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Development and Implementation of a Mobile-Based Accounting Terms Application as Self-Learning Kit in English for Vocational Purposes

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***Abstract*— The dictionary of accounting terms plays an important role for students as an independent learning medium because it can make it easier for students to find vocabulary so they don't need to use a general dictionary. To increase the effectiveness of using a dictionary of accounting terms, an accounting term dictionary application that is integrated with mobile devices or mobile-based applications is needed so that it is easier for users to find the meaning of a term in the accounting field. This research focuses on developing a mobile-based dictionary of accounting terms that are used as a self-learning kit (SLK) in the process of teaching writing and analyzing its implementation. This SLK was built according to ADDIE Model's adaptation. The application was built using the Waterfall method, Dart programming language, and Flutter framework. The implementation phase was carried out in a pre-experimental design so that quantitative data was obtained. Quantitative data were obtained from the statistical analysis of pre-test and post-test essays written by twenty-seven students before and after a self-learning kit (dictionary application) was implemented in learning. SPSS Statistics 25 program was used to analyze the results of pre-test and post-test evaluations in order to investigate the impact of using digital dictionaries on improving student performance. Meanwhile, qualitative data was obtained from an online questionnaire in the form of a google form consisting of scale-type questions and paragraph-type questions. The responses gathered from the questionnaire were examined to investigate student perceptions of the use of a mobile-based accounting term dictionary in learning writing competence. The analysis of both quantitative and qualitative data shows that students gained enriched experience in learning writing, had improvement in their writing competence. Students also gave positive responses in the aspects of the application's compatibility, feature, content, and overall usability.**

Keywords—writing competence; technology-enhanced language learning; accounting term dictionary mobile application; English for vocational purposes

I. INTRODUCTION

Paradigm in learning English has shifted along with technological developments in the field of education. The learning process can also be done through very easy access from mobile phones. Mobile apps in education can adequately connect teaching and learning activities because they provide a wide range of learning opportunities with an attractive appearance. As stated in [1] and [2] that technology is the most important part of language learning at different levels. Therefore, technology is used to help students visualize, simulate, solve problems, collaborate, research, and design solutions [3], [4], [5]. In other words, technology can help students learn things on their own. In this case, the teacher acts as a facilitator for the student, so the teacher needs to be able to support the student by integrating technology into the English teaching curriculum to connect the classroom to the world.

Mobile-based learning media allows teachers and students to be able to further explore and personalize the teaching and learning process so that it will improve overall performance. Mobile devices can be used as mobile-based learning tools that will make the learning process more flexible [6]. In addition, learning English will be more fun and enjoyable for students. Therefore, teachers are

expected to be able to provide facilities and infrastructure so that students can improve the quality of their learning. There are several advantages to using mobile technology in learning a foreign language. The first element is the flexibility of learning because it provides teaching and learning materials that are freely available online for open access [7]. The second aspect is accessibility. Mobile technology allows learners to learn and practice a language at any time. Studies on the integration of mobile technology in learning a language have been carried out by many researchers [8], [9], [10], [11], [12]. However, in the context of vocational education in Indonesia, this is relatively unexplored, especially in the development of a dictionary application with a list of terms and example sentences specifically used in the field of English for Vocational Purposes. One example is the term in accounting which is widely used by vocational students in preparing financial reports, formal presentations, and compiling email correspondence. For vocational students who study English with an emphasis on more practical skills, the dictionary plays an important role in mastering active skills, especially writing in a formal context. As stated in [13] that the important role of the dictionary for foreign language learners cannot be denied because it serves as the main language learning tool. The importance of dictionaries is also expressed in a study [14] which reveals that dictionaries are learning support for second and foreign languages because they help reveal the meaning of words in the right context.

Based on the observations made, when dealing with English terms in accounting, students often do not understand the meaning and how to use these terms in sentences. This is because several aspects include teaching that is still carried out to complete the material covered in the curriculum. In addition, it is done without discussing the accounting terms used. The opportunity for students to learn English in class is still inadequate as it is namely only to meet the demands of the curriculum. Therefore, there is an urgency where students must learn to understand the term through a self-directed and autonomous learning process. To reach the independent learning stage, students need to be equipped with self-learning kits that not only contain comprehensive content but can also be accessed in the form of a digital platform, considering that students are digital natives who use technology in almost every aspect of their lives. Based on this, this study aims to provide learning tools to users, especially students, so that they can carry out an independent learning process. The learning tool developed in this study is in the form of a mobile-based dictionary application of accounting term.

The dictionary application which is the product of this research, not only provides the equivalent of an accounting term but also provides examples of the use of the term in a sentence accompanied by the word class of each term. This self-learning tool or self-learning kit (SLK) is expected to play a role in helping improve students' understanding of accounting terms and use them coherently and cohesively in the writing learning process. The integration of learning tools can facilitate the process of sharing information between students concerning the subjects being taught more clearly. In addition, learning tools aim to help students understand the subject more easily and systematically. In this study, the development of learning tools was carried out then it was implemented in the learning process. Thus, the impact and perception of students regarding the implementation of self-learning kits in improving the quality of learning English, especially writing competence can be analyzed.

II. METHODOLOGY

The self-learning kit developed in this study was built on the basis of the ADDIE Model's adaptation [15]. According to the ADDIE model, the development of this learning kit includes 5 (five) stages, namely analysis, design, development, implementation, and evaluation stage. The application was built using the Waterfall method, Dart programming language, and Flutter framework. The implementation phase was carried out in a pre-experimental design method to 27 students of the Managerial Accounting Study Program. Quantitative data were obtained from the pre-test and post-test essays produced by students before and after the integration of a self-learning kit, i.e., dictionary application in the learning process. The results of the pre-test and post-test assessments were examined using the SPSS statistics 25 program to analyze the effect of using the digital dictionary in improving students' achievement. Statistics from paired samples were applied to investigate the average score on the pre and post-test to identify the distinctness between the two. The correlation coefficient (R) was obtained based on the analysis of paired sample correlations. This analysis was applied to discover the strength of the relationship before and after the implementation of the self-study kit in the learning process. In addition, the paired-sample t-test emphasized whether there was a meaningful distinction in students' English writing scores before and after using SLK in the form of a dictionary application. Qualitative data were obtained from an online questionnaire in the form of a google form consisting of scale-type questions and paragraph-type questions. The responses gathered via a questionnaire were examined

and analyzed descriptively to define students' views on learning writing using a mobile-based dictionary of accounting terms.

III. FINDINGS AND DISCUSSIONS

This part of discussion explores the stages of developing a self-learning kit, i.e., a mobile dictionary called Practical Accounting Dictionary (PAD) based on ADDIE model.

3.1. Analysis

In this stage, an online questionnaire was given to students to get the necessary requirements that need to be met while developing the software. This part of finding and discussion highlights students' perspectives on some aspects related to learning English based on the aspects of personal view on learning English as accounting students, vocabulary mastery and independent learning, and their view or expectation on using a mobile accounting dictionary. In addition to the 5 points likely-scale type of questions, students also described their expectations in short statements. The results of the analysis were used as the basis to examine students' current learning obstacles and gathered information on the needs analysis. Based on the responses in the form of short statements, it can be summarized that students as the potential users expected the application to have an attractive design, simple but has full features and easy to understand.

Regarding the feature and content, students highlighted that the features must have a friendly user interface or is easy to understand and the content should cover the most common accounting terms. Meanwhile, the system requirements analysis phase aims to analyze the requirements of the application to be developed, such as system functional analysis and non-functional system analysis. The functional analysis consists of the analysis of features or functions that exist in the application and the analysis of system users. The non-functional analysis of the system aims to identify the software and hardware requirements needed to develop and implement this application. In this study, the needs analysis phase was carried out by distributing online questionnaires, interviews, and conducting documentation studies from previous research.

Based on the needs analysis stage carried out, the user of this application only consists of one role, namely the guest user. Guest users are users who directly use the services provided by this application. In the implementation, those who act as guest users are students who use this dictionary application as an independent learning tool. Referring to the results of the non-functional examination of the system, the technology used in building the application included frontend or interface, using the javascript programming language with the Vue.js framework and the Capacitorjs framework to build applications into mobile-based applications. Backend or Web Services, using PHP programming language with a SLIM framework. In terms of software, this application was built using MySQL system database, Apache as a backend server, Visual Studio Code as a text editor, and Integrated Development Environment (IDE) using Android Studio. Meanwhile, the hardware used was Cloud VPS with 1 GB RAM, 2 Core CPU, and 20 GB Disk Space as backend server and cellphone with android OS version 6 for the client's side.

3.2. Design

The design phase in the development of this application is divided into three types of design, namely the design of the application flow, the design of the application database, and the design of the application interface.

a. Application Flow Design

The design of the application flow was carried out using a procedural approach using a DFD (Data Flow Diagram) modeling tool. The results of the application flow design can be seen in the figure below.

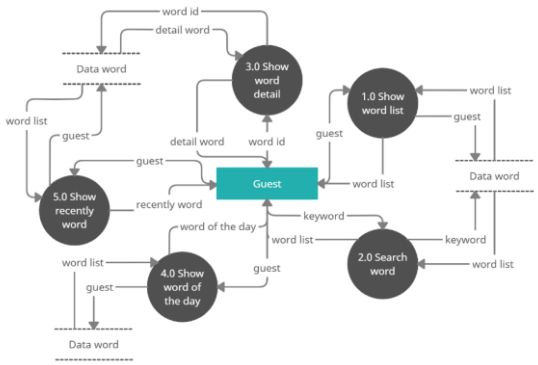

Figure 1. Data Flow Diagram Function 1-5

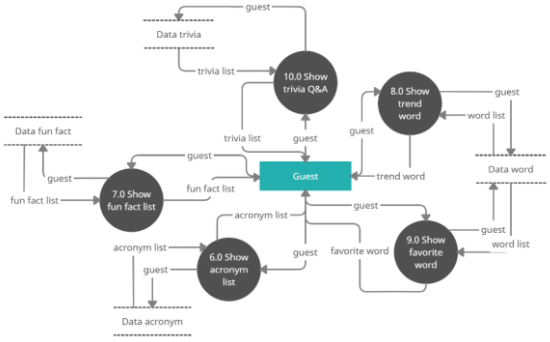

Figure 2. Data Flow Diagram Function 6-10

b. Database Design

The design of the database in this application used ERD (Entity Relationship Diagram) model. The ERD results from the database design of this application is presented in Figure 3.

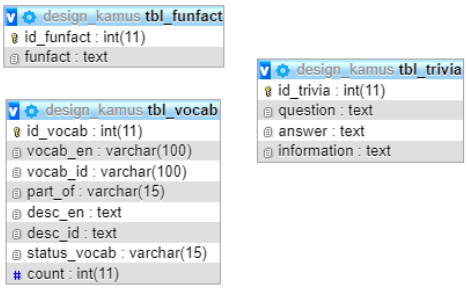

Figure 3. Entity Relationship Diagram

c. Interface Design

The design of the application interface was done by making an application mockup. Mockups were created for each predefined feature. The primary content in this application, i.e., the list of vocabulary entries was taken from an e-dictionary compiled in pdf format. On the basis of analysis on needs and references, other types of content have been added to enhance students' exposure to accounting-related technical terms and texts. The other contents include acronyms, fun facts and trivia question and answer.

3.3. DEVELOPMENT

At this stage, the implementation of the design results in lines of program code that can be understood by the computer. The coding process at this stage used the PHP programming language using the Slim Framework for its web services, Javascript language using the Vue.js Framework for its frontend. Capasitorjs was used as a framework for building mobile apps, and MySQL was used as the database. The development of each function was tested in parallel. This test aimed to check that the functions in the application were running according to a predetermined design. In addition to testing the application's functionality, user acceptance testing was also carried out in which the application was implemented and the user provided feedback and suggestions.

3.4. IMPLEMENTATION

The implementation stage was carried out after each function or feature in the application had run according to the predetermined design. At this implementation stage, the data migration process required by the application was carried out, including accounting terms data, acronyms data, fun facts data, and Trivia QnA data. In addition to data migration, the setup process or installation of web service applications was carried out at this stage, in which the web service entered the deploy stage on hosting so that it can be accessed via the internet network. This English - Indonesian dictionary application can be installed on Android-based smartphones in the form of.apk (Android PacKage).

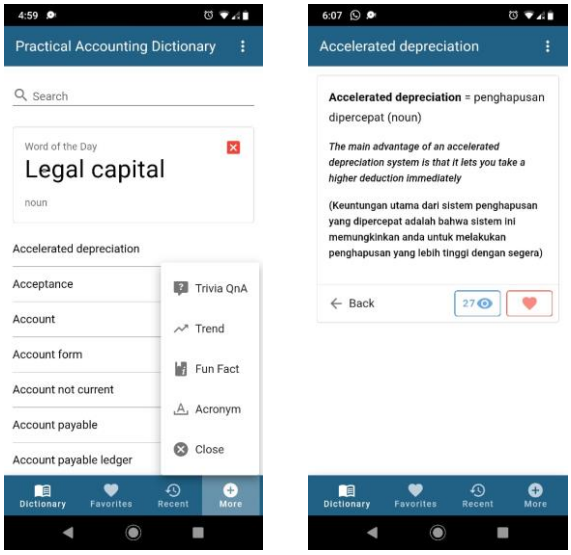

Figure 4. Front Page and Sample Data

Fig. 4 shows the display of the front page and sample data. On the front page, users can see a list of data based on the alphabet order, search field, and word of the day. Word of the day is randomly chosen among the data. The data entry consisting of 422 words describes the translation into Indonesian, word-class, and the elaboration of meaning both in English and Indonesian. The individual data shows the frequency of view and users can click the 'heart' button to add the word to the favorites list. In addition, the front page also displays some features including favorites, recent, acronyms, fun facts, trend, and trivia question and answers. By clicking the close button in the right corner of the 'more' menu, users can close the dictionary application. The list of acronyms covers 78 data and is particularly aimed to assist students in enhancing their choice of technical terms while writing. The fun fact feature includes 40 entries and is addressed to broaden students' background knowledge ranging from historical facts up to the role of accounting in the entertainment industry. The trend and recent features are mainly included in the development of this application to keep track of users' activities in accessing the application. The trend feature highlights the list of words frequently searched by the users, marked by the number of data access frequency in brackets. The recent feature

allows individual users to track their activity as it displays the list of words that are recently looked up to in the application.

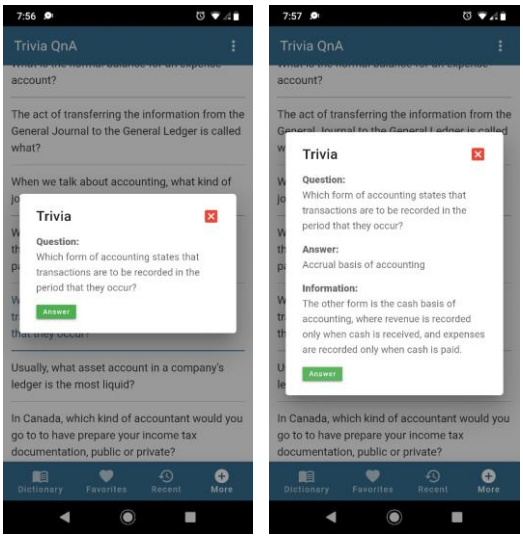

Figure 5. Trivia Question and Answers Feature

Fig. 5 presents the page of trivia question and answer feature which is arranged to provoke students' curiosity and eagerness to answer questions independently before they check the correct answers. To meet the ultimate goal of this feature, users are directed to experience a series of steps including clicking on one of the listed questions, then they can see the pop-up box that displays the question once again. This step gives time for the users to consider their answers, then they can click on the answer button in green to know the correct answer along with the additional information related to the answer.

In this implementation stage, the dictionary was also tested on students using a pre-experimental design (pre-test and post-test). One-group pretest-posttest research design was used in particular. This research design combined both post-test and pre-test studies by carrying out a test on a single group before and after the treatment was administered. Quantitative data was collected in the form of student's scores based on their performance on the pre-test and post-test assignments assessed based on the writing assessment rubric adapted from the TFU Foreign Language Assessment Rubrics.

In the pre-test stage or before the integration of the mobile dictionary application, students were inquired to compose a piece of writing or essay aiming to explore the concept of accounting treatment. Students could choose one of the provided topics including accounting treatment of assets, treatment of debt, and treatment of capital. Before the post-test stage, students were given a link to download the mobile dictionary application to support their learning. At this stage, students were given three topics to be developed in their essay including treatment for commission and consignment revenues as well as the differences between them, comparison between treatment for capital expenditure to purchase the asset and capital expenditure for long-term investment, and the advantages and disadvantages of share and loan capital. The assessment was based on four criteria, i.e., content covering good elaboration on the selected topic, organization (introduction, body, conclusion) and coherent flow of ideas, vocabulary which emphasizes the use of appropriate vocabulary based on the context, language use covering good grammatical patterns and mechanics which highlights the correct use of spelling, punctuation, capitalization.

3.5. EVALUATION

In the evaluation stage, quantitative data or students' scores were analyzed using SPSS statistics 25 and qualitative data or students' responses in google form were descriptively described. In addition, there was also data in the form of student perceptions in the form of descriptions obtained through filling out the paragraph-type of questions.

- *Analysis on Students' Writing Competence*

The extensive application of mobile and wireless devices in education has promoted progressive shifts in the approach used by teachers. Due to their ubiquity, mobile phones are regarded as conceivably essential learning kits. However, the personal use of mobile phones and their applications by students for learning benefits continues to be studied. Therefore, this study investigated not only how the mobile-based dictionary on accounting terms was built, but also the impact on students' achievement and how students perceived its application in the classroom setting.

The results of data processing as the outcome of paired sample statistics using SPSS statistics 25 show that the students' average pre-test score was 79.70, and the students' average writing score (post-test) was 81.63. In this case, the standard deviation value in post-test (2,844) was smaller than the pre-test (4,037), which shows the post-test data was better than the pre-test. This analysis was done to identify the level of relationships between before and after mobile accounting dictionary applications, that is, integrating Practical Accounting Dictionary into the learning process. Based on the analysis, the correlation coefficient (R) of data in Class A was 0,767. The result was in the range of 0.701-0.900 meaning that the correlation is strong. The probability value underlines that it is still below 0.05 (Data shows the significant value of the output is 0.00). This indicates that there was a positive relationship in the

context of before and after students using the app to complete their writing assignments.

According to the comparison of t_{count} and t_{table}, if $t_{count}<t_{table}$ or $-t_{count}> -t_{table}$ then H0 (there is no positive impact of the dictionary application on students' achievement) is approved, whereas if $t_{count}> t_{table}$ or $-t_{count} <-t_{table}$ then H0 is rejected. The level of significance is concluded using a degree of confidence of 95% or an error rate of 5% ($\alpha = 0.05$). Where the 95% confidence level and sig. (α) = 0.05, then the value of df (degree of freedom) or degree of freedom = (nk) = 27 - 1 = 26. With a two-tailed test, each side is of $\alpha / 2 = 0.05 / 2 = 0.025$ to determine the value of t_{table}. This can be seen in Figure 6.

Paired Differences

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest – Posttest	-1.926	2.601	.501	-2.955	-.897	-3.848	26	.001

Figure 6. Paired Samples Test

The value of t_{table} (0.025.26) is ± 2,05553. Based on the analysis using the SPSS 25 statistical program at a 95% confidence level (a significant level of 0.001 <0.05), t_{count} is -3,848. The result of the data set shows that $-t_{count} <-t_{table}$ (-3,848 < -2,05553). This suggests that H0 is rejected and H1 is accepted (the integration of the dictionary app contributes a positive impact to students' achievement in writing).

In other words, there was a significant influence between before and after the integration of the mobile accounting dictionary in the learning process. Based on the statistical examination, it can be underlined that the self-study kit (Practical Accounting Dictionary) developed in this study is an effective learning aid to improve students' writing skills. Students showed better competence after using the application. This finding corresponds with the outcome of a study carried out by [18] which investigated the impact of the mobile dictionary on 34 lower-intermediate language learners and proved that mobile phone was considered as valuable learning tools in language learning as the experimental group of 17 students who used the online dictionary in the mobile phone and outperformed the 17 students from the control group who used the textbook dictionary. The results of the study showed that the language skills of language learners who utilized mobile dictionaries to learn English as a foreign language showed improvement compared to those who practiced the English skill using printed dictionaries. It was also mentioned that using mobile dictionaries helped learners acquire vocabulary and it was considered as time-efficient too.

Based on the analysis of SPSS statistics 25 described previously, the findings in this study showed that students of higher vocational education who used mobile phone dictionaries to study English have enhanced their language competence. The finding confirms previous studies that typically computer-assisted language learning circumstances can contribute a beneficial impact on learners' accomplishment in mastering English as a foreign language. Implementing technology promotes language learners' motivation, develops good perspectives to learn a foreign language [16], and reduces learners' apprehension in a language classroom setting [17].

Nevertheless, the groundbreaking findings of this research are related to the use of mobile dictionaries in language courses and the extension of learning to settings outside the classroom, daily activities, and anytime, anywhere with the help of a mobile application [19]. The mobile application provides a wide range of learning experiences (for students), which can be downloaded to their mobile devices and used efficiently in various environments at the appropriate time and place [20]. In the case of language learning, this feature of mobile learning is a more practical help, as "extending language learning outside of classroom time, especially where in-class language practice time is limited, is essential to language acquisition. Referring to the context of learning language, the feature offered by mobile learning provides more practical assistance, because the extension of language learning outside of class, particularly when the allocated time for language practice in class is restricted, supports the process of acquiring language. In addition, because foreign language learning requires recurring exercises [21], mobile phones support learners with broad chances for endless contact with the target language.

- *Analysis on Students' Perception of Practical Accounting Dictionary (PAD)*

This part of the finding and discussion highlights students' perspectives on some aspects related to learning English and experiences in using the mobile dictionary application to support their learning. The findings are described based on the aspects of students' feedback after using the mobile dictionary application named Practical Accounting Dictionary (PAD) covering aspects of compatibility, content, features, and usability.

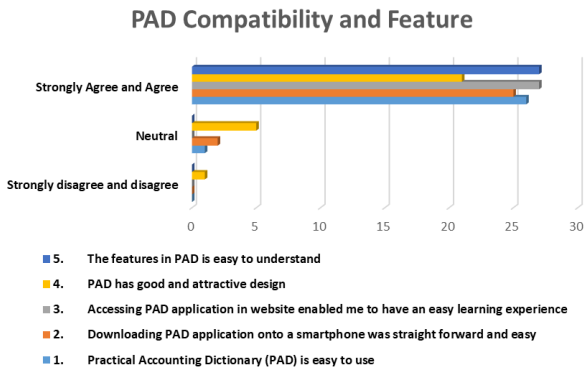

Figure 7. PAD compatibility and feature

Responses in Fig. 7 emphasize students' perspectives on the compatibility and feature offered by the mobile accounting dictionary. Most of the respondents provided positive responses on the aspect of PAD compatibility, particularly regarding the technical aspects and features that they could explore while using the digital platform. Out of 27 respondents, 26 or 96.3% agreed and strongly agreed that PAD was easy to use. Furthermore, 25 students or 92.6% approved that the process of downloading the platform was easy, 27 students or 100% respondents also acknowledged that accessing PAD in a web browser gave them an easy learning experience. Regarding the design, the majority of students (21 students or 77.8%) showed positive responses by choosing scales 4 and 5. For the last statement, all 27 students chose positive scales (agree and strongly agree) to the statement mentioning that features offered in PAD are easy to understand.

One of the most prominent challenges that students have to deal with is how to master vocabulary competence. Vocabulary has always been considered the fundamental element of any language acquisition process, where the lack of knowledge of students' vocabulary leads to obstacles in the use of foreign languages [22]. The implementation of dictionaries is of great assistance for learning vocabulary. Currently, electronic dictionary development has added a new favorite resource for vocabulary learning [22]. In mobile applications, students highly value the use of dictionaries, as using mobile dictionaries saves time, offers aids for language learners to obtain vocabulary and to check verb conjugations [20]. A study conducted in [23] mentioned that mobile technology used in mastering English as a Second language would enhance teaching and learning. The portability of the device enables learners to study regardless of place and time boundaries. Mobile devices that are extensively used among students can be utilized for education and can be regarded as an encouraging media for students. The research in [24] underlined that the mobility and the ease of access offered by mobile dictionaries assured learning chances that are not limited by space and time settings. Students can conduct learning activities through immediate access to information at any time. These findings highlighted that mobile-based dictionaries have developed into an essential tool for language teaching, especially in the aspect of vocabulary.

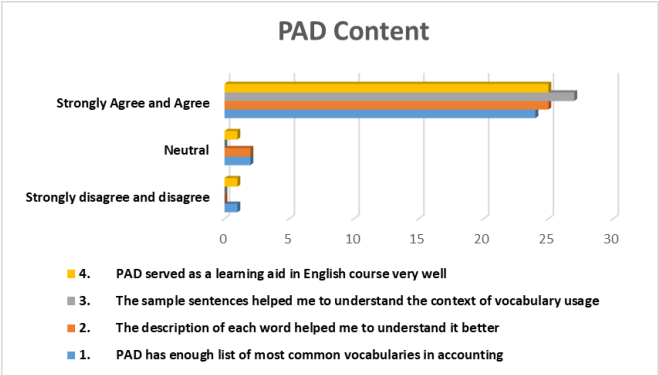

Figure 8. PAD content

Based on data presented in Fig. 8, students gave positive responses to all four statements listed in the questionnaire. Among four different statements concerning the content in PAD, the majority of the population chose scales 4 and 5 (agree and strongly agree). This showed that the students appreciated various content offered in PAD. In the first statement concerning the number of vocabularies listed in the application, 24 students or 88.9%% agreed and strongly agreed that the application has enough list of most common accounting vocabularies. A large number of students (25 92.6%) acknowledged that the description given in each word assisted them to understand the terms better. Regarding the idea that sample sentences helped students to understand the context of vocabulary usage, all respondents (27 students or 100%) chose the positive scales 4 and 5. Lastly, 25 students or 92.6% students also provided positive responses when referring to the claim that PAD served as a learning aid in English course very well. These findings coincide with previous studies on impressions, perspectives, and views about the use of dictionaries and mobile-based dictionaries in learning language learning [25], [26], [27].

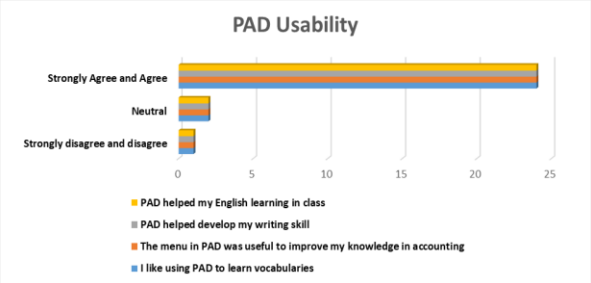

Figure 9. PAD usability

Fig. 9 displays students' perceptions on the aspect of PAD usability. As presented in the percentage diagram, more than 50% of respondents preferred scales 4 (agree) and 5 (strongly agree) concerning the statements given in the questionnaire. The same number of respondents (24 students or 88.9%) chose scales 4 and 5 in all statements. Based on students' preferences in responding to the statements on PAD usability, it can be concluded that students liked using the mobile application to learn about vocabulary. Menus presented in PAD including the list of vocabularies, favorites, trends, acronyms, fun facts, trivia question and answer, and word of the day were useful in helping students expand their accounting knowledge. In addition, students also approved that the self-learning kit for English in a vocational setting which was developed in this study assisted students in developing their writing skills and improving the process of learning in the classroom. This finding coincides with preceding research focusing on students' perspectives in using a dictionary on accounting terminology in the context of vocational education. A study by [28] highlighted that dictionary on accounting terminology was able to assist students in the learning process and inspired them to be more productive in terms of vocabulary usage, particularly in the context of financial accounting terms.

IV. CONCLUSION

This research produced a self-learning kit in the form of a mobile-based dictionary application of accounting term built based on the ADDIE method consisting of analysis, design, development, implementation, and evaluation stages. The dictionary designed and developed in this study does not only include a vocabulary list, but also includes several other features including acronym lists, fun facts, trivia (questions and answers), word of the day, and trends. The dictionary application had been implemented in the process of learning English to investigate the impact on students' mastery in the field of writing. According to the elaborated analysis, the self-learning kit or self-study tool in the form of the Practical Accounting Dictionary developed in this study is an effective learning tool to improve students' writing competence. In addition, language learners were also required to fill in an online survey in the form of a google form to determine student perceptions of the quality of self-learning kits and student experiences when implementing dictionary applications in learning writing competence. Students gave a positive perception on the aspects of compatibility and features, content, and usability of the dictionary application developed in this study.

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