The Effect of Incentives on Promoting Student Autonomy: A case study of web-based language learning

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<th>著者（英）</th>
<th>Midori Iba</th>
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The Effect of Incentives on Promoting Student Autonomy:
A case study of web-based language learning

Midori Iba

Abstract
Research on learner autonomy has commanded considerable attention in the past few decades. In addition, advances in computer technology have broadened the field of distance learning. On the other hand, in respect of accreditation in higher education, students have been encouraged to study using computers outside the classroom by way of supplementary learning. If students are sufficiently motivated and willing to study, it would not be problematic both for teachers and students. However, not all students are motivated to study outside the classroom and will not complete e-learning programs satisfactorily. How can teachers enhance students’ motivation and make them study autonomously?

My research compares two groups of students who enrolled in English listening
courses in different years, 2012 and 2013. They were instructed how to use the web software and were advised to use it for self study outside the classroom. The difference between the two groups was that the 2013 students were given some incentive by the present writer. Specifically, they were told that they would receive three extra percentage points when graded if they took pretest, participated and completed the training and took the posttest. The results of pretests and posttests of each group, as well as the number of students who completed the study, were compared and analyzed to examine the effect of the incentive on their response. Based on my interpretation of these results, suggestions for further studies are also discussed.

Keywords: incentive, student autonomy, computer-assisted language learning

Introduction

In the literature of language learning, there is general agreement on how difficult it is to enhance student autonomy, namely, to enhance student engagement in and out of the classroom (Toyoda & Harrison, 2002). It has been argued that effective feedback is highly necessary for motivation, empowerment, retention and development of self-critical learning skills for first year students at university (Nicol, 2008; Race, 2009). The Open University, with 40 years of experience and over two million graduates, is one of the major providers of distance education. Retention was seldom considered a problem in its earlier days. However, the university attracts many more young students seeking marketable degrees than in the past. The university’s provision has moved decisively towards named degrees with prescribed pathways. Retention has thus become a serious issue for the university. Currently, only four in 10 first year students progress to take another module in the second year (Chetwynd & Dobbyn, 2011). On the other hand, research suggests that motivation contributes to language learning outcomes independently from language aptitude (Wigfield & Wentzel, 2007). If positive motivation is fostered among students, it will improve language education for all students.

Other psychological fields have been discussed among researchers. Most recently, several theories focus on motivational change and revolution: goal-directed behavior (Boekaerts, de Koning & Vedder, 2006), identity development (Roeser & Peck, 2009) and Self-Determination Theory (La Guardia, 2009).
According to La Guardia (ibid.), Self Determination Theory suggests that intrinsic motivation and internalization, and identity development are molded by three basic psychological needs: autonomy, competence, and relatedness. Autonomy refers to actions that learners initiate and regulate themselves with a positive attitude. Competence means learners’ feelings of content mastery or intellectual challenge. Relatedness refers to the need to feel acceptance by others such as teachers, parents and peers. Intrinsic motivation and extrinsic motivation are the important concepts in this Self Determination Theory. Intrinsic motivation is based on autonomy and competence. For example, learners enjoy learning due to inherent interest and they are satisfied with what they have acquired, which is ‘competence.’ Extrinsic motivation refers to motivation that was induced in individuals from outside. The motivation factors are external. Learners expect some rewards which provide satisfaction that the task may not offer such as money or a grade. Extrinsically motivated learners will work on a task even when they are not very interested in it. Bainbridge (2013) refers to extrinsic motivation as follows:

Extrinsic motivation does not mean, however, that a person will not get any pleasure from working on or completing a task. It just means that the pleasure they anticipate from some external reward will continue to be a motivator even when the task to be done holds little or no interest. An extrinsically motivated student, for example, may dislike an assignment, may find it boring, or may have no interest in the subject, but the possibility of a good grade will be enough to keep the student motivated in order for him or her to put forth the effort to do well on a task.¹

The idea that “the possibility of a good grade will be enough to keep the student motivated” as mentioned above, sounds appropriate, and would be generally accepted. However, I have been interested in how true it proves to be in the real classroom.

In this study I compared two groups of students who enrolled in English listening courses in 2012 and 2013, I advised them to use web software which was created as a self-study tool to prepare for the TOEIC. To enhance students’ extrinsic motivation, the merits of joining the training session were explained. The difference between the two groups was that the 2013 students were given an additional incentive. They were told that they would receive three extra percentage

¹ Underlined by the present writer.
points when graded if they took pretest, participated and completed the training and took the posttest.

As for the training software, Yamada (2013), the developer of the software, reports that at least 20 hours are needed for the training to have effect, which is also examined in this study. Thus, the research questions of the study are as follows.

**Research questions**

1) Does an incentive (announcement that participants who completed the training will receive extra points in grading) affect the training of the students?
   - The rate of participation

2) Do the results of the training support the theory of the twenty-hour training effect?
   - The relation between training hours and training outcomes

3) Are there any differences to be noted between male students and female students in relation to the training session?

**Method**

**Participants**

A total of 107 Konan University students (Year 2012, 54 students: Year 2013, 53 students) from an Intermediate Listening Course (2 classes) were invited to take part in a computer self-study TOEIC preparation course outside the classroom. Ninety four students out of 107 (Year 2012, 42 students: Year 2013, 52 students) took the pretest. See Table 1. However, the number of students who both completed the training course and took the posttest is relatively few. See Table 2 in Results.
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Table 1. Numbers of pretest participants in 2012 and 2013

<table>
<thead>
<tr>
<th></th>
<th>Male (Enrolled)</th>
<th>Pretest</th>
<th>Male (Enrolled)</th>
<th>Pretest</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>33</td>
<td>23</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>2013</td>
<td>27</td>
<td>26</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>49</td>
<td>47</td>
<td>45</td>
</tr>
</tbody>
</table>

Note. (Enrolled)=The students who enrolled in the listening course

Students who enrolled in the course had taken a GTEC placement test. They were placed in one of the top level classes. Participants’ ages ranged from 19 to 21 years; the mean age was 20 and there were no outliers. Most were second year students. Forty-seven percent of participating students were female, a higher percentage than the actual student population (35%). As shown in Figure 1, they belonged to different faculties of the university. None had spent more than one month in an English speaking country. They reported normal hearing and vision.

Figure 1. Numbers of participants by faculty

![Graph](image.png)

Note. S&T: Science and Technology

Software

Participants in the study accessed the website named ATR CALL BRIX. ATR CALL is a computer-based English learning system. It was created from the results of 20 years of research into spoken language learning at the Advanced Telecommunications Research Institute International (ATR). According to ATR,
people vocalize an accurate pitch by sensing their own voice internally. Even when reading or writing, people vocalize in the brain. Thus, one of the main features of ATR CALL is that it is based on speech sound. It is the basis of the four skills.

ATR BRIX is an e-learning system that incorporates the full concept of ATR CALL. Its extensive contents cover a wide range of educational levels from elementary school to university. The TOEIC preparation course was adopted in the study. The progress of each participant can be checked via the Learning Management System (LMS).

Figure 2. ATR BRIX interface

Procedures of data collection

Each participant was provided an ID and a password and instructed how to use ATR BRIX at home. As the software is designed for use with Internet Explore, those participants without a computer at home or access to the Internet were asked to use computers in a self-study room on campus. Participants were informed that the software was designed to improve all four English skills and participation in the program was not mandatory. In 2012, as the TOEIC preparation courses of ATR BRIX were still in the period of trial operation, the performance of the software was not stable. Under these conditions, it was not possible to award extra percentage points by way of incentive for taking the pretest, completing the training and taking the posttest. As for the 2013 participants, since the operational problems of the software were resolved by this time, it was possible to offer the incentive. The period of the training session was approximately three months.
Before participants began training, they took a pretest on the web. They were encouraged to practice as much as possible during the training period. At the conclusion of the period, they took a posttest on the web which was different from the pretest\(^2\).

The results of the pretest, the posttest and training sessions were automatically preserved in data storage on the web. These were checked easily via LMS. An administrator can interact with each participant using LMS. However, I didn’t use the interactive procedure because I wished to focus on the effect of the incentive on student autonomy.

**Statistical Analyses**

Two analyses were done for this study. In Analysis 1, the Multi-way analysis of variance (ANOVA) was used to measure the difference between the pretest and the posttest. In order to avoid a drawback in the normal ANOVA, a regression analysis was adopted to maintain the same results drawn from the Multi-way analysis.

In Analysis 2, a regression analysis called the ordinary least square (OLS) with heteroscedasticity-robust standard error was adopted to see the relation between study hours and scores.

**Results**

The total number of participants who took the pretest, completed the training and took the posttest is shown in Table 2.

Both the students who enrolled in the listening course in 2012 and 2013 were encouraged to join the training. The common incentive they were given was that if they joined the training they would improve their English skills. The additional incentive for 2013 students was if they completed the training they would acquire three percentage points in their grade. Table 2 shows the stronger effect of the additional incentive to participants. Compared to the 2012 students, most of the 2013 students took the pretest (male: 26 out of 27, female: 26 out of 26). The number of students who studied more than 20 hours is shown in Table 3.

\(^2\) The pretest and the posttest had been created by ATR. ATR BRIX has a variety of these kinds of tests for each course.
The number of participants who worked more than 20 hours was two in 2012 and seven in 2013. Both numbers are quite low but more students tended to complete in 2013. If the condition of “more than 20 hours” were changed to “more than 10 hours,” the same tendency (4 in 2012 and 10 in 2013) would be observed as in Table 3.

Analysis 1 Comparison of the pretest and the posttest using ANOVA

Table 2. Participants who completed the training and took the posttest

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Enrolled)</td>
<td>Pretest</td>
<td>Training</td>
</tr>
<tr>
<td>2012</td>
<td>33</td>
<td>23</td>
<td>9</td>
</tr>
<tr>
<td>2013</td>
<td>27</td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>49</td>
<td>25</td>
</tr>
</tbody>
</table>

Note. (Enroll) = Students who enrolled the listening course.

Table 3. Participants who studied more than 20 hours and more than 10 hours

<table>
<thead>
<tr>
<th></th>
<th>More than 20 hours</th>
<th>More than 10 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The number of participants who worked more than 20 hours was two in 2012 and seven in 2013. Both numbers are quite low but more students tended to complete in 2013. If the condition of “more than 20 hours” were changed to “more than 10 hours,” the same tendency (4 in 2012 and 10 in 2013) would be observed as in Table 3.

Analysis 1 Comparison of the pretest and the posttest using ANOVA

Table 4. Comparison of the pretest and the posttest

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Average pretest score of 2013</td>
<td>41.712</td>
<td>1.260</td>
<td>33.110</td>
<td>0.000</td>
</tr>
<tr>
<td>2 Increase in test score (post minus pre) of 2013</td>
<td>27.803</td>
<td>5.355</td>
<td>5.192</td>
<td>0.000</td>
</tr>
<tr>
<td>3 Average pretest score of 2012 against 2013</td>
<td>-3.807</td>
<td>2.415</td>
<td>-1.576</td>
<td>0.117</td>
</tr>
</tbody>
</table>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Average posttest score of 2012 against 2013</td>
<td>-5.963</td>
<td>8.697</td>
<td>-0.686</td>
</tr>
<tr>
<td>5</td>
<td>Female posttest score of 2013 against male</td>
<td>0.169</td>
<td>0.064</td>
<td>2.637</td>
</tr>
<tr>
<td>6</td>
<td>Female posttest score of 2012 against male</td>
<td>0.177</td>
<td>0.095</td>
<td>1.858</td>
</tr>
<tr>
<td>7</td>
<td>Posttest average score of 2013 (worked more than 20 hours)</td>
<td>0.092</td>
<td>0.061</td>
<td>1.511</td>
</tr>
<tr>
<td>8</td>
<td>Posttest average score of 2012 (worked more than 20 hours) against 2013</td>
<td>0.128</td>
<td>0.059</td>
<td>2.178</td>
</tr>
<tr>
<td>9</td>
<td>Female posttest average score (worked more than 20 hours) against male</td>
<td>-0.002</td>
<td>0.001</td>
<td>-2.306</td>
</tr>
</tbody>
</table>

Note. Adjusted R square=0.630, n=146

The following is the results of Analysis 1 shown in Table 4.

1. The average pretest score of 2013
   The estimated coefficient score is 41.712 out of 100.

2. The increase in test score of 2013
   The average score increased by 27.8 points after giving incentive and is statistically significant. The posttest average score is about 69.5 (41.7+27.8)

3. The average pretest score of 2012 against 2013
   The pretest average score of 2012 is lower than that of 2013 by 3.81 points but not statistically significant.

4. The average post-test score of 2012 against 2013
   The posttest average score of 2012 is lower than that of 2013 by 5.96 points but not statistically significant.

5. The female post-test score of 2013 against male
   The female posttest score of 2013 is higher than male's 2013 by 0.17 points and statistically significant.

6. The female post-test score of 2012 against male
   The female posttest score of 2012 is higher than male's 2012 by 0.18 points and statistically significant at 6.5% level.

7. The post-test average score of 2013 (worked more than 20 hours)
   The Students who worked more than 20 hours are expected to get higher scores than other students, but this hypothesis is not true for the case of 2013.
8. The post-test average score of 2012 (worked more than 20 hours) against 2013

The students who worked more than 20 hours got higher scores than other students by 0.22 points (0.092+0.128) for the case of 2012 and this result is statistically significant.

9. The female post-test average score (worked more than 20 hours) against male

The female students who worked more than 20 hours achieved a slightly lower score (-0.002) and this is statistically significant (for 2012 and 2013).

The following figures show the difference between the 2012 participants and 2013 participants.

**Figure 3. The difference of scores in 2012**

**Figure 4. The difference of scores in 2013**
Table 5. Study hours and scores

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Estimated Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Hours of study (male)</td>
<td>0.471</td>
<td>0.202</td>
<td>2.336</td>
<td>0.024</td>
</tr>
<tr>
<td>b Hours of study (female against male)</td>
<td>-0.264</td>
<td>0.291</td>
<td>-0.906</td>
<td>0.369</td>
</tr>
<tr>
<td>c Female dummy</td>
<td>10.917</td>
<td>5.316</td>
<td>2.054</td>
<td>0.046</td>
</tr>
<tr>
<td>d 2012 dummy</td>
<td>-5.627</td>
<td>4.773</td>
<td>-1.179</td>
<td>0.244</td>
</tr>
<tr>
<td>Constant</td>
<td>69.279</td>
<td>4.593</td>
<td>15.080</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note 1. Adjusted R square=0.084, n=52, F(4,47)=2.17 (p-value=0.087)

Note 2. Regression model
Posttest score = constant + a*(hours of study) + b*(hours of study)*(female dummy variable) + c*(female dummy variable) + d*(2012 dummy variable) + random disturbance term

Table 5 shows that the longer male students work, the better score they achieve. This result is statistically significant. The female coefficient is 0.208 (=a+b) and the hypothesis that a+b=0 cannot be rejected. Therefore the female students’ coefficient is considered to be zero. See Figure 5.

Figure 5. The difference between male students and female students regarding hours of study and score

Discussion and Conclusion

This study has some limitations. The number of students who completed the training and took the posttest was lower than I had predicted. Furthermore, the number of students who studied with the software for more than 20 hours was quite low, as in Table 3. Therefore, this study requires further experiments and more evidence for credible conclusion.
Another limitation is that there might be unmeasured variables in analyses. Unlike experiments in laboratories which can control settings precisely, this study observed real students who didn’t recognize themselves as participants in an experiment. Laboratory experiments typically offer remuneration to participants. As a result, participants’ commitment to experiments might differ from this kind of study.

However limited, my hope is that this study contributes to the literature on incentives and motivation by answering research questions set out at the beginning of this article.

**Research questions and answers**

1) Does an incentive (the announcement that participants completing the training will receive extra points in grading) affect the training of the students?

Probably yes. The common incentive (the announcement that participants will improve their English skills by joining the web training session) for both 2012 students and 2013 students was not so affective as the 2013 incentive (the announcement that participants completing the training will receive extra points in grading). The hypothesis that the extra-points incentive is closely related to student motivation can be easily predicted, and in reality the rate of participation in 2013 was higher than that in 2012. See Figure 6 and Figure 7.

**Figure 6. Pretest: the rate of participation (%)**

![Figure 6. Pretest: the rate of participation (%)](chart.png)
However, as mentioned above, if compared to a controlled laboratory experiment, this study deals with real students outside the classroom. Thus it would be oversimplifying to attribute the difference between 2012 students and 2013 students to a single three-point incentive.

2) Do the results of the training support the theory of the twenty-hour training effect?

Interestingly, this question cannot be answered so simply. There was no significant difference to support the theory in the results of 2013. However, in 2012, male participants tended to achieve higher scores. Further investigation regarding the theory is needed because the number of participants who completed the twenty-hour training is too few to conclude.

3) Are there any differences to be noted between male students and female students in relation to the training session?

Regarding the posttest, both male and female participants achieved higher scores than in the pretest. The effect of the training would account for this. The total scores of female students were somewhat higher than male students. This tendency can be seen in both years and statistically proved to be true.

Regarding the relation between study hours and scores, the longer male students worked, the better results they achieved. It is too early to draw conclusions from this tendency, because relatively few males took part in the sessions. Further research is also needed for this question.
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