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Proficiency, Learning Strategies, and Logging Behaviors on The Dictation Training Courseware

Yuichi ONO
Faculty of Humanities and Social Sciences, University of Tsukuba, Japan
ono.yuichi.ga@u.tsukuba.ac.jp

Abstract: This paper investigates the possibility of classifying Japanese university EFL learners on the basis of learning behavior on the online training courseware, learners' learning strategies, and predicting learners' proficiency. Clustering and decision tree analyses employed in this study indicated that learning strategies play a mediating role in predicting proficiency and that each cluster revealed characteristics in learning behavior on the courseware.

Keywords: classification, prediction, learning log data, learning strategy, dictation practice

1. Introduction

The possibility of relating log data with other psychological and pedagogical constructs has been investigated in the field of learning analytics. However, applications to foreign language learning have not been sufficiently discussed thus far (Ono, 2018; Ono & Ashizawa 2020). This paper is a replication of our earlier study on the log data collected on dictation practice courseware (Ono & Ashizawa, 2020), with a preliminary focus on the relationship between Japanese EFL learners' learning strategies and learning behavior. Our former paper was based on the data collected within a short research design, and the essential questions on the relationship between learning strategies and their listening proficiencies were unexplored. The current study follows the preliminary study with almost the same participants and a longer research design (eight weeks). We conclude that the data on learning strategies and learning behavior could classify participants and predict their proficiency.

2. The Research Project

2.1 Prediction and Personalization from Log Data

The prominence and influence of learning analytics is strongly activated in the interdisciplinary field of learning sciences as a whole, and in particular, the CSCL community (Tan & Koh, 2017). Ono (2018) discusses the importance of exploring the possibility that learning behavior be collected as learning behavior data in an online learning environment in cases of foreign language online learning, since this might directly lead to the automatized "personalization" and "adaptation" of learners' learning. Chen et al. (2016) stressed the importance of including learning style data in addition to learning behavior data. This study sets learning strategies as mediating factors in explaining learning behaviors under the assumption that online learning strategies should reflect learning behaviors.

2.2 Dictation Task

Dictation is the process of writing down what someone else has said. Oller (1971) evaluated dictation tasks by providing learners with expectancy grammar skills and promoting general proficiency. Heaton (1975) pointed out that dictation tasks can predict concepts such as phonetical discrimination,

vocabulary knowledge, grammatical knowledge, listening comprehension, and phonological memory span. This task is intended to activate both the top-down and bottom-up processes. In the field of Japanese EFL research, it is agreed that both processes interact in listening tasks: the top-down process is activated, especially when the learners cannot understand phonetic information (Satori, 2010). Dictation tasks involve a variety of processing factors to complete online tasks, and task completion requires grammatical, phonological, cognitive, and other general skills to promote proficiency.

2.3 Courseware

As in Ono and Ashizawa (2020), this study used the courseware "CaLabo MX," produced by CHIeru©, Japan (https://www.chieru.co.jp/products/high-school/calabo-mx/) The support modules (parameters) are presented in Figure 1 and Table 1. In addition to these data, we collected logging frequency, mean time per activity, and total time length for each activity as the sum, mean, and length (ms), respectively.

Figure 1. Screenshot of the support modules

Table 1. *Parameters*

① Seek the place to start to play (Seek)	④ Go forward 2 seconds (Forward)
② Push the Play/Stop button (Play Stop)	⑤ Set the A-B point for repetition (AB)
③ Go back 2 seconds (Back)	⑥ Change the speed (Speed)

2.4 Listening Strategies

Ono and Ashizawa (2020) conducted a survey on listening learning strategies on EFL strategy inventory (ELLSI) constructed by Nix (2016). The data were analyzed into four factors using explanatory factor analysis. This study employed the same questionnaire for analysis. The factors are listed in Table 2.

Table 2. *Factors of Listening Strategies*

Factor 1	Global Understanding Strategies (Global)	Factor 3	Knowledge and Experience-Based Strategies (Knowledge)
Factor 2	Paralinguistic and Grouping Strategies (Paralinguistic)	Factor 4	General Listening Learning Strategies (General)

3. Study

We set up the following two research questions:

RQ1: How are data classified on the basis of learners' proficiency, strategies, and behaviors, and what are the characteristics of each cluster?

RQ2: What is the relationship between learning behavior/listening strategies and general proficiency?

During the autumn term of the 2020 academic year, 79 first-year college students participated in the study. Since all the participants had joined the former project, all were familiar with the use of the courseware. The total number of log data collected in this study for analysis was 39,887. For RQ1, a cluster analysis was conducted to determine the classification, followed by ANOVA to observe how the values differed among clusters. The clustering employed the square Euclidean distance measure and the ward method. The descriptive statistics of each parameter are presented in Tables 2 and 3. The between-group differences are summarized in Table 3. For the total, TOEIC-IP scores were employed.

The results of the decision tree are illustrated in Table 4. It was indicated that the factors of strategy use appear as top nodes, and some learning behavior factors are relevant factors.

4. Concluding Remarks

This study explored the possibility of classifying Japanese university EFL learners on the basis of learning strategies and learning behavior, and predicting general proficiency. We investigated the individual learning process using a large-scale longitudinal research design for future research.

Table 3. *Descriptive Statistics of Each Parameter*

		Total		Global		Paralinguistic		Knowledge		General		Change		Seek		Play_Stop	
	N	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Cluster 1	19	440.6	235.2	2.8	0.5	2.9	0.7	3.4	0.6	2.9	0.7	12.2	4.8	100.9	206.8	138.7	78.6
Cluster 2	28	508.1	116.0	3.4	0.5	3.4	0.5	4.0	0.6	3.5	0.5	18.0	3.0	102.0	98.1	254.1	75.1
Cluster 3	29	573.5	148.5	4.0	0.6	3.8	0.8	4.3	0.4	4.0	0.5	16.4	3.9	33.5	38.0	158.3	58.7
Cluster 4	3	450.0	226.1	3.9	0.1	3.6	1.2	4.0	0.9	2.7	1.2	21.7	9.1	1618.3	233.2	94.7	56.9

		Back		Forward		AB		Speed		Finish		Sum		Mean		Length	
	N	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Cluster 1	19	20.0	32.3	0.3	0.6	7.2	22.9	6.8	8.3	45.6	35.9	331.6	208.7	10782.9	3715.2	3207972.6	1314323.8
Cluster 2	28	59.4	68.1	0.3	0.6	9.3	19.9	14.6	10.5	99.2	33.4	556.8	138.2	8999.9	1822.4	4850905.8	878466.7
Cluster 3	29	20.5	31.2	0.0	0.2	0.2	0.8	7.9	7.3	72.0	29.7	308.8	89.1	12018.1	3049.7	3572395.8	935509.8
Cluster 4	3	11.7	12.6	0.0	0.0	176.3	53.7	3.3	1.5	31.7	6.7	1957.7	352.2	3223.8	102.8	6292902.0	987562.4

Table 4. Multiple Comparison (TukeyHSD)

Total	1>3*	Seek	4>1***, 4>2***, 4>3***	Finish	2>1***, 2>4***, 3>1*, 2>4**
Global	3>2***, 3>1***, 2>1***, 4>1**	Play_Stop	2>1***, 2>3***, 2>4***	Sum	4>1***, 4>2***, 4>3***, 2>3***, 2>1***
Paralinguistic	3>1**	Back	2>1**, 2>3**	Mean	3>2***, 3>4***, 2>4***, 3>4***
Knowledge	3>1***, 2>1**	Forward	none	Length	4>2**, 4>3***, 4>1***, 2>3***, 2>1***
General	3>1***, 3>2***, 4>3***, 2>1*	AB	4>1***, 4>2***, 4>3***		
Change	2>1***, 3>1***, 4>1***	Speed	2>1**, 2>3**		

Note. ***<.001; **<.01; *<.05

Table 5. Characteristics of Each Cluster

Cluster 1	Lower proficiency, Fewer action, Less activity time	Cluster 3	Highest proficiency, Fewer action, Less activity time, Listening strategies motivated, Fewer action
Cluster 2	Middle proficiency, Frequent Play, Stop/Back, Change speeds, Bottom-up behavior enhanced, Long activity time	Cluster 4	Only three members, Frequent and repeated use of AB, Long activity time

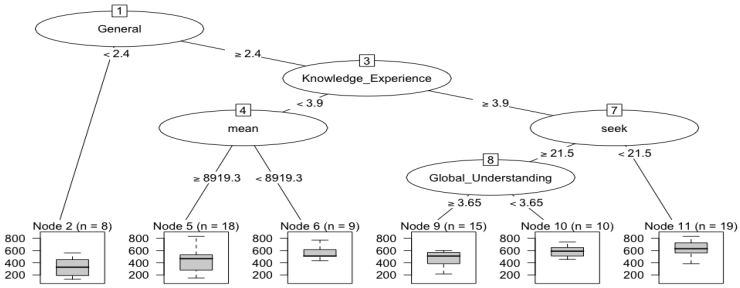

Figure 2. Result by decision tree

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References

Heaton, J. B. (1975). *Writing English Language Tests: A Practical Guide for Teachers of English as a Second or Foreign Language*. London: Longman.

Oller, J. W., Jr. (1971). Dictation as a device for teaching foreign language proficiency. *ELT Journal, 25* (3), 254–259.

Ono, Y. (2018). Can Page-Flip predict better reading comprehension? – A preliminary study. In Wu, Y.-T. et al. (Eds), *Workshop Proceedings. 26th International Conference on Computers in Education* (pp. 449–456).

Ono, Y., & Ashizawa, M. (2020). The relationship between learning behavior and learners' listening strategies in dictation practice courseware? – A preliminary study. In So, H. J. et al. (Eds), *Proceedings of the 28th International Conference on Computers in Education. Asia-Pacific Society for Computers in Education* (pp. 129–136).

Satori, M. (2010). The effect of teaching phonetic information through repeated practice of dictation and reading aloud in L2 listening class. *Language Education and Technology, 47,* 159–180.

Tan, J. P.-L., & Koh, E. (2017). Situating learning analytics pedagogically: Towards an ecological lens. *Learning: Research and Practice, 3(1)*, 1–11, DOI: 10.1080/23735082.2017.1305661