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Course Design Based on Students' English Skill Cluster: A Case Study in a University Language Center

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Abstract

The English Proficiency Test (EPrT) is a prediction test for English as a Foreign Language (TOEFL), which is a prerequisite for graduation at XYZ University. The Language Center provides a course for EPrT preparation. The course post-test data shows that only 74% of students met the graduation prerequisites. This study aims to develop an English course design based on the students' English skill cluster. This study uses the K-Means clustering approach to classify the students based on English skills. The respondents are 397 students who joined the EPrT preparation course in October and November 2018. The 397 students are distributed into 3 clusters, which are 174 students in cluster 1, 116 students in cluster 2, and 107 students in cluster 3. Cluster 1 consists of students with the score below average. Cluster 2 consists of students with the total score above average, but the components score is below average. Cluster 3 consists of students with pre-test total score below average, but the post-test score are above average. Therefore, the EPrT preparation course is suggested to have different levels, instead of one level as now. The course materials are designed to be suitable for students' initial English skills at each level.

1. INTRODUCTION

English is an important skill to be mastered by university graduates. This skill is very useful in a global work environment. Therefore, many universities establish a Language Center as a foreign language learning facility (Poedjiastutie & Oliver, 2017). The Language Center in a university provides beneficial and attractive facilities and programs that support the foreign language learning process (Miller, 2018). The Language Center usually also has measurement tools for assessing the proficiency level in the foreign language. The students' foreign language proficiency level can be used as a requirement for graduation or a requirement for receiving certain awards (Hori & Takeuchi, 2019). These sorts of requirements encourage students to learn a foreign language, especially English. As a support, the Language Center provides courses, such as English for General Purposes (EGP) and English for Specific Purposes (ESP) (Harper & Widodo, 2018).

XYZ University has a Language Center since 2007, which provides some language services such as courses, proficiency tests, and translation. For the English proficiency test, the Language Center develops some original test. The English Communicative Competence Test (ECCT) is an English language proficiency test to measure verbal communication skills. The English Proficiency Test (EPrT) is an academic English language proficiency test that consists of 50 listening questions, 40 grammar questions, and 50 reading questions. The EPrT score is used as a prerequisite for graduation. The minimum EPrT score for bachelor students is 450. A different requirement is applied to international class students, Industrial Engineering students, and Information System students, which must fulfill 500 as the minimum EPrT score. To help the students achieve the target score, the Language Center provides a twenty-hour EPrT preparation course. The course only has one level, so the students with various English skills join in the same class. The course post-test data of 397 students who joined the EPrT preparation course in October and November 2018 shows that only 76.83% of students met the graduation prerequisite. Therefore, the design of the EPrT preparation course needs to be evaluated and improved.

There are some previous studies discuss the improvement in an English course. The improvement is done through different approaches. Saliu and Hajrullai (2016) explores the best practices in ESP classes through a survey of sixty students. The best practices can be used as a reference for improving the course. The other approach is the experimental approach, which examines whether the new design program can

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improve the course result or not. Kawachi-Furlan et al. (2017) examines the impact of a certain pedagogic intervention on the performance of the forty-four participants. Yükseltürk et al. (2018) investigates the impact of game-based learning with Kinect technology on the English self-efficacy of the thirty-two participants.

This study aims to develop an English course design based on the students' English skill cluster. The clusters give insight into the distribution of students, as the course participants, based on English listening, grammar, and reading skill. This study enriches the implementation of the clustering approach in the university students' context. Some examples of university students clustering in the previous studies are related to students' performance (Asif, Merceron, Ali, & Haider, 2017), students' emotionally intelligent leadership (Facca & Allen, 2011), students' work readiness profile (Agilhandani, Kurniawati, & Widyastuti, 2018), and students' language learning strategy (Wright, Ahn, & Lee, 2018).

This paper is structured into four sections. Following the introduction section is the method section. This section explains about the respondents and the clustering approach used in this study. The third section represents the result and discussion. In this section, the descriptive statistics, the clustering result, and the proposed English course design are explained. The last section provides the conclusion of this study.

2. METHODS

The respondents of this study were determined based on the purposive sampling. Since this study was started in December 2018, the targeted respondents were all of the students who joined the EPrT preparation course from October to November 2018. The number of respondents is 591 students. Due to data incompleteness of 194 students, only the data of 397 students were proceeded in this study. The 397 students come from eleven different bachelor programs.

The data used in this study are the pre-test and post-test scores of EPrT. The EPrT is a paper-based test that consists of 140 multiple choice questions that should be done in 120 minutes. There are 50 listening questions, 40 grammar questions, and 50 reading questions. The overall score interval is ranging from 217 to 677.

The clustering approach used in this study is K-Means clustering, which is also implemented in Agilhandani, Kurniawati, and Widyastuti (2018) and Wright, Ahn, and Lee (2018). The main steps are determining the number of clusters, determining the cluster centers, calculating the distance between each object to each cluster center, allocating each object into a cluster with the shortest distance, calculating new cluster centers. The third, fourth, and fifth steps are repeated until no object can be moved to another cluster (Agilhandani, Kurniawati, & Widyastuti, 2018). The targeted number of clusters is three. This number will be related to the course level, which can be divided into beginner, intermediate, and advanced classes. The change from one to three course level is still possible to be applied by the Language Center, considering the resource limitation.

Based on the clustering result, the existing EPrT preparation course is evaluated. The evaluation is related to the course duration and material. The course duration adjustment might be needed for students with a low initial EPrT score. The course material composition can be changed according to students' English skills in listening, grammar and reading.

3. RESULTS AND DISCUSSION

The results of this study are presented and discussed in the following three subsections. The first subsection presents the descriptive statistics, which explains the profile and EPrT score data of 397 students. The second subsection explains the cluster analysis, which follows the K-Means clustering procedure. The third subsection discusses the improvement of the existing EPrT preparation course design.

3.1 Descriptive statistics

The respondents of this study are 397 students who come from eleven different bachelor programs. Most of the students come from Management of Business in Telecommunication and Informatics bachelor program (85 students), Communication Science bachelor program (83 students), and Industrial Engineering bachelor program (76 students). Among the 397 students, 380 are fourth-year students. The domination of fourth year students occurs because these students try to meet the prerequisite for graduation.

The data used in this study are the pre-test and post-test scores of EPrT, which are obtained before and after the EPrT preparation course. The post-test data consist of the total score, the listening score, the grammar score, and the reading score. The pre-test data are only presented by the total score, because the listening score, the grammar score, and the reading score are not available. The summary of the descriptive statistics is shown in Table 1.

The mean of pre-test and post-test total score shows that after joining the EPrT preparation course, the EPrT score is increased by almost 100 points. Among listening, grammar, and reading, the lowest mean is for grammar, while listening and reading are almost the same. The standard deviation for the post-test score is around 10 points smaller

than the pre-test score. It means that after joining the EPrT preparation course, the EPrT score is increased and converged.

Although most of the students improve their EPrT score after the course, there are still 13 students with a lower post-test than the pre-test score. The 13 students are 3.27% of the 397 students, so this is still an acceptable error rate. The EPrT score of the course participants is increased by 100 points (mean), but 92 students still have not met the graduation prerequisite. This number is quite high, which is 23.17% of the total respondents. The mean of the 92 students' pre-test score is 377.3804, while the mean of the post-test score is 444.9456. The score is increased by around 67 points, which is below the increased score for the 397 students. This implies that by joining the twenty-hour EPrT preparation course, the student with a low pre-test score can not improve his or her score high enough to fulfill the graduation prerequisite.

3.2 Cluster analysis

To gather more understanding of the students' English skills, a cluster analysis is conducted. The targeted number of clusters is three. This number will be related to the course level, which can be divided into beginner, intermediate, and advanced classes. The initial cluster centers are shown in Table 2. The cluster centers and cluster members are changing in 28 iterations. The minimum distance between the initial centers is 6.001.

The final cluster centers are presented in Table 3. The distance between the final cluster centers for cluster 1 and cluster 2 is 2.163. The distance between the final cluster centers for cluster 1 and cluster 3 is 2.400. The distance between the final cluster centers for cluster 2 and cluster 3 is 2.484. The F test indicates that the variable with the highest difference in the three clusters is the post-test total score, with the F value is equal to 140.074 and the sig value is equal to 0.000.

The distribution of students in the three clusters is 174 students in cluster 1 (43.83%), 116 students in cluster 2 (29.22%), and 107 students in cluster 3 (26.95%). Most of the students are categorized in cluster 1. Cluster 1 consists of students with all of the scores below average, especially the post-test score. Cluster 2 consists of students with pre-test and post-test total score above average, but the post-test components score are slightly below average. Cluster 3 consists of students with pre-test total score below average, but the post-test total and components score are above average.

The average pre-test total score of the 397 students is 398.98, while the average post-test score is 495.07. The average increased score is 96.09. The average pre-test total score of the students in cluster 1 is 369.25, while the average post-test score is 466.10. The average increased score is 98.85. The average pre-test total score of the students in cluster 2 is 447.15, while the average post-test score is 529.54. The average increased score is 83.40. The average pre-test total score of the students in cluster 3 is 395.09, while the average post-test score is 504.79. The average increased score is 109.70.

The three clusters indicate that the students with the highest improvement are the students in cluster 3. The pre-test score of the students in cluster 1 and cluster 3 are below average. The students in cluster 3 (26.95%) can improve around 109.70 points, while the students in cluster 1 (43.83%) can only improve around 98.85 points. The number of students in cluster 1 is higher than in cluster 3. This situation implies that for most of the students with a pre-test score below 398.98, it would be hard to reach the minimum EPrT score for graduation prerequisite, even though the students join the EPrT preparation course. The students in cluster 1 need to improve all of the components and total score, especially in listening, so a twenty-hour course might be not enough. The pre-test score of the students in cluster 2 is above average. The students in cluster 2 already have a total score above average, but still need to improve the components score, especially in grammar. Although the score improvement is only around 83.40, the post-test score can fulfill the minimum EPrT score of the graduation prerequisite. This shows that for the students with the pre-test score around 447.15, the twenty-hour EPrT preparation course is enough.

Table 1.
Descriptive statistics of the students

	Number of data	Minimum	Maximum	Mean	Standard deviation
Pre-test (total)	397	217.00	573.00	398.9773	52.04123
Post-test (listening)	397	19.00	45.00	33.3123	5.21344
Post-test (grammar)	397	19.00	39.00	27.7632	3.71516
Post-test (reading)	397	24.00	45.00	34.8111	3.80949
Post-test (total)	397	350.00	610.00	495.0680	42.26561

Table 2
Initial Cluster Centers

	Cluster		
	1	2	3
Zscore(PreTotal)	-3.49679	3.15178	0.21181
Zscore(PostListening)	-1.40259	-0.44353	-0.05991
Zscore(PostGrammar)	1.40957	0.33290	-1.28211
Zscore(PostReading)	-0.47541	0.31209	0.31209
Zscore(PostTotal)	0.89747	2.71928	-2.65152

Table 3.
Final Cluster Centers

	Cluster		
	1	2	3
Zscore(PreTotal)	-0.57117	0.92560	-0.07463
Zscore(PostListening)	-0.42149	-0.13101	0.82744
Zscore(PostGrammar)	-0.18068	-0.50013	0.83602
Zscore(PostReading)	-0.38490	-0.39847	1.05789
Zscore(PostTotal)	-0.68530	0.81568	0.23013

3.2 Course design

The cluster analysis shows that the students in cluster 1 still have difficulties in achieving the minimum EPrT score for graduation prerequisite, even though the students already participate in the EPrT preparation course. Therefore, it is suggested that the Language Center provides a two-level EPrT preparation course, instead of one-level as the existing course. The cut-off points between the two levels can be adopted from the average pre-test score of the students in cluster 1, which is 369.25. This value could be rounded up to 370. Students with a pre-test score less than or equal to 370 must join the first level, while the students with a pre-test score above can directly join the second level.

The first level is conducted in twenty hours, equally divided into ten lectures. The composition of the course material is design based on the result of the post-test component score of the students in cluster 1. Compared with students from cluster 2 and cluster 3, the students in cluster 1 have listening skills far below average, followed by reading and grammar skills, as shown in Table 3. Therefore, the suggested composition of course material for the first level is 40% listening skills, 30% reading skills, 20% grammar skills, and 10% comprehensive exercises. The focus of this first level is to increase students' vocabulary and basic grammar.

The second level is also conducted in twenty hours, equally divided into ten lectures. The composition of the course material is design based on the result of the post-test component score of the students in cluster 2. Compared with students from cluster 1 and cluster 3, the students in cluster 2 have grammar skills far below average, followed by reading and listening skills, as shown in Table 3. Therefore, the suggested composition of course material for the second level is 40% grammar skills, 30% reading skills, 20% listening skills, and 10% comprehensive exercises. The focus of this second level is to improve students' advanced grammar and vocabulary.

The course material can be delivered through various activities. Saliu and Hajrullai (2016) explores the best practices in ESP classes through a survey of sixty students. It highlighted that debates and quizzes are favourable and proven in improving students' English skill.

The implementation of this two-level EPrT preparation course will occupy more classrooms than the existing one-level course. The number of classrooms that can be used by the Language Center is limited. To solve this problem, the course can adopt the blended learning system, which combines offline and online lectures. Since the university already has an online learning system, the Language Center does not need to build the new one. It is suggested that the online lectures for the second level class can be more frequent than the first level class because it believes that the students of the second level class have higher self-learning capability. An important thing in conducting the online class is that the lecturer must arrange a situation to make the students actively involve and interact with the lecturer and other students. Student collaboration is a critical success factor in online learning (Laily, Kurniawati, & Puspita, 2013).

4. CONCLUSION

This study aims to develop an English course design based on the students' English skill cluster. The K-Means clustering approach classifies the 397

students based on English skills using the pre-test and post-test EPrT scores. The post-test data consist of the total score, the listening score, the grammar score, and the reading score. The distribution of students in the three clusters is 174 students in cluster 1 (43.83%), 116 students in cluster 2 (29.22%), and 107 students in cluster 3 (26.95%). Cluster 1 consists of students with all of the scores below average, especially the post-test score. Cluster 2 consists of students with pre-test and post-test total score above average, but the post-test components score are slightly below average. Cluster 3 consists of students with pre-test total score below average, but the post-test total and components score are above average.

Based on the clustering result, it is suggested that the Language Center provides a two-level EPrT preparation course, instead of one-level as the existing course. The cut-off point between the two levels is 370. Students with a pre-test score less than or equal to 370 must join the first level, while the students with a pre-test score above can directly join the second level. The composition of course material for the first level is 40% listening skills, 30% reading skills, 20% grammar skills, and 10% comprehensive exercises. The composition of course material for the second level is 40% grammar skills, 30% reading skills, 20% listening skills, and 10% comprehensive exercises. To solve the high classroom occupancy problem, the course can use the blended learning method, which combines offline and online lectures.

The limitation of this study is that the difference between the pre-test and post-test in each component score can not be identified due to the absence of the pre-test component score. Because of that, the improvement in each type of English skill can not be compared. For future research, the new course design can be evaluated using the experimental design research approach. By using this approach, the effectiveness of the new and the existing course design can be compared.

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