

KOH08340

Students' Discourse and Motivation in Project Work

Caroline Koh, C. K. John Wang, Oon Seng Tan, Woon Chia Liu, and Jessie Ee

National Institute of Education, Nanyang Technological University, Singapore

Abstract

This study, undertaken in Singapore, investigates aspects of students' motivation in undertaking Project Work (PW), and explores the link between motivation and the quality of students' discourse during group discussions. It uses a Self-Determination framework to answer questions on students' perceived satisfaction of basic psychological needs, motivation and performance outcomes. Analysis of students' discourse during PW helped to substantiate survey findings, which showed that the participating students perceived satisfaction in the need for competence and relatedness, but less in autonomy support. Furthermore, many students were extrinsically motivated in PW, appreciating its value but not necessarily finding enjoyment in the process. Students' talk during PW group discussions tended to be of the practical (problem-solving) mode and cumulative (collaborative, non-critical) type. The findings suggest that, in order to enhance motivation and task engagement, students should be encouraged to share knowledge explicitly and to make their thinking visible through discourse.

Introduction

In Singapore, although there is a well-established education system, there arose a new challenge at the turn of the century, to "ensure that our young can think for themselves, so that the next generation can find their own solutions to whatever new problems they may face" (Goh, 1997). To promote thinking and innovation, the Ministry of Education initiated new strategies and changes in classroom practices and assessment procedures.

In an attempt to move away from conventional assessment methods towards performance-based assessment, the Project Work (PW) initiative was introduced in Singapore schools in the late nineties to enhance creative and critical thinking, problem solving, collaboration and communication skills. The approaches adopted for PW tend to vary from school to school, although common practices can be identified. In most instances, students are first taught project skills such as planning, research and data collection, report writing and oral presentation. The students then form groups of five to six members to work on their project tasks. In most schools, PW is carried out within curriculum time and on a weekly basis. However, aside the planned PW sessions, students often spend time on their projects outside school hours. The teacher's role in PW is usually that of a facilitator, providing guidance and feedback to students. Some teachers also assume the roles of PW instructors in their schools, and yet others are PW coordinators or members of the PW committee, whose tasks include preparing PW resource materials and managing the implementation of PW in their schools

The benefits of group work and cooperative learning have been extolled by a large number of researchers. For instance, Johnson and Johnson (1989) postulated that cooperation amongst

students working in groups enhanced productivity, achievement, social interaction and psychological health. Team members benefited from constructive feedback on their work, the recognition of their contributions, the enhancement of their effort and the promotion of interpersonal trust within the group. In addition, improved psychological well being, reduced anxiety and stress levels and enhanced motivation towards goal achievement were observed in cooperative groups. That learning in groups promoted students' academic and social skills was supported by Burrion, James and Ambrosio (1993) and Ossont (1993). In the Singapore context, a number of researchers have focused their attention on the implications of PW on learning (Chua, 2004), communication and teamwork (Tan, 2002), motivation (Liu, Tan, Wang, Koh, & Ee, 2007) and students' perceptions (Chang & Chang, 2003; Koh, Tan, Wang, Ee, & Liu, 2007). Generally, their findings showed that PW had a positive effect on students.

In most of the studies cited above, findings were derived from either self-report instruments or conventional face-to-face interviews or both. In recent years, there has been a growing interest in the influence of students' discourse in promoting the effectiveness of cooperative learning strategies such as group work. For instance, Mercer, Wegerif and Dawes (1999) found that developing children's awareness of language use and adherence to basic guidelines for group discourse improved the quality of collaborative activity and reasoning skills. Postholm (2005) found that teachers play an important role in creating conducive learning environments to enhance the quality of students' dialogues in project work. Although there is an increasing pool of western literature on the role of discourse in improving the effectiveness of cooperative strategies, no such study has yet been undertaken in Asian learning contexts. Furthermore, it would benefit researchers and classroom practitioners to be aware of any relationship between the effectiveness of team dialogue and other factors contributing to the success of PW.

Aims of the project

This study attempts to fill the gaps in the aforementioned areas firstly by investigating aspects of students' perceived motivation in undertaking project work, and secondly by exploring the link between perceived motivation and the quality of students' discourse during group activities. Our investigation on students' motivation in project work is based on the tenets of the self determination theory (SDT), which stipulates that for personal development and well-being, individuals require the fulfilment of their three basic psychological needs (Deci, Vallerand, Pelletier, & Ryan, 1991), namely that of autonomy (volition and self-initiation), competence (aptitude and effectiveness in performing a task) and relatedness (sense of familiarity and belonging to a social group). According to the SDT, the satisfaction of these three needs will promote intrinsic motivation (Deci & Ryan, 2000). The aim of this study is to provide answers for the following questions:

1. What are students' perceived psychological needs satisfactions in PW?
2. What are students' perceived levels of motivation in PW?
3. What are students' perceived outcomes of participation and learning in PW?
4. To what extent does students' discourse during PW reflect their aforementioned perceptions of needs satisfaction, motivation and outcomes of learning and participation?

The following section gives an overview of the context in which this study was undertaken.

The Educational system in Singapore

In Singapore, a child typically begins formal education with a six year primary/elementary school program, at the end of which, he/she sits for the Primary School Leaving Examination (PSLE). The child's PSLE scores play a key role in determining his/her placement in one of the four courses offered at secondary/high school level. For instance, the 'Special' and 'Express' courses are four-year programs offered to pupils admitted to the secondary schools. The Special course is offered to the top 10% of the PSLE cohort, and enables these academically-able students to study their second language (Mother Tongue) at a higher level. Both the Special and Express courses lead to the University of Cambridge GCE 'O' level examination in the final year. The Normal (Academic)/ N(A) and Normal (Technical)/ N(T) courses are offered to students who are unable to meet the requirements for the Express stream, and hence follow a four-year program, catering for their learning pace and leading to the GCE 'N' level examination. Normal (Academic) students who perform well in their 'N' level exams are eligible for a fifth year's study leading to the GCE 'O' levels. Based on their progress and the recommendation of their teachers and school principals, students are given the option to switch courses. For example, a Normal (Academic) student who performs well in his/her studies is able to join the Express course in the following academic year.

At post-secondary level, the top 25 to 30% of the 'O' level graduates are offered a two-year course in the Junior Colleges, leading to the GCE 'A' level examination and preparing students for university education. There are also a number of privately-funded, independent schools which offer a six-year program, allowing students to by-pass the 'O' levels and to sit for the 'A' levels at the end of their course. The rest of the students opt for courses in the polytechnics, the Institute of Technical Education and the Millennia Institute, which offers a three-year 'A' level program.

Research methods

Survey procedure

In this study, 588 Secondary 2 (8th Grade) students from the five secondary schools took part in the survey. This sample consisted of 335 male and 253 female students, aged between 12 to 15 years (mean = 13.43, SD= 0.49). The secondary schools were selected on the basis that they were representative of the range of students' profiles and learning contexts found in Singapore. Thus, two of the schools were from the high achievement bands, two others were from the middle band and one from the lower band. As one of the over-arching objectives of this study was to explore the effectiveness of Project Work as a learning strategy for academically weak students, the participants in this investigation were students from the Normal (Academic) and Normal (Technical) streams.

The survey items were adapted from a number of established instruments used and validated by other researchers. Thus the Academic Self-Regulation Questionnaire (SRQ-A, Ryan & Connell, 1989) and the Academic Motivation Scale (Vallerand et al., 1992) provided items for the assessment of motivation. The Learning Climate Questionnaire (LCQ, Williams & Deci, 1996) and the Intrinsic Motivation Inventory (IMI, McAuley, Duncan, & Tammen, 1989) provided items used for perceived needs satisfaction. Items for perceived outcomes of participation were adapted partly from the IMI and partly from the Motivated Strategies for Learning Questionnaire (MSLQ, Pintrich, Smith, Garcia & McKeachie, 1991). A seven-point scale, ranging from 1 (not true at all) to 7 (very true) was used for the scoring process. The

internal consistency coefficients were calculated for each of the subscales and all were found to be satisfactory ($.64 < \alpha < .87$).

Students' discourse

The qualitative approach involved fieldwork conducted at three of the schools involved in the survey administration. Four student teams, referred to as teams A, B, C and D (one team from each of four of the participating schools), each consisting of about six members on average, were observed and their dialogues were video-recorded during six of their weekly PW sessions. The video-recordings were then transcribed and first analysed by using an open coding system (Glaser & Strauss, 1967). Following this, further detailed analyses were conducted with 30 minute segments from each of the four teams. These segments were chosen on the basis of their dialogue representativeness, sound quality and content value.

Research findings

Survey results

In answer to our first research question, the students perceived that their psychological needs were satisfied in PW since the mean scores obtained were high for relatedness (4.85) and competence (4.61), though moderate for autonomy support (3.82). In terms of their motivation, students perceived themselves as being mostly extrinsically motivated (identified regulation, 4.50; external regulation, 4.14), followed by intrinsically motivated (4.00) and least likely, amotivated (3.28). As for students' perceptions of participation outcomes, metacognition (4.37) and effort (4.32) were ranked highest, followed by value (4.18) and enjoyment (3.67) at a considerably lower level. The mean scores for students' perceptions of learning outcomes were moderate (collaboration, 4.45; problem solving, 4.24; communication, 4.26). These findings are described in more detail in Koh, Wang, Tan, Liu and Ee (2008).

Video-recordings

Three themes emerged from the analysis of video-recordings: discourse mode, frequency of utterance, task adherence. The discourse mode can be further divided into three sub-categories (Packer, 1985): practical mode (problem solving); reflective mode (discussion, disagreements and deliberation); theoretical mode (abstraction and logic). In addition, it was observed that students' dialogues can be grouped into the three types of talk described by researchers (Mercer, Wegerif, & Dawes, 1999) as cumulative (non-critical sharing of information), disputational (competitive and uncooperative) and exploratory (critical, but constructive discussions). In this study, the detailed analysis of video recordings involved the consideration of both the discourse mode categories and the types of talk. The relevant findings are presented in Table 1.

Table 1. Incidence of discourse modes and types of talk amongst students during 30 minute brainstorming sessions.

		Discourse modes												Total incidence
		Practical				Reflective				Theoretical				
Project teams		A	B	C	D	A	B	C	D	A	B	C	D	
Types of talk	Cumulative	7	6	6	-	2	1	1	-	2	3	-	-	28
	Disputational	-	-	8	3	-	5	-	-	-	-	-	-	16
	Exploratory	3	6	4	-	2	1	-	-	1	1	-	-	18
	Total incidence	10	12	18	3	4	7	1	-	3	4	-	-	62
		43				12				7				

The data from the video-recordings showed that students' utterances belonged mostly to the practical mode, were occasionally of the reflective nature and rarely of the theoretical nature. In addition, student talk was often of the cumulative type, which showed that they shared information but in an uncritical way. There were nevertheless, valiant attempts on the part of some students to engage in exploratory talk, in making relevant information and reasoning explicit. This is illustrated in Excerpt 1, in which students from Team B were formulating questions for their proposed health survey.

Excerpt 1

- 1 Cindy: Ok, question 2 is on diabetes
- 2 Ed: What do you know about diabetes?
- 3 Cindy: Do you know that diabetes is not caused by eating too much sugar? They say it's caused by gaining weight...
- 4 Tim: (We) can get diabetes at any age.
- 5 Cindy: What is diabetes caused by?
- 6 Tim: Too much sugar.
- 7 Cindy: It's wrong, sugar plays a part but it's not only sugar...it's by gaining weight. Let's say I'm now 40 kg... (if) I gain 40 kg in one week, I'll get diabetes.
- 8 Ed: Do you think only sugar is the cause of diabetes?
- 9 Tim: There are two types of diabetes. Type 1 is the mild form.

Line 1 (where Cindy prompts her group to formulate a survey question on diabetes) and line 2 (where Ed responds with a suggested question) are examples of the practical cumulative mode whereby views are exchanged cooperatively by group members attempting to solve the problem at hand. In lines 3 to 7, the students are making an attempt at exploratory talk, sharing their views and giving relevant reasons for them. Line 7 also typifies an attempt at the theoretical discourse mode, when Cindy makes use of an example to illustrate her point. Some students however, spent a considerable amount of time on disputational discourse, trying to advance their views aimlessly and without giving clear reasons for their preferences. This is illustrated in Excerpt 2, taken while students from Team C were brainstorming for

ideas for their project, which involved the production of a video clip on the theme ‘Adaptation’.

Excerpt 2

- 10 Sharon (to the team): So what do you want?
11 Daisy: Nature...
12 Vicky: Classroom...like, for example, two boys fighting...I know how to draw.
13 Sharon (to Pat): What to you want?
14 Daisy: If we draw...like Nature...
15 Jenny (to Daisy): But how to draw? You know how to draw?
16 Vicky: Animals! I don’t know how to draw animals!
17 Daisy: It doesn’t mean it’s about drawing...
18 Vicky: But drawing (is) nicer... (We) can get more marks... I know how to draw classroom.
19 Daisy: (How about) mountains?
20 Vicky: Mountains?!
(Sharon pretends to choke in horror).
21 Vicky: Draw classroom...
22 Pat: For what?
23 Vicky: Two boys fighting...
24 Pat: Don’t want!

Throughout the discussion, the team members stated their individual preferences, but although there were attempts to justify their choices (lines 12, 16, 18), the reasons given were mostly of a simplistic and egocentric nature. The team members tended to converse in the competitive, uncooperative manner that characterizes disputational talk. When, in the end, they came to an agreement on the subject of their video clip, they did so with reluctance and displayed little enthusiasm towards the chosen topic.

Furthermore, the data from the video segments showed that the frequency of utterances tended to be high for only some members of the group, who were inclined to dominate the conversations. In some of the groups, the team members had the propensity to go off-task and found it difficult to focus on the PW issues being discussed. Teacher intervention in group discussions varied from once to as many as four times within a 30 minute video segment, and tended to be higher for the weaker groups which were in need of more guidance in their work. Table 2 shows the incidence of utterance, teacher intervention, and task adherence observed in 30 minute segments of video-taped discussions undertaken by each of the four project teams.

Table 2. Incidence of utterance, teacher intervention and task adherence.

	Project teams			
	A	B	C	D
Frequency of utterance	Discussion dominated by the team leader and a male member	Team leader steers discussion, with participation from all members	All members participated in the discussion, led by two of the girls	Dialogue was mainly between two of the boys
Teacher assistance	2 x	1 x	4 x	1 x
On-task	Most of the time	Always	Most of the time	-
Off-task	-	-	-	Most of the time

Discussion

The quantitative findings showed that the students perceived their basic psychological needs to be satisfied in PW. They felt adequately competent and experienced relatedness with team members, although they perceived that more could be done in terms of autonomy support from their instructors. We infer that an improvement in this area could contribute to a higher degree of enjoyment, and hence intrinsic motivation in PW. The video recordings of students' discourse show that students displayed adequate competence in carrying out their project tasks. In most groups, there was good interaction amongst members albeit the differing opinions and disputes. These observations support the survey findings on the students' perceived satisfaction of competence and relatedness. Field observations and video-recordings of teacher talk prior to and in the course of group discussions indicated that teachers closely monitored students' work and progress in PW. This may have led to the students' perceptions of lower autonomy support. In terms of student motivation, the video-recordings showed that not all members participated actively in group discussions and/or tasks. There were many instances when team members were off-task or taking an entirely passive stance, thus corroborating the survey findings that team members' involvement in collaboration, problem solving and communication have to be further improved before intrinsic motivation can be promoted in PW.

Conclusion

Our observations from students' discourse were thus valuable in substantiating the survey findings on students' perceptions of their needs satisfaction, motivation and outcomes of participation and learning through PW. However, our findings could have been strengthened by further observations and more extensive analyses of the video-recorded dialogues. Nevertheless, the findings of this study could assist teachers and facilitators in their preparations for project work implementation. For instance, in the teams where collaboration was observed and the project successfully carried out, the members tried hard to make their reasoning visible through dialogue. This supports earlier findings that teaching students to use exploratory talk would promote their reasoning skills (Mercer et al., 1999), and thus assist in enhancing motivation and task engagement.

Acknowledgements

This research is made possible by the funding obtained from the Education Research Fund EP3/TOS: Enhancing learning for Normal stream students – Insights into cognitive and motivational processes in Project Work, awarded by the Ministry of Education, Singapore.

References

- Burron, B., James, M., & Ambrosio, A. (1993). The effects of cooperative learning in a physical science course for elementary/middle level pre-service teachers. *Journal of Research in Science Teaching*, 30(7), 697-707.
- Chang, T. T., & Chang, S. C. A. (2003). *Assessing the project work: A teachers' and students' perspective*. Paper presented at the Asia Pacific Conference on Education, Singapore.
- Chua, J. J. (2004). *Evaluating the effects of project work on learning in a primary school*. Unpublished Master's thesis, National Institute of Education, Nanyang Technological University, Singapore.
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11, 227-268.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, 26, 325-346.
- Goh, C. T. (1997). *Shaping our future: Thinking schools and learning nation*. Retrieved January 8, 2008, from http://www.moe.gov.sg/speeches/1997/020697_print.htm
- Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: strategies for qualitative research*. New York: Aldine.
- Johnson, D. W., & Johnson, R. (1989). *Cooperation and Competition: Theory and Research*. Minnesota: Interaction Book Company.
- Koh, C., Tan, O. S., Wang, C. K. J., Ee, J., & Liu, W. C. (2007). Perceptions of low ability students on group project work and cooperative learning. *Asia Pacific Education Review*, 8(1), 89-99.
- Koh, C., Wang, C. K. J., Tan, O. S., Liu, W. C., & Ee, J. (In Press). Bridging the gaps between students' perceptions of project work and teachers' expectations. *The Journal of Educational Research*.
- Liu, W. C., Tan, O. S., Wang, C. K. J., Koh, C., & Ee, J. (2007). Motivation in the context of project work: The self-determination perspective. In D. M. McInerney, S. Van Etten & M. Dowson (Eds.), *Research on Sociocultural Influences on Motivation and Learning: Standards in Education* (Vol. 7, pp. 189-213). Greenwich, CT: Information Age Publishing.
- Mercer, N., & Wegerif, R., Dawes, L. (1999). Children's talk and the development of reasoning in the classroom. *British Educational Research Journal*, 25(1), 95-111.
- McAuley, E., Duncan, T. E., & Tammen, V. V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: A confirmatory factor analysis. *Research Quarterly for Exercise and Sport*, 60, 48-58.
- Packer, M. J. (1985). Hermeneutic inquiry in the study of human conduct. *American Psychologist*, 40, 1081-1093.
- Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991) *A Manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning, University of Michigan
- Postholm, M. B. (2005). The teacher shaping and creating dialogues in project work. *Teachers and Teaching: Theory and practice*, 11(6), 519-539.

- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*, 749-761.
- Tan, T. L. S. (2002). *Using project work as a motivating factor in lower secondary mathematics*. Unpublished Master's thesis, National Institute of Education, Nanyang Technological University, Singapore.
- Vallerand, R. J., Pelletier, L. G., Blais, M., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, *52*, 1003-1017.
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology*, *70*, 767-779.