Structure of Learning Motivation of Japanese High School EFL Learners:
Scale Development and Cross-validation

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Abstract

In preceding studies, Ichikawa (1998) proposed the Two-axis Model of learning motivation for school subjects in general. Maeda (2003) modified those items for English learning and applied the model to high school EFL learners in Japan. This study was initiated as a sequel to Maeda (2003) to: 1) investigate cross-validation of the model for supporting the results; 2) develop a questionnaire for better measurement reliability; 3) confirm the model to ensure its effectiveness; and 4) present the scale and data as fundamental material for further studies.

Multistage extraction yielded 1,584 participants from 42 high schools in the survey, which included 36 revised question items for learning motivation and 64 test items for learning achievement. Participants were divided into three groups according to achievement tests. Then, Multi-group Confirmatory Factor Analysis investigated cross-validation, confirmed the model, and obtained several kinds of coefficients. Consequently, the four aims were reasonably accomplished. Discussion implies that were distinct learner types because motivation differences are difficult to explain by achievement differences.

1. Background

Learning motivation has remained a frequently mentioned topic among various individual learners’ differences. Maeda (2003) found problems in preceding research, then tried to overcome them using the Two-axis Model (Ichikawa, 1998) shown in Fig. 1. That study assessed many survey participants comparatively, and analyzed them in sophisticated ways including Structural Equation Modeling. Results confirmed the model: the quantity and the quality of the subjects were comparatively reliable to represent Japanese high school EFL learners. The structure of learning motivation was shown and discussed in terms of learning achievement.
High

Importance of Learning Contents

Low

Fulfillment
Enjoy learning itself

Training
Train ability

Practicality
Utilize ability in life

Relation
Tempted by others

Self-respect
Respect oneself or compete with others

Reward
Be rewarded

Low

Utility of Learning Results

High

Figure 1. The Two-Axis Model of Learning Motivation (Ichikawa, 1998)

However, some problems remain. Some improvement can be made in terms of scale development. Maeda (2003) used 18 items (observed variables) for 6 factors (latent variables) in the questionnaire; thereby, only 3 items are analyzed for each factor. Though a smaller number of items is preferable from the perspective of survey practicality, stable analysis of outcomes requires more observed variables for each latent variable.

Another problem is data and model validity. Maeda (2003) obtained 1,177 participants from 15 high schools. The quality of the subjects seems varied. The quantity can be considered sufficient, but they are extracted arbitrarily through personal acquaintance with the author. For validity, content validity and construct validity are carefully discussed in the process of model building (e.g. Ichikawa, 1998). It seems hasty to conclude the research effort with one survey because Maeda (2003) applied this model, which was developed in the context of educational psychology, in the English language education area. Therefore, this study confirms the model using another data set to investigate its cross-validity.

2. Purpose

The present study was designed as a sequel to Maeda (2003). The following four aims are intended to improve some insufficient points in the preceding study and investigate the structure of learning motivation of Japanese high school EFL learners further:

1) Cross-validation: obtain sufficiently numerous and varied survey participants to engender inference that the data represent Japanese high school EFL learners.

2) Scale development: prepare more items as observed variables for each latent variable and revise their expressions.
3) Model confirmation: investigate the degree to which the model from preceding studies fits data of this study.
4) Scale and data presentation: provide investigated question items and data as fundamental material for further research.

3. Survey

3.1. Subjects

This multistage extraction method was based on a list with names and sizes of high schools in Japan. Of 455 solicited schools, 42 agreed to participate. Finally, 1,584 answer sheets were analyzed.

3.2. Materials

This study measured learning motivation with a questionnaire comprising 36 question items revised from Ichikawa (1998) and Maeda (2003). Carefully prepared for stable measurement with a sufficient number of observed variables, each factor was measured with six items. Responses were collected on a five-point scale, from “5. I quite agree.” to “1. I quite disagree.” Although the original questionnaire (e.g. Horino and Ichikawa, 1997) was designed with a seven-point Likert scale, a five-point scale was considered preferable because participants seem to answer easily and multiples of five seem simpler, especially when designing applications in educational settings.

Learning achievement was measured with the 64-item C-test, which was used in Maeda (2001) and Maeda (2002). This test form, designed to require 5 min, was used only for survey practicality.

3.3. Procedures

Professional typists typed all answer sheets: typing was verified by inputting data of each sheet twice to be collated. Missing values were not systematic. Therefore, they were ignored by each variable in summing them into a frequency table, or estimated by Maximum Likelihood Method in conducting Multi-group Confirmatory Factor Analysis. Regarding software, SPSS® Base 11.5.1 and Amos® 4.0.2 were used.

Subjects were divided into three groups by their C-test performance. Similarly to the preceding study (Maeda, 2003), the High Achievement Group (HA) comprising those whose scores were higher than the $M + 0.5\ SD$, and the Lower Achievement Group (LA) comprising those whose scores were lower than the $M - 0.5\ SD$. The Middle Achievement Group (MA) comprised those whose scores were from $M - 0.5\ SD$ to $M + 0.5\ SD$.

Answers to question items were counted and calculated into a table with means. Multi-group Confirmatory Factor Analysis investigated cross-validity of the model and results in Maeda (2003) by
confirming the degree to which the model explains data and tendencies of participants’ learning motivation related to learning achievement (HA, MA, and LA).

3.4. Results

Figure 2 shows distribution of C-test scores of participants. Table 1 shows statistics. The maximum possible score of the C-test was 64. Values from Maeda (2003) are cited in parentheses for comparison. Responses of the entire group of subjects and the three groups to each item are summed into Table 2. As stated above, this study reexamines Maeda (2003) and its latent variables; however observed variables, question items, are added or revised for scale development. Therefore, direct data comparison of previous results to present data is impossible here.

![Figure 2. Distribution of the C-test score](image)

Table 1. Result of the C-test (N=1584)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,584 (1,177)</td>
<td>28.27 (29.41)</td>
<td>9.97 (9.50)</td>
</tr>
<tr>
<td>HA</td>
<td>481 (385)</td>
<td>40.06 (39.54)</td>
<td>5.00 (4.13)</td>
</tr>
<tr>
<td>MA</td>
<td>572 (432)</td>
<td>28.49 (29.76)</td>
<td>2.89 (2.89)</td>
</tr>
<tr>
<td>LA</td>
<td>531 (360)</td>
<td>17.36 (18.15)</td>
<td>4.47 (5.47)</td>
</tr>
</tbody>
</table>
Table 2. Means of the questionnaire (N=1584)

<table>
<thead>
<tr>
<th>Item No.</th>
<th>M</th>
<th>Item No.</th>
<th>M</th>
<th>Item No.</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfillment 1</td>
<td>3.1/3.3/3.0/2.9</td>
<td>Training 1</td>
<td>2.6/2.7/2.5/2.5</td>
<td>Practicality 1</td>
<td>3.1/3.4/3.1/2.8</td>
</tr>
<tr>
<td>Fulfillment 2</td>
<td>3.5/3.8/3.6/3.2</td>
<td>Training 2</td>
<td>2.8/2.9/2.8/2.7</td>
<td>Practicality 2</td>
<td>3.1/3.3/3.2/2.9</td>
</tr>
<tr>
<td>Fulfillment 3</td>
<td>3.3/3.5/3.3/3.1</td>
<td>Training 3</td>
<td>2.6/2.7/2.7/2.5</td>
<td>Practicality 3</td>
<td>3.6/3.8/3.6/3.3</td>
</tr>
<tr>
<td>Fulfillment 4</td>
<td>3.5/3.7/3.5/3.3</td>
<td>Training 4</td>
<td>3.1/3.3/3.2/2.9</td>
<td>Practicality 4</td>
<td>3.0/3.2/3.0/2.8</td>
</tr>
<tr>
<td>Fulfillment 5</td>
<td>2.9/3.1/2.9/2.7</td>
<td>Training 5</td>
<td>2.8/2.9/2.8/2.6</td>
<td>Practicality 5</td>
<td>3.1/3.3/3.1/3.0</td>
</tr>
<tr>
<td>Fulfillment 6</td>
<td>3.0/3.2/3.0/2.8</td>
<td>Training 6</td>
<td>2.7/2.8/2.7/2.7</td>
<td>Practicality 6</td>
<td>3.5/3.6/3.5/3.2</td>
</tr>
<tr>
<td>Relation 1</td>
<td>3.0/2.9/3.0/3.1</td>
<td>Self-respect 1</td>
<td>2.6/2.6/2.6/2.5</td>
<td>Reward 1</td>
<td>2.6/2.7/2.7/2.6</td>
</tr>
<tr>
<td>Relation 2</td>
<td>2.1/2.1/2.1/2.1</td>
<td>Self-respect 2</td>
<td>2.3/2.4/2.3/2.3</td>
<td>Reward 2</td>
<td>2.0/2.0/2.1/2.0</td>
</tr>
<tr>
<td>Relation 3</td>
<td>2.6/2.7/2.6/2.5</td>
<td>Self-respect 3</td>
<td>2.4/2.5/2.4/2.3</td>
<td>Reward 3</td>
<td>2.8/2.9/2.9/2.7</td>
</tr>
<tr>
<td>Relation 4</td>
<td>2.7/2.6/2.7/2.7</td>
<td>Self-respect 4</td>
<td>2.8/2.9/2.9/2.7</td>
<td>Reward 4</td>
<td>3.3/3.6/3.4/3.1</td>
</tr>
<tr>
<td>Relation 5</td>
<td>2.4/2.4/2.4/2.5</td>
<td>Self-respect 5</td>
<td>3.0/3.1/3.0/2.8</td>
<td>Reward 5</td>
<td>3.0/3.1/3.0/2.9</td>
</tr>
<tr>
<td>Relation 6</td>
<td>2.8/2.9/2.8/2.8</td>
<td>Self-respect 6</td>
<td>2.9/3.0/2.9/2.7</td>
<td>Reward 6</td>
<td>3.3/3.5/3.3/3.1</td>
</tr>
</tbody>
</table>

Note: Total / HA / MA / LA

The model to simultaneously analyze the three groups is restricted in several ways, as in Maeda (2003). By investigating what is equal and not equal in the model, one can compare values that are not under such equal restrictions and vary according to learning achievement.

Configural invariance and measurement invariance are presumed, as in the preceding study. If these two assumptions are not possible, it becomes more difficult to compare results of one group to others. However, it is known that the restricted model fit the data well (Maeda, 2003), so these two conditions are used. Similarly, inter-factor correlations are not assumed to be invariant here because correlations among latent variables varied reasonably among groups in the previous study. Table 3 provides the result of model comparison with restrictions. Group MA is used as a criterion, setting the factor mean at 0.00 and factor variance at 1.00.

Table 3. Model Comparison by Multi Group Confirmatory Factor Analysis

<table>
<thead>
<tr>
<th>Model: Restriction</th>
<th>RMSEA</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 0: Configural invariance + Measurement invariance</td>
<td>.051</td>
<td>9898.549</td>
</tr>
<tr>
<td>Model 1: Model 0 + Error variances are invariable</td>
<td>.050</td>
<td>9877.660</td>
</tr>
<tr>
<td>Model 2: Model 0 + Factor means are invariable</td>
<td>.051</td>
<td>9955.347</td>
</tr>
<tr>
<td>Model 3: Model 0 + Factor variances are invariable</td>
<td>.051</td>
<td>9981.330</td>
</tr>
<tr>
<td>Model 4: Model 1 + 2</td>
<td>.050</td>
<td>9934.766</td>
</tr>
<tr>
<td>Model 5: Model 1 + 3</td>
<td>.050</td>
<td>9860.598</td>
</tr>
<tr>
<td>Model 6: Model 2 + 3</td>
<td>.051</td>
<td>9937.767</td>
</tr>
<tr>
<td>Model 7: Model 1 + 2 + 3</td>
<td>.050</td>
<td>9917.206</td>
</tr>
</tbody>
</table>
Two indexes of goodness-of-fit are specifically addressed here. The root-mean-square error of approximation (RMSEA) is selected for the judgment of the absolute fitness because comparatively numerous samples and variables are used. On the other hand, the Akaike Information Criterion (AIC) is used for relative fit in model comparison. Model 5 is the best to explain the data here. In addition, this result agrees with the previous study.

The structure of the variables, measurement (causal coefficient to observed variables, intercept of observed variables, and error variances) and factor variances does not vary among the groups. Therefore, factor means and correlation coefficients among factors are brought into focus of comparison among the groups. Tables 4 and 5 present these results comparing the present study and the last study (in parentheses).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Factor</th>
<th>Factor</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfillment</td>
<td>Training</td>
<td>Practicality</td>
<td>Reward</td>
</tr>
<tr>
<td>0.26/0.00/-0.28</td>
<td>0.17/0.00/-0.13</td>
<td>0.22/0.00/-0.30</td>
<td></td>
</tr>
<tr>
<td>(0.16/0.00/-0.30)</td>
<td>(-0.04/0.00/-0.27)</td>
<td>(0.23/0.00/-0.25)</td>
<td></td>
</tr>
<tr>
<td>Relation</td>
<td>Self-respect</td>
<td>Reward</td>
<td></td>
</tr>
<tr>
<td>-0.05/0.00/-0.02</td>
<td>0.08/0.00/-0.14</td>
<td>0.10/0.00/-0.22</td>
<td></td>
</tr>
<tr>
<td>(-0.19/0.00/-0.12)</td>
<td>(-0.08/0.00/-0.27)</td>
<td>(-0.13/0.00/-0.11)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Factor means among the three groups (not standardized)

<table>
<thead>
<tr>
<th>Fulfillment</th>
<th>Training</th>
<th>Practicality</th>
<th>Relation</th>
<th>Self-respect</th>
<th>Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Relation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-respect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Inter-factor correlation coefficients among the three groups (standardized)

Note: HA / MA / LA

56
3.5. Discussion

Survey participants are inferred to comprise a representative sample of Japanese high school EFL learners because they were selected by randomized multistage extraction. In addition, distribution of C-test performance (Fig. 2) may be regarded as a normal distribution. Moreover, the score strongly resembles that of the preceding study. These facts support the representativeness of the samples in both the present study and the previous one.

Regarding strength of learning motivation, the item means (Table 2) indicate two findings. One is that greater difference among the groups is engendered in content-attached factors (Fulfillment, Training, and Practicality), rather than content-detached ones. Learners at higher achievement levels tend to show stronger motivation than those in lower levels in general; differences in content-attached factors are easily identified. The other is that there are differences in mean values. However, it is difficult to infer they are meaningful. For instance, the maximum and the minimum standard deviations (omitted in the table) are 1.3 (LA in Reward 6.) and 1.0 (MA in Practicality 1). Considering those values, even the maximum differences, 0.6 (HA and LA, in Fulfillment 2 and Practicality 1) do not appear remarkable because a difference of 0.6 with 1.0 standard deviation is converted to 6 when assessing a T-Score whose SD=10.

Similar observations can be made about factor means presented in Table 4. Factor means of HA and LA indicate directly how far their means deviate from those of MA because factor variances are fixed at 1.00 (so, standard deviations are 1.00) in all groups and factor means at 0.00 in MA. In other words, a difference of 0.26 (between HA and LA, Fulfillment) can be interpreted as 2.6 in T-score. Although factor means and their tendencies are approximate for this study and the preceding one so that the model is confirmed, such differences are not easily considered materially meaningful.

Regarding correlation among factors (Table 5), results of the two studies are similar for the most part. They appear variable according to achievement. Correlations among factors both in Content-attached factors and in Content-detached factors are relatively higher than those of factors between the former and the latter, as Maeda (2003) indicates. Likewise, LA shows greater positive correlation between two groups of factors. Here again, we assume that the more a learner achieves, the more their motivation changes its emphasis only on the content-attached factors.

The result that differs greatest with the preceding study is that correlations between Relation and the other factors are remarkably dissimilar. One reason can be that the measurement invariance is not conditioned though the model is assumed in the same way, between the preceding and present study. The other is presumed to be the result of modification of question items because the items in the preceding study presented undesirable possibilities and seemed too childish. In that sense, data derived in this study are reasonable for actual learners.
4. Conclusion

Initially, this study had four important aims. Survey results indicate that the model has reasonable cross-validation with another sample group because this study involves the same model as the preceding study and analyses are conducted in the same procedure. Therefore, the model has sufficient generality for learning motivation of EFL learners in Japanese high schools.

Next, increasing the number of question items extends measurement according to the model. Fitness of data to the model is sufficient to allow the interpretation that the scale was developed successfully with higher reliability.

The third purpose is related to the first and the second ones. The model is confirmed with the cross-validity and the developed scale because the model explains the present data well and the values are quite similar to the last study. As for the last target, the appendix or tables show fundamental data for further research or reexamination.

Differences in learning achievement relate slightly to those of learning motivation. Although motivated learners are known as higher achievers, the relationships between motivation and achievement are possibly influenced by learner type. For example, some learners may be motivated and achieve easily, whereas other kinds of learners may be motivated, but achieve only with difficulty. Further analyses could reveal such types of learners by clustering them in terms of motivational tendencies because these preceding and present studies specifically address differences of motivation by dividing learners in terms of achievement.

References

市川伸一 (1998). 『認知カウンセリングから見た学習方法の相談と指導』 プレーン出版。
Appendix: Question Items

Note: Items used in the study are all written in Japanese.

Why do you study English? (私が英語を勉強するのは、)

Fulfillment 1. Because I would like to know something new.
   (新しいことを知りたいから)
Fulfillment 2. Because I would like to become a person with varied knowledge.
   (いろいろな知識を身につけた人になりたいから)
Fulfillment 3. Because I enjoy understanding something.
   (わからないこと自体面白いか)
Fulfillment 4. Because I enjoy the process whereby I come to do something.
   (何かができるようになっていくことは楽しいから)
Fulfillment 5. Because I feel fulfilled when I study.
   (勉強すると充実感があるから)
Fulfillment 6. Because I would not like to leave something I do not understand.
   (わからないことを、そのままにしておきたくないから)

Training 1. Because I think it trains my brain.
   (頭の訓練になると思うから)
Training 2. Because I would like to learn how to study.
   (学習のしかたを身につけたいから)
Training 3. Because I would like to learn to think reasonably.
   (合理的な考え方ができるようになりたいから)
Training 4. Because I would like to learn to think from different perspectives.
   (いろいろな面から物事が考えられるようになりたいから)
Training 5. Because I would like to learn to think logically.
   (筋のとおった考え方ができるようになりたいから)
Training 6. Because I would like to keep my brain active.
   (頭のはたらきを活発にしておきたいから)

Practicality 1. Because I would like to use what I learn in my future job.
   (勉強したことを、将来の仕事にいかしたいから)
Practicality 2. Because what I learn is useful in my daily life.
   (勉強したことが、生活の場面で役に立つから)
Practicality 3. Because the knowledge seems to be useful in my job or daily life in future.
   (勉強で得た知識は、いずれ仕事や生活の役立つと思うから)
Practicality 4. Because I would like to enjoy the experience of utilizing knowledge and skill.
   (知識や技能を使う喜びを味わいたいから)
Practicality 5. Because, thereby, I will not be in troubled by my business in the future.
   (勉強すると、将来仕事の上で困らないから)
Practicality 6. Because what I learn will be helpful when it is needed.
(必要になった時に，勉強した成果があれば役に立つから)

Relation 1. Because I think it is natural: everybody does it.
(みんながやるので，なんとなくあたりまえと思っているから)

Relation 2. Because I would like to accompany my friends in my school.
(友達といっしょに何かしていたいから)

Relation 3. Because I would like to be regarded as a member by those around me.
(まわりの人たちに認めてもらいたいから)

Relation 4. Because people around me do so.
(まわりの人たちが勉強するので，それにつられるから)

Relation 5. Because I think it is strange if I do not follow people around me.
(みんながすることをやらないのは，おかしいと思うから)

Relation 6. Because I feel I am obliged to do so.
(勉強するのが自分の義務だと思うから)

Self-respect 1. Because I feel superior to others if I have good grades.
(成績がいいと，他の人よりすぐれているような気持ちになるから)

Self-respect 2. Because I think I am honored if I succeed in learning.
(成績があれば，まわりの人から尊敬されると思うから)

Self-respect 3. Because I am admired if I go to good schools.
(勉強して良い学校を出ると，立派だと思われるから)

Self-respect 4. Because I feel happy if I am better at my studies than others.
(人より勉強ができると嬉しいから)

Self-respect 5. Because I feel confident in myself if I am better at studies than others.
(人より勉強できると，自信がつくから)

Self-respect 6. Because I would like to become better at studies than others.
(ほかの人よりも勉強できるようになりたいから)

Reward 1. Because I am complimented if I get good grades.
(成績がいいと，ほめられたりするから)

Reward 2. Because I can get some rewards if I get good grades.
(成績があれば，ほうびがもらえるしたりするから)

Reward 3. Because I would like to live an economically advantaged life in future.
(勉強できると，おとなになって経済的にいい生活ができるから)

Reward 4. Because I can get benefits after I enter the business world.
(勉強しておくと，社会に出てから得なことが多いと思うから)

Reward 5. Because I can find better places of employment in the future.
(勉強して力をつければ，将来いい仕事先があるから)

Reward 6. Because I can proceed to better and higher education.
(勉強すれば，良い進学ができたりするから)