A Study on Evaluation of the Quality of Group Study

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Abstract - This research aims at finding how to evaluate the student’s teamwork ability. It is not easy to evaluate the teamwork ability, because the teamwork ability is synthetic and has no simple objective indicator.
We examined the relations between the team record and the standard deviation of peer-evaluation in the team, the improvement of self-evaluation so far. It was found that there were correlations between them. However, these correlations were poor, and it was insufficient for evaluating the quality of the group study only with these correlations. In this report, we will report the results of our examination on the relation between the team record and the team peer-evaluation that students assessed other team activities compared with their own team activities. We totaled these individual evaluation results in the team, and took the team peer-evaluation. It was found that the correlation is good and it may be able to evaluate the quality of the group studies from the result of the team peer-evaluation.

Index Terms – teamwork ability, quality of group study, evaluation indicator, team peer-evaluation, synthetic ability

1. INTRODUCTION

Ability to function well as a member of a team is one of the most important nature as an active engineer in the society. So, we aim to improve the student's teamwork ability at the subject named Engineering Design 1&2 which is done with the PBL form. However, it is difficult to evaluate it simply because this teamwork ability is synthetic and there is no simple objective indicator. So the purpose of this study is to find how to evaluate the student’s teamwork ability. At present, we evaluate the student's record by the team products such as the report which the team submitted. However, the qualities of these products depend on the other individual abilities of the member of the team and it can't be said that it is accurate for the evaluation of the student’s teamwork ability (Refer to Figure 1.)

Though there are many reports focused on the education of the team activities or the evaluation of the teamwork ability done for the schoolchild or the junior high school students in Japan, however, it is a little different from the teamwork ability which is necessary for the engineer whom we are making the target. Matsumoto and et al [1] analyzed the relation between the individual result of the peer-evaluation in the team and their activities during the semester in the classroom and they reported that relevance. Lisa M. Donahue and et al. [2] shows the items that the teamwork ability should be evaluated, and define those meaning. They took seriously the items which are useful in the society soon for evaluating the teamwork ability. On the other hand, Orland M. W. et al. [3] is using the actual activity items in the team as the evaluation items.

We thought that the quality of the group study depend on the member's teamwork ability directly. We evaluated the group studies by the item of 130 and more about the activities as to not only the documents of the team but also the activities in the daily classroom and the oral presentation. We thought that this result showed the quality of the group studies, and took the team record. Then, we examined the relations between this team record and the peer-evaluation of the team contribution, the self-evaluation of the improvement in the individual’s ability, and reported our study results at the ICEER 2004 CZ, and at the ICEE 2005 Glawice POL up to now. This time, we will report our study result on the relations between the team record and the team peer-evaluation that students evaluate other team's activities compared with their own team's activities at the end of a term.

2. OUTLINE OF THE ENGINEERING DESIGN 1&2.

2.1 The outline of the class management.

The important goal for the education of Kanazawa Institute of Technology is to bring up the student to the engineer who is active in the society. We implement Engineering Design 1&2 as that leading class [4]. That important goal for learning is improvement in the synthetic ability like student's teamwork ability. This Engineering Design 1&2 are opened for all of the freshmen and sophomore about 1500-1700 students by 40-50
classes, and each class is divided into 5-7 teams, and therefore each team is composed of 5-7 students. A team to say here is as the following. It is composed of some members, the member is active in the relations of in the limited time, reciprocity, mutual enlightenment to the same goal to attain, and the members share the management and the work. And it is a group to work by the cooperation to increase the biggest team products.

We prepared six systems so that the team might become active and these are shown in TABLE 1.1, and Figure 2.1 shows a scene of the poster session.

**TABLE 1.1**  
**SYSTEM TO PROMOTE THE TEAM ACTIVITIES**  
- Parts Shearing and Turning in Rotation  
- Team Leader Submit Leader Report  
- Recorder Submit Team Weekly Report  
- Class Master Record Activities of Each Member  
- Make Activity Plan at the End of Every Week  
- Peer-Evaluation at the 5th and 9th week

### 2.2 How to evaluate the team record

Output of the team shown in the table 2.1 was evaluated as the team record by the item of about 130 in detail. As an example, evaluation items of oral presentation are shown in table 2.2.

By the way, 30% of the rest of the individual evaluation was added to the 70% of the team record, and the record of the each student was decided.

**TABLE 2.1**  
**EVALUATION OBJECTS OF TEAM RECORD AND ITS DISTRIBUTION**  
<table>
<thead>
<tr>
<th>Evaluation Items</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission Files of Every Week</td>
<td>15</td>
</tr>
<tr>
<td>4,6,8th Oral Presentation and Discussion</td>
<td>5</td>
</tr>
<tr>
<td>Final Oral Presentation and Discussion</td>
<td>10</td>
</tr>
<tr>
<td>Final Submission File</td>
<td>30</td>
</tr>
<tr>
<td>Poster, Presentation and Discussion at the Poster Session</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
</tr>
</tbody>
</table>

**TABLE 2.2**  
**EVALUATION ITEMS OF ORAL PRESENTATION**  
1. Are the title, the presenter's name, the flow and the conclusion definite?  
2. Is the explanation easy for you to understand?  
3. How is the quality of the slide?  
4. How is the quality of the contents?  
5. Is the presentation time proper?

### 3. THE OUTLINE OF OUR RESEARCH SO FAR

#### 3.1 The peer-evaluation and the self-evaluation system

The student evaluated the degree of the team contribution of the team member mutually at the end of the term by five heads. These five valuation items are shown in the table 3.1. The method to evaluate it is as the following. Each member distributes a total 1,000,000 yen to the member except for oneself corresponding to the degree of the team contribution. The result of the evaluation of the student F is shown as an example in the table 3.1 too. It knows that he excludes himself, and he distributes 1,000,000 yen.

**TABLE 3.1**  
**AN EXAMPLE OF PEER-EVALUATION (STUDENT F; K-YEN)**  
<table>
<thead>
<tr>
<th>EVALUATION ITEMS</th>
<th>STUDENT A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPINION EXPRESSION</td>
<td>40</td>
<td>60</td>
<td>40</td>
<td>40</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>LISTEN TO OTHER OPINION</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>LEADERSHIP</td>
<td>50</td>
<td>40</td>
<td>50</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>RESPONSIBILITY</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>QUALITY OF HIS WORK</td>
<td>50</td>
<td>40</td>
<td>40</td>
<td>30</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>240</td>
<td>200</td>
<td>210</td>
<td>170</td>
<td>180</td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, every student evaluated the ability of himself of 3 times during the semester about 24 heads which relates to this class. They registered his evaluation results through the class homepage.

#### 3.2 Results of the examination

**Relation between the team records and the peer-evaluation**

We calculated the standard deviation of the student's peer-evaluation in each team, and examined the relation with the team record. When the standard deviation was about 15%, as for the team record, it found that it became the highest as that result.

**Relation between the team records and the self-evaluation**

Each student's amount of improvement of the self-evaluation during the class was totaled in each team, and the relations between that result and the team record were investigated. As for the amount of improvement of the self-evaluation of a team and the team record, it found that they are in straight line
relations in many cases as that result. However, there is a case which doesn't show the correlation at all, too.

Therefore, it found that it was insufficient to evaluate the quality of the group studies only by these correlations.

4. Study on the Correlation Between the Team Peer-Evaluation and the Team-Record

4.1 Method of the Team Peer-Evaluation

At the end of a term, students of 4 classes of the sophomore whom we took charge of in 2005 years, assessed other team activities compared with their team activities concerning four items with +1, 0 and - 1. That is, each student writes in his evaluation with +1, 0 and -1 for the every four items and for each team.

The member composition of these classes is shown in the table 4.1, and the four valuation items are shown in the table 4.2.

<table>
<thead>
<tr>
<th>CLASS NAME</th>
<th>NUMBER OF STUDENTS</th>
<th>NUMBER OF TEAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HM (Media informatics)</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>EM (Mechanical eng.)</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>EE (Electrical eng.)</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>EA (Aeronautics)</td>
<td>22</td>
<td>4</td>
</tr>
</tbody>
</table>

4.2 Team-Peer-Evaluation Results

The result that the student A of team 5 evaluated other teams was shown as an example in the Table 4.2. Such individual evaluation of the each team was added to every team in their team except for their team. We defined this result Team Peer-Evaluation of the team. The team peer-evaluation of the team EE-5 is shown as an example in the figure 4.1. The column of team NO.5 in the figure 4.1 is an evaluation zero because it is their team.

As for each student's evaluation, it is understood that it is greatly different from the figure 4.1. The result of the evaluation of these each teams was put together in the class. We named these results as Team Peer-Evaluation of the class. The result of the Team Peer-Evaluation of the class EE is shown as an example in the figure 4.2.

4.3 The Analysis of Relations between the Team Peer-Evaluation and the Team Record

The results of the team peer-evaluation of each team were plotted to the team record explained in the section 2.2 for every class. These are shown in the figure 4.3 ~ figure 4.6. The square of the coefficient of correlation R was shown together in these figures. As for the team record and the team peer-evaluation, it found that the very good correlation was shown from these figures for every class. Student can evaluate other teams comparatively honestly because his evaluation result doesn't influence his record directly when the students evaluate other teams, as the result, we thought that it could get so good the correlation. And if the evaluation by many people is put, the evaluation of such synthetic ability can be thought almost to become right.

To remove the character of each class, the record and the peer-evaluation value of each team were standardized by the difference in each highest value and bottom line. The result put together four classes was shown in the figure 4.7. We know that in spite of the number of data are 21, the coefficient of correlation R became about 0.78 in the figure 4.7. So, it is understood that the correlation between the team record and the team peer-evaluation is still good.
5. Conclusion

We thought that the member's teamwork ability appeared in the quality of the group study directly. Then, we evaluated the team record by the group activities of about 130 items in the class aiming to improve the student's teamwork ability. The relation between this team record and the peer-evaluation in the team and the amount of improvement of the self-evaluation were examined so far.

This time, the student evaluated other team activities compared with his team at the end of a term. And the relations between the team peer-evaluation that the individual evaluation result was totaled in the team and the team record were examined. As the result, it is understood that there is very good correlation between them, and it may be able to evaluate the quality of the group study from the result of the team peer-evaluation.

References


