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Preface

This e-book describes the research papers presented at the International Conference on Emerging Computational Technologies (ICECoT 2021), organised by Faculty of Computer and Mathematical Sciences (FSKM), UiTM Cawangan Melaka. The main discussions of the conference is on the technological advances that help shape the skills that are required to cope with the Fourth Industrial Revolution (IR 4.0). Considering that this is our first attempt at organising a conference, we are therefore greatly honoured that the Universitas Negeri Semarang (UNNES), Indonesia, Mahasarakham University (MSU), Thailand and University of Hail (UoH), Saudi Arabia have all agreed to become our partners by contributing several reseach papers as well as providing reviewers to assess the quality of the papers.

Out of the numerous research works that had been submitted and reviewed, the Editorial Board have selected 22 papers to be published in the e-book. The discussions of these papers pertain to the use of technologies within the broad spectrum of Computer Science, Computer Networking, Multimedia, Information Systems Engineering, Mathematical Sciences and Educational Technology. It is hoped that the research findings that are shared in this e-book can benefit those who are interested in the various areas of computational technologies; such as graduate students, researchers, academicians and the industrial players, to name a few.

As the Project Manager, I would like to thank all of the committee members from the bottom of my heart for their tireless efforts in ensuring the success of ICECoT 2021. Without their continual support and excellent teamwork, this conference would not have come to fruition. In fact, holding this major event has been a good learning experience for us all, and I sincerely believe that our future conferences will become more outstanding if the same spirit is maintained.

Dr. Noor Aishikin Adam

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Dynamic Assessment in ESL Writing with Learning Media Based on Augmented Reality

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Abstract— Augmented reality has experienced rapid development since the term was coined by Tom Caudell. This rapid development was made possible by the increasing development of mobile computing power and its functionality. Until finally, augmented reality is integrated on smart phones and makes this technology accessible to many parties. In education, augmented reality has designed learning tools to enrich the learning and teaching experience. This three-dimensional character can be used as a learning medium, especially in the field of English for Civil Engineering. This study uses a mixed methods approach, namely qualitative and quantitative. A qualitative approach with a case study design was used to determine student responses to the application of Augmented Reality learning media. This study followed the sandwich format on dynamic assessment which used pre and post – test so that a quantitative approach with a quasi-experimental research method and a non-equivalent control group design. Based on the results of the paired samples t test in the control and experimental groups, there is a significant difference between the mean between the control class and the experimental class.

Keywords—augmented reality, CLIL, ESP, instructional media

I. INTRODUCTION

Augmented reality has experienced rapid development since the term was coined by Tom Caudell in the 1990s [1]. This rapid development was made possible by the increasing development of mobile computing power and its functionality. Until finally, augmented reality is integrated on smart phones and makes this technology accessible to many parties [2]. Therefore, education, engineering science, medical science, and even the military develop augmented reality technology to simplify their tasks [3].

Augmented reality combines reality and virtual [4] in contrast to Virtual Reality which actually provides a virtual experience to users. In education, augmented reality has designed learning tools to enrich the learning and teaching experience [5]. This technology provides convenience that cannot be obtained from other technologies, such as providing access to phenomena that cannot be seen directly, for example the movement of the sun [6]. In the field of learning English as a foreign language, [7] created a game based on augmented reality technology that is useful for enriching cultural understanding, linguistic awareness, and motivating students to actively use language.

3D augmented reality is an image that, when scanned by a smart phone, will be able to reveal three-dimensional characters. This three-dimensional character can be used as a

learning medium, especially in the field of English for Civil Engineering. English for Civil Engineering is different from English courses in general because English for Civil Engineering focuses on using English to support the field of Civil engineering. Therefore, English for Civil Engineering requires learning media that are tangible and concrete. The use of learning media in the form of power points is no longer relevant because it is unable to represent the equipment used in the field of civil engineering.

English for Civil Engineering as English for Specific Purposes in the field of civil engineering previously focused more on English so that the content of other fields was only used as my introduction. However, English for specific purposes has now developed into Content and Language Integrated Learning (CLIL). CLIL provides a balanced focus between teaching subjects in each field of study and English. CLIL can be a solution for the needs of learners who want to get a balance between subject matter learning content and English. When viewed from the aspect of technical pedagogy, the application of CLIL itself is in accordance with the main principles of communicative language learning which aims to place language learning in a meaningful context for learners [8].

The application of English learning can be more contextual through the application of CLIL. However, appropriate learning media in terms of academic learning that represent the fields that students take must also be used. To achieve this goal, researchers use 3-dimensional based learning media as a representation of equipment or buildings in the field of civil engineering in order to support the learning process of Content and Language Integrated Learning in the English for Civil Engineering course. In the future development, this research can produce 3-dimensional based learning media for other subjects.

Writing in English requires good grammar skills, imagination and ideas, determining the main and supporting ideas, to the editing process [9]. [10] argue that writing requires practice in terms of paragraph arrangement, language use and mechanics. Therefore, learning English as a second language has difficulty due to lack of linguistic knowledge and regarding content to create meaning [11]. Various kinds of problems are faced by students when learning to write using English such as lack of vocabulary, experience writing in English, and difficulty in describing their ideas [12]. [13] added that writing using English as a foreign language provides two learning burdens at once, namely expressing ideas in writing and using English. [10] found grammatical, punctuation, and spelling become the

main problems in writing. Difficulties in using English can be caused by the lack of use of English in everyday contexts.

Assessment is defined as an information gathering activity [14]. [15] added that the purpose of the assessment is to obtain information about the level of knowledge or ability of the learner. Information about the ability of learners can be accepted and considered an important part of education [16]. In the field of EFL learning, assessment in EFL was introduced by [17]. The assessment in language classes raises the different role of educators: a facilitator who monitors the language development of learners and also as an assessor whose job is to measure language skills [18].

II. METHODOLOGY

This study uses a mixed methods approach, namely qualitative and quantitative. A qualitative approach with a case study design was used to determine student responses to the application of Augmented Reality learning media. This study followed the sandwich format on dynamic assessment using pre-test and post-test so that a quantitative approach with a quasi-experimental research method and a non-equivalent control group design was used to determine the effect of intervention in the form of using augmented reality learning media to write discussion text.

The treatment or intervention in the dynamic assessment term given to the experimental group is the use of learning media in the form of augmented reality. Meanwhile, the control group only received an explanation of the conventional text discussion. The population of this study were students of the Civil Engineering Education Program who took English courses in the Department of Civil Engineering. Because the total population is only 50 students, total sampling is used so that this study involves the entire population to be the sample.

The test consisting of pre-test and post-test was carried out to determine the effect of the application of augmented reality 3 D digital learning media. The pre-test was carried out before the implementation of the digital 3 D augmented reality learning media. The post test was carried out after the implementation of digital 3 D augmented reality learning media.

Quantitative data in the form of test result data will be analyzed for normality using Kolmogorov - Smirnov, homogeneity using One - way ANOVA to determine whether test result data can be analyzed using parametric or non - metric statistics. If it is proven that the data is homogeneous and normally distributed, then paired samples T-test is carried out on the pre-test and post-test results in the control and treatment classes to find out whether there is a difference in the mean between the two classes. Simple linear regression is used to find the R square or the magnitude of the influence of the independent variable on the dependent variable. Quantitative data analysis was carried out using SPSS version 23 software.

III. RESULTS AND DISCUSSION

Dynamic assessment is carried out on the topic of writing a discussion text with the sub-topic of green architecture where students are asked to write a discussion text. The discussion text genre was chosen as a student writing format so that students could develop their arguments directed at a clear writing framework in the discussion of the topic of Green Architecture. The discussion text genre has the

following generic structure: issue, supporting viewpoints, contrasting viewpoint, and conclusion. The use of this genre gives students the opportunity to practice writing their arguments in a certain format sequentially with clear logic.

Green architecture is a construction technology that can be used to reduce the negative impact of construction on the environment. The focus of the text discussion with the theme of Green architecture here is the arguments made by students based on facts to support and reject the implementation of green architecture in house construction to reduce its negative impact on the environment. Students can choose the elements of green architecture as follows: rainwater harvesting, sustainable energy utilization, and environmentally-friendly construction materials.

The dynamic assessment used in this study is an interventionist approach by [19]. Therefore, this study uses administrative procedures and forms of treatment to produce measurable results with predetermined final results so that comparisons between and within a study group can be made [16]. The form of treatment given to the study group in this study is the use of an Android-based augmented reality application. This application will show a 3-dimensional image of a house construction using the principles of green architecture. Fig. 1 displays the results of the augmented reality application used as a treatment in this study:

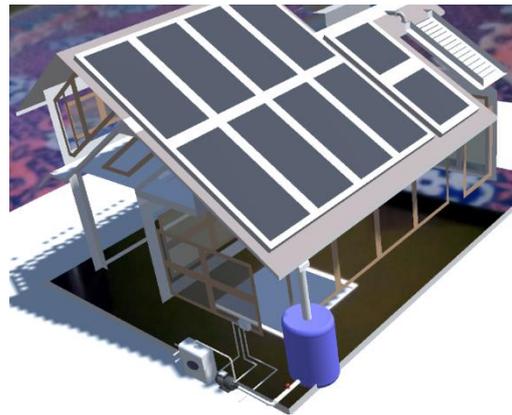


Fig. 1. The display of the application

The application in the .apk format is distributed to students as a treatment that functions as a learning medium so that they get a clear picture of the elements of sustainable energy utilization and rain harvesting systems.

The pre-test was given to students who were involved as research samples. 27 students in the control class and 23 students in the experimental class. The pre-test is given online and the research sample is asked to make a discussion text, which will then be used as the pre-test result. The results of the pre-test were then analyzed for normality using the Kolmogorov - Smirnov test using SPSS version 23.

Based on Table I, the two samples are normally distributed because the probability value is $0.200 > 0.05$.

TABLE III. THE RESULTS OF PRE TEST

	pre_control	pre_experimental
N	27	23
Test Statistic	.136	.148
Asymp. Sig. (2-tailed)	.200 ^{c,d}	.200 ^{c,d}

Homogeneity test using one-way ANOVA with the help of SPSS version 23 was also carried out on the pre-test data of both groups. The homogeneity test results of the pre-test scores for the two groups can be seen in Table II below.

TABLE IV. TEST OF HOMOGENEITY OF VARIANCES

Levene Statistic	df1	df2	Sig.
1.180	1	48	.283

Based on the homogeneity test above, the significance value obtained was 0.283 and the value was $0.283 > 0.05$, so the data in the two groups had the same variance or were homogeneous.

After the treatment was carried out in the experimental class, the post test was given to both groups. The normality and homogeneity tests were carried out on the post-test results of the two groups. The following are the results of the normality test performed using the Kolmogorov Smirnov test on SPSS 23.

TABLE V. THE RESULTS OF NORMALITY TEST

	pre_control	pre_experimental
N	27	23
Test Statistic	.142	.157
Asymp. Sig. (2-tailed)	.170c	.148c

Based on Table III above, the significance value in the control group = 0.170 and the experimental group = 0.148. Because both values > 0.05 . So it can be concluded that, the data is normally distributed.

The homogeneity test was then carried out in both groups. The results of the homogeneity test using the One-way ANOVA test with SPSS version 23 are as follows. Based on Table IV, the significance value of the two groups is 0.068 because the value is more than 0.05, so both data have the same variance or are homogeneous.

TABLE VI. TEST OF HOMOGENEITY OF VARIANCES

Levene Statistic	df1	df2	Sig.
3.475	1	48	.068

Because it has fulfilled the classical prerequisite test, namely the data is normally distributed and homogeneous, the t test can be done to determine whether there is a difference between the two data groups.

The results of the paired samples t test in both groups can be seen in Table V.

TABLE VII. T TEST RESULTS ON POST TEST EXPERIMENTAL AND CONTROL GROUP

	Mean	t	df	sig
Pair1 post_experimental - post_control	7.174	3.335	22	.003

Based on the paired samples t test, t statistics = 3.335 with T critical = 2.07387, then t statistics $>$ t critical. The significance value shows $0.003 < 0.005$. So it can be concluded that there is a significant difference between the mean between the control class and the experimental class.

Paired samples t test was also carried out on the pre-test and post-test scores of the experimental class to see if there were differences in the values after being given treatment by the researcher. The results of paired samples t test can be seen in Table VI.

TABLE VIII. T TEST RESULTS

	Mean	t	df	sig
Pair post_experimental - pre_experimental	6.739	9.986	22	.000

Based on the paired samples t test for the post test and pre-test data in the experimental class, t statistics = 9,986 with T critical = 2.07387, then t statistics $>$ t critical. The significance value shows $0.000 < 0.005$. So it can be concluded that there is a significant difference between the mean between the control class and the experimental class.

IV. DISCUSSION

The findings of this research are in line with [20] that augmented reality promotes learning improvement in education. They also confirm the findings of [21] that augmented reality in education offers advantages for learners. The academic performance of learners is also improved when augmented reality is used in learning process. This finding is confirmed by [22] [23]. The use of dynamic assessment in this study which could enhance students' learning achievement specifically on the field of EFL writing is corroborated by [24 - 26].

V. CONCLUSION

Based on the results of the pre-test in the two study groups, the scores of the two groups were normally distributed and the two groups had the same variance, so it could be concluded that the abilities of the two groups were the same. Based on the results of the paired samples t test in the control and experimental groups, the value of the post test shows that the mean value of the control class = 67.83 and the experimental class = 75.00. The mean value of the experimental class is higher than the control class. T statistics = 3.335 with T critical = 2.07387, then t statistics $>$ t critical. The significance value shows $0.003 < 0.005$. So it can be concluded that there is a significant difference between the mean between the control class and the experimental class.

To find out whether the treatment given by the researcher had an effect, the paired samples t test was carried out at the experimental pre-test and post-test values, the mean value of the experimental class at the time of the post-test = 75.00. Meanwhile, at the pre-test = 68.26. There was an increase in the value when the post-test was carried out and after being

treated. t statistics = 9,986 with T critical = 2.07387, then t statistics $>$ t critical. The significance value shows $0.000 < 0.005$. So it can be concluded that there is a significant difference between the mean between the control class and the experimental class.

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