SOCIO-SCIENTIFIC STUDY: RELATIONSHIP OF STUDENTS’ SOCIAL INTERACTIONS WITH NATURAL SCIENCES LEARNING OUTCOMES

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Abstract
Social interactions that occur between individuals in natural sciences are called socio-scientific. Socio-scientific norms are rules derived from mathematical values brought into the social context. Norms are seen as being able to increase students’ understanding. The main focus in this research are, (1) Analyzing social content in elementary natural sciences learning courses; (2) Describe the process of social interaction on research subjects; and (3) describe the relationship between social interaction and natural sciences learning outcomes. This type of research is quantitative with a descriptive approach. Study subjects was 100 prospective elementary school teachers. Data collection techniques was using survey methods and analysis of student’s final exam in natural sciences test. Data analysis uses simple linear regression analysis. From the research, the results are obtained: (1) Mathematical content in the lecture process has been raised by the lecturer. The lecture system in the form of group discussions can improve students’ communication, courage and collaboration skills. (2) The description of students’ social interactions can be modeled. Social interaction models show social interaction can be in the form of associative and dissociative. (3) There is a relationship between social interaction with learning outcomes in natural sciences. The relationship is quite strong, and social interaction influences student natural sciences learning outcomes.

Keywords: Socio-scientific, Learning outcomes, Social interactions

INTRODUCTION
Lecture activity is one of the activities to shape human character who is pursuing levels in tertiary institutions [1]. Someone who is educated at a tertiary level is already at the stage of child development according to Piaget, where the environment is a key factor in the formation of human character [2,3]. Therefore, educational activities in higher education cannot be separated
from aspects of social interaction between students [4;5].

According to Osborne [6;7], education itself aims to form individuals who are capable of community and useful both for themselves and for others. In relation to natural sciences education, the objectives of natural sciences education are (1) an emphasis on the ability to arrange students' reasoning and personality (formal goals); and (2) emphasis on the application of natural sciences both in natural sciences and outside natural sciences (material goals) [7;8]. These two goals should be realized in a balanced way. The fact is that material goals related to individual mathematical abilities are more emphasized than formal goals. Lecturers or teachers as educators more often focus on student achievement in solving math problems. Whereas the ability to socialize that is related to formal goals is an important aspect that must be possessed by individuals in the millennial era now [10]. Seeing the importance of positioning natural sciences in social interactions, Mufidah et.al [11] formulated 4 mathematical education objectives namely, (1) practical goals; (2) civic goal; (3) professional goals; and (4) cultural goals. These goals are related to the ability of individuals to solve problems and the ability of individual social interactions.

Social interactions that occur between individuals are often referred to as social norms. Social norms in natural sciences learning are often known as socio-scientific [11;12;13]. Socio-scientific norms are rules derived from mathematical values brought into the social context. According to Disasmitowati & Suba [15], the development of Socio-scientific norms can improve students' understanding because the classroom conditions are comfortable and conducive to the learning process.

Related to the importance of the development of Socio-scientific norms in the educational process, researchers are interested in studying the development of Socio-scientific norm values among students. The researcher hopes that the results of the study can provide an overview and related insights about Socio-scientific values for education practitioners, especially at the tertiary level.

### Table 1. Distribution of socio-science proportions at various levels of education

<table>
<thead>
<tr>
<th>Prov</th>
<th>SD</th>
<th>SMP</th>
<th>SMA</th>
<th>SMK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yogyakarta</td>
<td>1:13</td>
<td>1:12</td>
<td>1:10</td>
<td>1:10</td>
</tr>
<tr>
<td>Jakarta</td>
<td>1:19</td>
<td>1:16</td>
<td>1:13</td>
<td>1:13</td>
</tr>
<tr>
<td>Papua</td>
<td>1:29</td>
<td>1:15</td>
<td>1:12</td>
<td>1:09</td>
</tr>
</tbody>
</table>

Source: Neraca Pendidikan Daerah Kemdikbud

### METHOD

This type of research is quantitative with a descriptive approach. To get the data needed, researchers distributed surveys to 100 students from the University of Mataram's PGSD Study Program who were randomly selected to be subjects in the study [16]. To simplify the data collection process, researchers used Googleform's platform which was already available on the Google search engine. The results of quantitative google form data have been tabulated so that the data can be directly analyzed descriptively by researchers.

The main focus in this research is, (1) Analyzing social content in elementary natural sciences learning courses; (2) Describe the process of social interaction of research subjects, and (3) describe the relationship between social interaction and natural sciences learning outcomes.

To obtain valid data related to the relationship between social interaction and natural sciences learning outcomes, researchers conducted a simple linear regression analysis [16]. Previously the data will be tested for normality and linearity. After the data is proven to be normal and
linear, the researcher will conduct a correlation test to see if there is a relationship between social interaction and natural sciences learning outcomes [17]. Natural sciences learning outcome data obtained from the final test value of learning subjects of students who were respondents in the survey.

RESULT AND DISCUSSION

Social Content in Natural Sciences

Learning Courses In elementary natural sciences learning courses, lecturers have implemented several social aspects in lectures. According to Wang et.al [18], social aspects of classroom learning are; (1) Collaboration through group discussions; (2) Dare to express ideas through presentations in front of the class; and (3) The ability to communicate with others through discussion and question and answer.

Based on observations and brief interviews, it shows that social content in natural sciences lectures has been going well. Students are active in group discussions, so that shows the ability of cooperation and communication of research subjects is good. When students present the results of their discussion, it appears that students have the courage to communicate what they want to explain. The following classroom layout design is applied in class to strengthen the social aspects of learning natural sciences in classroom.

![Figure 1. Classroom layout design](image)

Figure 1 shows the classroom layout design during lectures. The lecture design shows that in 1 class there are 2 lecturers who teach (team teaching). The arrows in Figure 1 also show that groups 1 and 3 face each other in groups 2 and 4. This group design can evoke activeness in group discussions because a sense of competition in the class can be raised. So that communication will be established as the embryo of social interaction between students, both internal communication within the group and interactions outside the group [19]. According to Eranil et.al [20], the design of learning groups in the learning process greatly influences the activeness of group discussion in the classroom.

One proof of the emergence of social content in elementary natural sciences learning is also seen in elementary natural sciences learning textbooks discussed during the lecture process. Many math problems that appear in textbooks are made contextually so that there are many social elements in the problems discussed in lectures in class. Especially at the thematic level of basic education, social themes will certainly emerge in the learning process. Thus, it is important for prospective teachers in this case students can link
social aspects in learning, including in learning natural sciences [21].

Overview of Student Social Interaction

Based on the results of a survey conducted with 100 students as respondents, researchers made social interactions. The model of social interaction created is between student and student. The social interaction model between students and students is described as follows:

![Figure 2. Models of student social interaction with students](image)

Figure 2 shows that the process of interaction between students begins with ideas. Then the process continues on the verbal communication patterns of each student. This stage of verbal communication distinguishes social interaction between student A and student B or students from one another. After that, there will be an admission process from student B. This process can then result in the form of associative or dissociative. If the results of the processing are associative, the social interactions that will be formed are cooperation, assimilation, accommodation, and acculturation. However, if the results of the processing are dissociative, then the form of social interaction is competition, convention, and conflict [13].

Based on the explanation, one of the key factors in the process of interaction between students is communication skills, especially verbal communication. According to Haidar & Janing [22], verbal communication is one of the main tools for an individual to be able to form relationships and socialize with other individuals.

Relationship of Social Interaction with Natural Sciences Learning Outcomes

To see with certainty whether there is an association between students’ social interactions and natural sciences learning outcomes, the researchers conducted a simple linear regression test. The data offered are the results of a survey given a score in the range 1-4. While the data of natural sciences learning outcomes in UAS subjects in the previous semester's elementary natural sciences subjects Before conducting a regression test using SPSS software, researchers first estimate the value in order to reach the same scale of 1-100 (equating to the value of the best natural sciences learning outcomes). The following results of the regression test and its interpretation:
Table 1. The results of the analysis of the relationship between the two variables

<table>
<thead>
<tr>
<th>Value</th>
<th>Social Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person Corelation Value</td>
<td>1.000</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>.526</td>
</tr>
</tbody>
</table>

| Sig. (1-tailed) Value | .000 |
| Social Interaction | .000 |

| N Value | 100 |
| Social Interaction | 100 |

Source: SPSS data analysis

Table 1 shows the results of the correlation of regression tests using SPSS. It can be seen that the Sig- (1-tailed) value of the data is 0.000. Because of the value > 0.05, it can be concluded that there is a relationship between social interaction and student natural sciences learning outcomes [23;24]. To see how strong the connection is we can see Table 2 below.

Table 2. The results of the data are not a strong relationship between the two variables

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df1</td>
</tr>
<tr>
<td>1</td>
<td>.526a</td>
<td>.276</td>
<td>.269</td>
<td>7.24358</td>
<td>.276</td>
</tr>
</tbody>
</table>

Source: SPSS data analysis

Table 2 shows that the R-value in the Model Summary table is 0.526. This value indicates that the relationship between social interaction and student natural sciences learning outcomes is quite strong. Furthermore, the Anova results in Table 3 below can indicate the effect or absence of influence between the two variables [25].

Table 3. Result of influence data between 2 variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1</td>
<td>1.961.988</td>
<td>37.393</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>98</td>
<td>52.470</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>99</td>
<td>7.104.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SPSS data analysis

Table 3 shows that the significant value in the Anova table is 0.000. Because the value > 0.05, it is said that there is an influence between social interaction and natural sciences learning outcomes [26].

Based on the explanation above, it can be seen that between social interaction and student natural sciences learning outcomes have a relationship. The relationship between these two things is quite strong. The above results also show that the social interactions that students have can affect their natural sciences learning outcomes [26;27]. Thus, the lecturer must also pay attention to the social interactions of students in the lecture process so that the objectives of the lecture can be achieved and the information that is trying to be transferred to students becomes more maximal.
CONCLUSION

Based on the results of research and discussion it can be concluded that (1) Natural science content in the lecture process has been tried to be raised by lecturers. The lecture system that makes discussion groups can improve communication skills, and institutions that support membership. This will impact the ability of students to support society among students. (2) Furthermore, the description of social interaction can be modeled. Social interaction models show that social interaction can be associative and dissociative. (3) Finally, the results of the study also show that there is a relationship between social interaction and natural sciences learning outcomes. The relationship is quite strong and social interaction can affect student natural sciences learning outcomes.

Research suggestions are addressed to lecturers who support courses, lecturers should pay attention to the lecture system that can stimulate the emergence of social interactions that occur between students. For further research, deepening can be carried out in aspects of social interaction to other more recent aspects, such as 21st-century thought processes or digital literacy. This needs to be done so that the horizons of studies related to social interaction can be richer and become additional insights for the general public, especially for education practitioners such as teachers and lecturers.

REFERENCES


