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CLASSROOM DISCOURSE: TEACHER STUDENTS INTERACTION AND GENDER PARTICIPATION IN PRIMARY SCIENCE EDUCATION

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Abstract. The objective of this research is to explore teachers-students domination and gender participation during classroom interaction primary science. This research employed descriptive case study approach. I am focusing my study on twelve science lessons at year four of two primary schools in the Greater Jakarta. Data were gathered using classroom observations. I wrote a field note for each lesson and record the observation using video recorder. The data gathered then analyze using descriptive statistics and thematic analysis approach. The study shows that students speak just as frequently as teachers during the talk. However, this is not the case for talk coverage as teachers dominate classroom talk during a science lesson. In terms of gender participation during classroom talk, there is no evidence of gender domination. The study shows that the domination of one gender in each of these classes is not caused by a gender stereotype, but rather is due to the teacher's strategies in maintaining social interaction in their classes.

Keywords : classroom interaction; gender participation; primary science

Abstrak. *Tujuan dari penelitian ini adalah untuk mengeksplorasi bagaimana dominasi guru-siswa serta partisipasi gender saat interaksi dalam pembelajaran sains di sekoah dasar.Penelitian ini menggunakan pendekatan studi kasus deskriptif. Peneliti memfokuskan studi pada dua belas pelajaran sains di kelas empat dari dua sekolah dasar di bagian selatan kota Jakarta. Data dikumpulkan menggunakan observasi kelas. Peneliti menulis catatan lapangan untuk setiap pelajaran dan merekam kegiatan pembelajaran. Data yang terkumpul kemudian dianalisis menggunakan statistik deskriptif dan pendekatan analisis tematik. Hasil penelitian ini menunjukkan bahwa dari segi frekuensi, siswa dan guru mempunyai frekuensi pembicaraan yang hampir sama. Akan tetapi dari segi durasi, guru terlihat mendominasi percakapan. Dalam hal partisipasi gender selama pembicaraan di kelas, terlihat bahwa tidak ada bukti dominasi gender secara umum.. Adanya partisipasi gender dalam beberapa pertemuan bukan disebabkan oleh stereotip jenis kelamin, tetapi lebih disebabkan oleh strategi guru dalam menjaga interaksi sosial di kelas mereka.*

Kata kunci : *interaksi dalam kelas; partisipasi gender; sains sekolah dasar*

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Introduction

Students enter the science classroom with some limitations, such as lack of science vocabulary, incomplete understanding of science content, and poor reading, listening and speaking skills (Dawes 2004; Holliday and Cain 2011). Therefore, teachers should pay attention to the strategy they incorporate in their conveyance of science knowledge. Furthermore, teachers should provide more opportunity for students to undertake science activities and to interact through classroom discussion.

Another important feature of classroom discourse is gender participation during classroom interaction. Differences in participation linked to gender are important in themselves as a matter of equity and justice. They have importance too as a critical lens to bring to the question of classroom talk in general, to look at the significance of differences in patterns of talk for learning outcomes.

There have been considerable studies addressing the problem of gender differences in the science classroom over the past three decades or so (for example, Aschbacher et al., 2010; Huang and Fraser 2009; Jenkins and Nelson, 2005; Gilbert, 2001, Kenway and Gough, 1998; Lee and Burkam, 1996). Various aspects related to gender differences in science education have been studied, such as career interest (Carli et al 2015; Sadler et al., 2012; Wang and Degol, 2013; Wang et al., 2013), students' performnces and attainments (Addabbo et al 215; Careell et al 2010; Catsambis, 1995; Tyson et al., 2007; Miyake et al., 2010), and attitudes towards science (Tyler and Osborne, 2012; Tseng et al., 2013; Abd-el-khalick et al., 2015). Therefore, I apply the idea using the literature in a particular science classroom to look at how gender difference and participation took place during a science lesson.

To some extent, previous studies suggested that female students underperform in science compared with their male counterparts (Jovanovic and King, 1998; Gilbert and Calvert, 2003; Brotman and Moore, 2008). Girls' participation during classroom discussion is also less than boys, with the latter speaking more frequently and seeming to dominate classroom talk.

There may be several reasons why girls have limited participation during science classroom interaction. First, some studies suggest that strong beliefs in gender stereotypes pervade which maintain that science and science-related jobs are more suitable for males than females (Dreves and Jovanovic, 1998). Consequently, girls seem to have less interest in science and demonstrate less motivation for learning science (Jovanovic and King, 1998). Teachers' perceptions of the gender stereotype (boys are better at science than girls) may lead them to respond more to boys than to girls. Secondly, other studies report that girls have less prior experience in science-related areas and lack exposure to science-related activities (Jovanovic and King, 1998; Hyde and Linn, 2006). For example, many boys' toys have a simple machine, such as cars and train sets. while girls like to play with dolls. Consequently, girls feel less confident about their science abilities and tend to speak less frequently in the classroom (Caspi et al., 2008). Third, there may be an element of discrimination, which disadvantages women in an academic environment. Some studies show that teachers interact more frequently with male students and provide better feedback to boys (Caspi et al., 2008). Canada and Pringle (1995) suggested that even though girls initiate more interaction, boys receive more follow-up than girls. Fourth, less support from home may be a possible factor which prevents girls from developing their interests in science. Some authors argue that females are socialised in ways that are anti-thetical to scientists' characteristics, such as dependence and passivity (Jones and Wheatley 1990; Catsambis, 1995).

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In recent years, opinion has echoed that matching teachers and students by gender (boys taught by male and girls taught by female teachers) in the learning process will be beneficial to students' performances and achievements. This idea seems to be driven by the assumption that like is good for like, so that, for example, an ethnic minority should be taught by the same ethnic minority, and girls should be taught by female teachers (Carrington et al 2007). In relation to such gender stereotypes in science education, whereby girls appear to perform at a lower level than boys, being taught by a female teacher may influence the performance of female students in science (Dee 2005, 2006). Several studies conducted in various countries (USA, Canada, Finland, UK and Australia) have examined the effect of the gender match of teacher and students. The findings of these studies are mixed.

Some studies reported that the gender match between pupils and teachers has little effect on students' performance (Ehrenberg et al., 1995; Lahelma, 2000). The study in the United States carried out by Ehrenberg et al (1995) reported that matching teachers and students by gender has little impact on students' achievements. Similarly, Lahelma (2000) stated that matching gender had little or no influence on students' performance based on the study carried out in a Finnish high school. Other studies conducted in Australia (Martin and Marsh, 2005), Canada (Sokal et al., 2005) and the United Kingdom (Carrington et al., 2007; Skelton et al., 2009) respectively revealed that matching gender had no influences on student performance. Sokal et al. (2005) investigated the matching gender study in Winnipeg in Canada and reported no differences in students' achievements between boys who worked with male teachers and those who had collaborated with female teachers. Martin and Marsh (2005), in their study in Australian junior and senior high schools, investigated that there was no significant difference as a function of teacher gender on student motivations, engagements and attainments. Accordingly, Carrington and Skelton (2003) indicated that matching students and teachers by gender has no discernible impact on both student achievements and attitudes.

To investigate the assumption in the Indonesian context, this study investigated teachers-students domination and gender participation during classroom interaction primary science.

Method

A case study is one of research approaches used most frequently in the field of social science, including education. A case study method enables a researcher to explore and investigate contemporary real-life phenomenon through detailed analysis. Yin (2003) defines case study as: "*an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used*" (Yin 2003 p. 13). Then, a case study can provide opportunities to create a comprehensive account of the case and provide detailed information that may be difficult to obtain using other approaches.

A descriptive case study approach employed for this project. Three parameters described by Yin (2003) were taken into consideration when I decided to choose the strategy proposed for this project. Yin (2003) reveals that the investigator can use a case study strategy when the research questions focus on what, how and why questions; the research focuses on contemporary events and the researcher is not required to control the event (Yin 2003). A case study approach is also suitable for this project, since the current knowledge on this topic in Indonesian

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classrooms is relatively inadequate (Rowley 2002).

In order to gain more depth of information in generating quality data, I focused my study on just two classrooms in different schools – so there are two cases, each in a different school. In each school the case comprises the science/classroom teacher of year foru and the students in their class. I attended science lessons with each class over a period of one semester.

The data were gathered using classroom observation methods. Observation is an important primary source of data for research. Merriam (2009) suggests that participant observation is the best methods when activities, event and situation can be see firsthand, Observation is not only questions of looking at something and simply noting down what do researcher need to observe. Gray (2004) reveals that observation is a complex process involving systematic viewing of research participant's action, recording what happen during the observation, analysis and interpretation of their behaviour.

The classroom observation is only half the process of generating data. To be able to analysed, classroom observation should be recorded. There are various way of recording observation, such as writing a field note, audio recording, and video recording (Merriam 2009, Flick 2009, Wragg2002). Each recording approach has advantages and disadvantages. Writing field note can be done immediately, economy in term of cost and time and can be discuss directly after observation. However, observer should make decisions what to record and some activities or participant behaviour missed from observation. Using video recording will provide the researcher with good visual and sound record data which can be paly and replay for many times for data analysis purpose. Researcher has less pressure to make instant decision and researcher have an opportunity to focus on particular event and participant.

I carried out the classroom observation during one semester at year four of one public primary school (Mr Diana Classroom) and one private primary school (Mr Dono Classroom) in the southern part of greater Jakarta. Data gathered then analyse using descriptive statistic and thematic analysis developed by Braun and Clarke (2006), and for this article the data analyses were taken from five lessons from each class.

Results and Discussion

The study indicates that both Mr. Dono and Mrs. Diana's classroom share a similar characteristic in term of talk turns and coverage. The figure 1 below represents the average turn and coverage of talk within five videotaped lesson; the teachers and students had similar turns to talk. Mrs. Diana had 49.75% compared to her students who had 50.25% of the turns, while Mr. Dono had fewer turns to talk at 46.66%. However, in contrast to the turns to talk, both teachers seemed to dominate classroom discussions. The data shows that Mrs. Diana covered almost 83% of talk and Mr. Dono covered almost 70%.

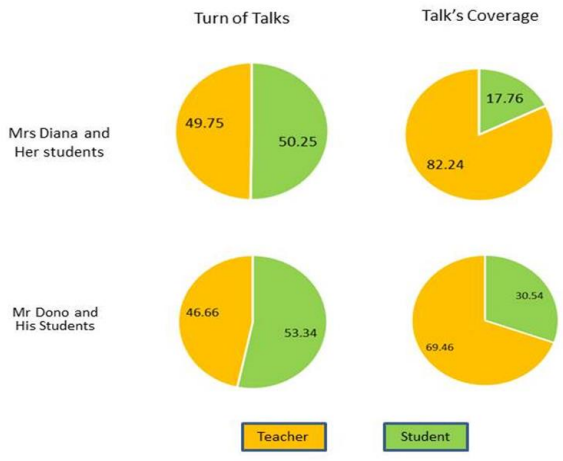

Figure 1. The average turn and coverage of talk between teachers and students from five lessons

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The data indicates that the number of turns to talk between teachers and students is fairly balanced. This indicates that the teacher has sought to provide ample opportunities for students to speak. It can be seen from utterances such as, "*who want to express their idea?*" and "*who else?*" Sometimes the teachers invite certain students, for example, "*now I want to hear from students who have not spoken yet.*" Teachers did not only invite students to talk but also motivated and encouraged them to speak. An invitation and motivation to participate actively in classroom talk certainly provides great learning space for students to learn on the intermental plane.

However, despite the balanced amount of turns to talk, data shows that teachers have much higher coverage in terms of the number of contributions in the discussion. This situation can be examined from both the students' and teachers' sides. Even though the teacher had given ample opportunities to speak, students did not sufficiently respond. It was rare that students responded in complete sentences. Most of the time, students only provided short responses in the form of one or two words. This may be related to their communication capabilities as young children. They still have yet to learn strong communication skills. Also, it could be that they do not have the habit of expressing their ideas. Mr. Dono and Mrs. Diana said during the interview that following the previous curriculum students did not have sufficient opportunities to speak and express their ideas.

Moreover, there are other factors that students verbal responses: the lack of preparation, feeling afraid to speak, and fear of appearing ignorant. From interviews with the students, students revealed that they did not always read the upcoming topics before class. Their lack of preparation made them reticent. As a result, they do not like to talk or they respond in short phrases to express their ideas. In addition, fear of speaking and fear of appearing ignorant if they express an erroneous idea also leads to lack of participation.

A feeling of reliance on the teacher may also contribute to students' participation in the classroom. They seem to still believe in the notion that the teacher is the source of knowledge. This view may have been derived from their learning experience in science classrooms in year three. As presented by the teachers, in the previous curriculum science was taught in the conventional way. Students are seated and teachers deliver lectures on science or even dictate science lessons. In line with this, the students also revealed that sometimes they are happy to hear explanations from the teacher. As a result, they opted to talk just a little and this tended to prompt teachers to give lectures related to the topic at hand.

From the teachers' side, one factor that makes teachers dominate the conversation is that they are still trapped in the habit of teaching science in a conventional manner. Changing something that has become a habit is certainly not easy. They have been using lecture and tutorial approaches for so long, and are most comfortable when applying it. The desire to give a lecture or explain the theory and science phenomena is still frequent during classroom talk.

Another factor that makes teachers dominate the discussion is the assumption that their students are still young and do not have a lot of knowledge. Instead of giving clues, sometimes a teacher immediately provides an explanation on the topic discussed. Moreover, the asymmetrical relationship between teachers and students in which teachers have more roles than the students also causes the teachers to participate in discussions more frequently than the students. The roles of teachers, which include structuring the talk, maintaining the discussion, explaining things when they think

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that their students do not understand, and reformulating and evaluating their ideas, make the teacher dominant in classroom talk.

Despite their many similarities as discussed above, there is a significant difference that can be seen between classes. Mrs. Diana dominated her classroom talk more than Mr Dono. Overall Mrs. Diana covered about 82% of the talk, while Mr Dono only about 69%. There are some things that cause this to happen. First, Mrs. Diana has been teaching longer than Mr. Dono. This means that she taught in the conventional way for longer than Mr. Dono, so she is still trying to adapt to the dialogic curriculum that encourages the teacher to offer more space for students to interact using classroom talk. Second, Mrs. Diana taught in larger classes with more students. This may also lead her to dominate talk in order to manage the dynamics of interactions in the classroom.

Continuing the discussion on the turns and talk coverage, another feature that is also important to consider is the gender gap, which appeared during the talk in both classes. The data from each class varied. As presented in the following figure 2, the data suggests that female students in Mrs. Diana's class participated more than the male students; meanwhile in Mr. Dono's class the opposite occurred.

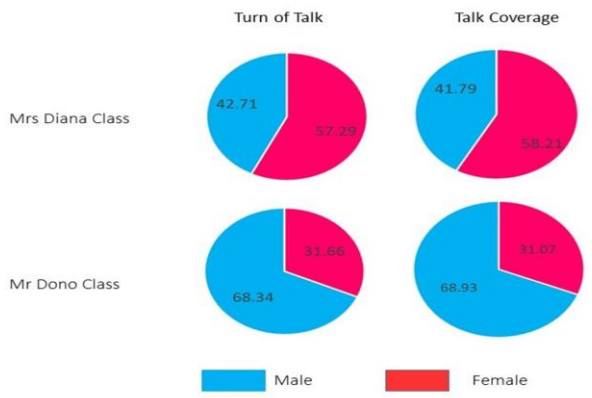

Figure 2. The average turn and coverage of talk between female and male students from five lessons

If we look at the chart above, it seems to present gender stereotypes; the girls have a good performance when taught by a female teacher and the boys perform well when taught by a male teacher. However, this is not actually the case in the classrooms of both Mrs. Diana and Mr. Dono. The discussion below will examine what happened in each classroom in terms of the gender gap.

The chart shows that female participation in the discussion is higher than that of the male students in Mrs. Diana's class. However, this does not actually show the gender stereotype in this classroom. It should be remembered that the classroom proportion is unequal: the number of female students is slightly higher than the number of male students. Moreover, the observation indicates that both genders are enthusiastic toward learning. Even when studying science, boys in Mrs. Diana's class show more enthusiasm than girls. This confirms several studies discussed in chapter 2, which demonstrate that even in a classroom with a female teacher boys showed more enthusiasm for science lessons than girls. Many of the boys raised their hands in the classroom to get chosen to talk: "Miss, me", "me, Miss". This may relate to the patriarchal values in an Indonesian context in which a male has been given a good chance to speak and deliver their ideas to their family. What causes the visibly higher participation of girls than boys in the chart above is that teachers often provide an opportunity for students who are less active, less enthusiastic, and less participative in talking. Usually the teacher points to female students. This shows that this teacher attends to the participation of students and would like to provide better opportunities for students who are less active, so that the discussion is not only dominated by several students.

Another factor that causes higher female participation in the talk is that Mrs. Diana

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allowed students who are already participating to appoint the next student. As stated above, after some time Mrs. Diana would appoint less active students, usually girls, to deliver their ideas. After a female student speaks, she was given the opportunity to call on her friend. This female student tends to select students of the same gender. In the Indonesian context, when there is female student pointing to a male student or vice versa, their friends will make a joke about them. So students tend to call on a student of the same gender. This has contributed to the fairly high participation of female students in the discussion.

In contrast to Mrs. Diana's classroom, male students in Mr. Dono's class participated more frequently than female students. Again, it should be remembered that, in term of student numbers, Mr. Dono's class has more male than female students. The data suggests that what happened in the classroom was actually not the boys' domination, but the presence of some male student domination. In the case of Mr. Dono's class, there were two boys — Fatih and Andre — who dominated classroom talk. Since these two male students often dominate the discussion, the overall contribution of male students is higher than that of the females.

The dominance of a few students in the discussion occurred due to several factors. Firstly, teachers are not always aware that some students dominate the classroom discussion, and even in some cases the teacher provides room for some students to dominate the conversation. Secondly, teachers need the contribution of students to respond to the questions given. When some students choose to remain silent and only a few students dare to deliver their ideas, teachers have to choose the same students again and again. Thirdly, some students are reluctant to speak out for fear of being wrong, as discussed above. As a result they would be very happy if there are students who wanted to speak. They might consider the students who are brave enough to talk as their representative, and at the same time the students who usually dominate the discussion feel that they receive support from their friends.

In the case of Mr. Dono's class, the dominance of two boys seemed to be caused by a combination of the above factors. Most of the students are still shy about expressing their ideas; meanwhile Mr. Dono needs students to share their ideas to maintain the discussion. Mr. Dono is actually aware of this situation and often invites less active students to speak. However, the invitation did not get a positive response from the students. As a result the teacher finally re-selected the same student to speak.

The study indicates that the gender performance gap cannot be attributed to stereotypical gender role models. This finding corresponds to previous studies (Ehrenberg et al. 1995, Lahelma, 2000, Carrington et al. 2005, Majzub and Rais 2010). The contributions of each gender during the classroom discussions in both Mrs. Diana's and Mr. Dono's classrooms do not relate to the teacher's gender. The domination of the gender in these classes occurred due to the strategies used by each teacher to maintain the discussion.

Conclusion

The study indicates that students speak just as frequently as teachers during the talk. However, this is not the case for talk coverage as teachers dominate classroom talk during a science lesson. There are several reasons that caused teachers to dominate classroom talk during a science lesson in an Indonesian context. Firstly, teachers have been using a conventional approach to teaching science for many years. It is quite difficult to change their fixed lecture habits; for that they need time to adjust to a dialogic teaching. The teacher's dominance may

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also be due to the asymmetric positions of teachers and students. Finally, students have less experience in a dialogic classroom. They have been given limited space to talk and limited time to explore their ideas in the previous curriculum; therefore, they tend to deliver short answers or even incomplete sentences during classroom talk.

In terms of gender participation during classroom talk, at first glance a gender stereotype seems to occur: the female students perform better when taught by a female teacher and male students perform better when taught by male teachers. However, this is not the case here, since there was a difference in the proportion of male to female students in both classes. One class had more male students, while the other class had more female students. In the case study, when the proportion of male and female students in each class was taken into account, there is no evidence of gender domination. The study shows that the domination of one gender in each of these classes is not caused by a gender stereotype, but rather is due to the teacher's strategies in maintaining social interaction in their classes.

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