. The classifications at this second level serve as attribute definitions to the Level 1 classification tags. Table II shows the different classifications / attributes for instructors as well as students. Students in these discussions hypothesize and make out arguments for or against a theory explaining certain facts of the case or provide scenarios for reasoning out a particular choice of a decision. Consequently we differentiate *theorizing* and *hypothesizing*. *Theorizing* refers to a theory or model put forth by a student explaining certain facts or issues of the case. On the other hand *hypothesizing* refers to causal explanations.

Figure 1 shows the distribution of the Level 2 speech act classifications over all of the discussions for the instructor as well as students. Many utterances have been classified with

multiple attributes in Level 2 to capture the essence of the illocutionary force and the propositional meaning.

TABLE II
LEVEL 2 SPEECH ACT CLASSIFICATIONS

| | Instructors | Students |
|---------------|-------------|----------|
| Acknowledging | X | |
| Acceptance | | X |
| Agreeing | | |
| Answer | | X |
| Argument | X | X |
| Clarification | X | X |
| Commenting | X | |
| Consolidation | X | |
| Contemplating | | X |
| Disagreeing | | X |
| Expanding | X | |
| Explanation | X | X |
| Highlighting | | X |
| Hypothesizing | | X |
| Justify | | X |
| Narration | X | X |
| Opinion | | X |
| Provoke | X | |
| Question | X | |
| Reasoning | | X |
| Rephrasing | X | |
| Soliciting | X | |
| Statement | X | X |
| Summarize | X | |
| Support | X | |
| Theorizing | X | X |

Illocutionary Act Analysis

The intentions of the speakers (instructors and students) in the context of the classroom discussion is judged and recorded. The instructor’s intentions are quite different from that of the students. The instructor would like to moderate the discussion, pick up the point of the student and make an argument and rationally evaluate it along with other students. The instructor makes utterances in this regard and the intentions in doing so are evident. The *rephrasing* is worth special mention. The instructor rationally evaluates a student’s explanation, and engages other students involved in the evaluation and the argumentation through the *rephrasing*. These are illocutionary acts of the instructor. Students initially tend to take sides and stick to certain decision options and bring forth their arguments. This is evident in their *commissives*. Later on as the discussion proceeds the students realize that they need to bring up as many explanations to reason the choices of decision-making as possible and hence make contributions towards this. This

is evident in some students who initially took sides and argued about one particular point of view, then later in the discussion brought explanations for other decision choices as well. Moreover, they explicitly mention at the beginning of the utterance that they intend to bring up another reason for a particular decision that indicates their intentions. These are some of the illocutionary acts of the students. Table III and Table IV gives the illocutions and the illocutionary effects for the instructor and student occurrences respectively.

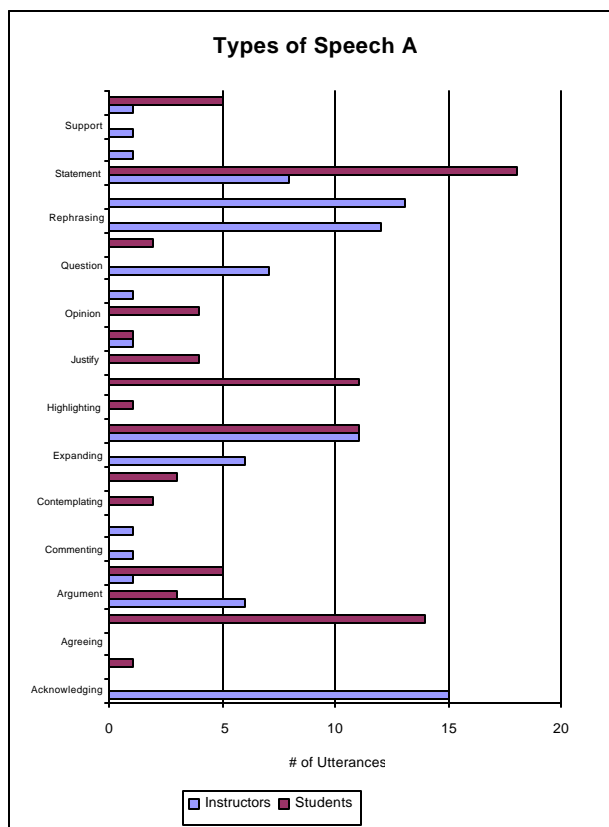


FIGURE 1
DISTRIBUTION OF LEVEL SPEECH ACTS

TABLE III
ILLOCUTIONARY ACTS OF INSTRUCTORS

| Intentions | Illocutions | Illocutionary effects |
|-----------------------------|-------------------|--|
| Initiate discussion | <i>Initiating</i> | Understanding the cue |
| Draw attention to an issue | <i>Requesting</i> | Understanding the request |
| Make a point | <i>Asserting</i> | Understanding the point |
| Joke | <i>Joking</i> | Understanding and appreciating the humor |
| Clarify an issue | <i>Clarifying</i> | Understanding the clarification |
| Change the focus (moderate) | <i>Moderating</i> | Understanding the re-direction of focus |

TABLE IV
ILLOCUTIONARY ACTS OF STUDENTS

| Intentions | Illocutions | Illocutionary effects |
|---|----------------------|--|
| Make a point | <i>Asserting</i> | Understanding the point |
| Justify a claim / position | <i>Justifying</i> | Understanding the justification |
| Hypothesize | <i>Hypothesizing</i> | Understanding the hypothesis |
| Make an explanation | <i>Explaining</i> | Understanding the explanation |
| Draw attention to an issue / aspect of it | <i>Requesting</i> | Understanding the request |
| Judgment / opinion | <i>Judging</i> | |
| Joke | <i>Joking</i> | Understanding and appreciating the humor |

Matching these illocutionary acts with the perlocutionary effects and its occurrence in the classroom determines whether a speaker is successful in his speech act utterance. The next section, *Perlocutionary Act Analysis*, describes and points out some of the perlocutionary acts and effects that are possible in the context of the classroom discussion.

Perlocutionary Act Analysis

Perlocutionary effects are defined as the actions that are likely to take place as a result of a speaker’s utterance. In the context of the classroom discussion however, the perlocutionary effects could be different from what is defined for general language usage. Table V below details some of the possible perlocutionary aspects in the classroom.

TABLE V
PERLOCUTIONARY ACTS IN CLASSROOM DISCUSSIONS

| perlocution | Inherent perlocutionary effect | Consecutive perlocutionary consequence examples |
|---------------|--|---|
| Initiating | Accepting the cue | Make utterances |
| Persuading | Accepting the request | Changing the focus of attention |
| Understanding | Understand the meaning | Utterances reflect this understanding |
| Accepting | Accepting the point | Record the point on the whiteboard |
| Clarification | Note the clarification and correct one’s understanding | Modify the point recorded on the whiteboard if needed |
| Persisting | To continue the conversation | Make an utterance to continue |

The intention of the speaker is conveyed implicitly or explicitly by the utterance. If this intention were perceived by the listener in the right intended spirit it would mean the success of the communication aspect of the utterance. However if the listener gets to perform the intended action, which is defined as the perlocutionary act, the utterance is regarded as completely successful. The perlocutionary acts could be viewed as an indicator of the success of a speaker’s utterance.

OBSERVATIONS AND INFERENCES

There are many observations and inferences that can be made about the nature of the interaction and the peer learning from this analysis of the utterances. The following are some of the observations and inferences that can be drawn from the utterances and their analysis:

- **Nature of interaction:** The total number of utterances of the instructor and the student are almost the same and the distribution of utterances is quite evenly dispersed indicating the *star* nature of interaction. A star nature of interaction is a graphical representation of social networks [15] wherein one person is in the center of the star (in this case the instructor) and all interaction is from the outer vertices (students in this case) to the center (instructor) and from center to outside i.e. radial interaction. There is very little interaction at the periphery (amongst the students themselves).
- **Nature of Argumentation:** Case studies are invariably about decision-making, which is about options, choices and reasoning [8-9]. Students, as we have seen through the analysis during the process of discussion, bring out different explanations and hypotheses that further the line of reasoning for every choice. This is evident in the 28 constatives uttered by the students (roughly 55 % of their constative utterances) that are characterized as theorizing, hypothesizing, explaining, justifying, or arguing. These explanations and hypotheses are rationally evaluated by peers / instructors. Such arguments are more *horizontal* (non-persuasive) in nature and not *vertical* (persuasive). By *horizontal* we mean many explanations are brought up however, unlike formal argumentation, there is not much argumentation about a single explanation or a point of view. The maximum that an argumentation runs for any explanation is five utterances. A *horizontal* type of argumentation is characterized by the absence of persuasive communication and the presence of a number of theories / explanations / view points. By *vertical* we mean the argumentation that develops over an expressed opinion or a point of view is highly persuasive with the locutors coming up with evidences, rebuttals, pro and counter arguments and hence involve many utterances on the same topic [8] and [14].
- **Learning process and knowledge integration:** The knowledge integration in the student takes place with the many options and choices of the decision-making that are discovered and the repertoire of arguments that are developed for each decision choice. The choices or options in a decision-making process and the development of the reasoning are critical in the learning process. Schick [9] clarifies the meaning of the terms: choices, options and reasoning in decision-making. The students rationally evaluate these *models* or *theories* and

then the instructor helps put all these models in perspective through his / her *rephrasing* and *closure* utterances. Mauffette-Leenders [8] points to this nature of theory / model development and evaluation. The process of the development of this repertoire of hypotheses and their evaluation through peer participation amounts to knowledge integration in the student. The evaluation is done with respect to one's knowledge and experiences that he / she brings to the forum.

- **Discussion environment:** The face-to-face discussion environment has many advantages and some disadvantages. The turn taking of the speakers has an effect of continuity but at the same time can be stifling in terms of the number of students who can participate. The physical space and the moderation of discussion also greatly affect the discussions. The moderation brings orderliness and is used to encourage participation. *Group gaze* or the focus of the group for discussion is easily controlled and moderated by the instructor or any other participant and would not be very orderly in other environments such as on-line discussions. The space limits the size of the class.

CONCLUSIONS

In this study we applied the socio-linguistic theory of speech acts to analyze and gain insights into the dynamic interaction and the peer learning that takes place in a classroom case-study discussion. We made certain extensions and modifications in the speech act classifications in order to effectively apply the theory to the context of classroom case-study discussions. We found that our modified speech acts analysis was able to provide insights into the interactive aspects of the classroom discussions. The methodology developed has promise in evaluating and comparing the effectiveness and nature of class discussions in engineering education.

The primary instructor in our example, Dr. Sara Beckman, has won many teaching awards and is known to be highly effective in promoting active and peer learning in classroom discussions. The results and the observations verified that the nature of her discussions is highly dynamic and interactive. Students form explanations, theories and hypotheses about the case and the issue being discussed based on their prior knowledge and what has been discussed and discovered earlier in the discussion. The classroom becomes a scene of social activity with the participants, including the instructor, playing different roles, having different intentions and becoming beneficiaries of other's actions in this process of verbal acting.

We also established the type of speech acts that contribute to the interactive aspects of the discussion and those that contribute to peer learning and knowledge integration in the student, including a better understanding of the nature of the argumentation in such discussions.

FUTURE RESEARCH

The speech act analysis described here provides a framework for evaluating and comparing different forms of social interactions and peer learning in product development case-studies. This work will inform our future research in the development of on-line environments that retain the pedagogical advantages of in-person classroom discussions and overcome some of their limitations in space and time.

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