



JOURNAL OF ACCOUNTING AND BUSINESS EDUCATION

P-ISSN 2528-7281 E-ISSN 2528-729X

E-mail: jabe.journal@um.ac.id

<http://journal2.um.ac.id/index.php/jabe/>

VBA (Visual Basic for Applications) Based Learning Media Development in Accounting Practice Learning

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DOI: <http://dx.doi.org/10.26675/jabe.v7i2.37125>

Abstract: This research aims to produce learning media products based on Excel VBA (Visual Basic for Applications) in accounting practice learning. This research used the R&D method with the ADDIE model, namely: Analyze, Design, Develop, Implement, and Evaluate. The subjects in this research were Grade XI Financial and Institutional Accounting students at SMK Negeri 2 Kediri. The results showed that the Excel VBA-based learning media showed the media's feasibility with validation test results by media expert of 100% and material expert of 90.87% and feasible category. In addition, the results of validation test on field practitioners (teachers) and students showed practicality and feasibility of the application of 98.61% and 93.25% respectively for accounting practice learning in Accounting Vocational Schools. Therefore, the presence of Excel VBA application as a learning medium developed is very effective and suitable for use in Accounting Vocational Schools.

Article History

Received:

1 January 2023

Revised:

1 March 2023

Accepted:

31 March 2023

Keywords

Excel VBA, Learning Media, Accounting Practice

Citation: Ulfa, A.F., & Laily, N. (2023). VBA (Visual Basic for Applications) Based Learning Media Development in Accounting Practice Learning. *Journal of Accounting and Business Education*, 7(2), 25-40

INTRODUCTION

Technology is the most important part in the development of an era (Willis, 2016). Technology has facilitated humans in creating tools with certain designs and purposes (Jablansky et al., 2019). Technology development is part of science that needs to be developed for changes in various sectors, including education sector. Education sector can make use of technology to reform paradigm in education (Peña-Ayala, 2021; Priangga, 2021), one of which is through creating more educative, effective and creative learning media (Pambudi et al., 2018). In addition, technology revolution has brought big changes to teaching practice. As explained by Saputro and Saputra (2015), technology development has led to changes on learning media from conventional to digital.

The changes resulting from technology development certainly have big impact on teachers, in which a teacher is demanded to be capable of adopting the changes into learning system (Suryani, 2020). Technology development allows teachers to have high involvement level in learning process (AlAjmi, 2022). A teacher is also demanded to understand the developing technology products and systems (Wijaya et al., 2016), and is then required to be adaptable to the learning system. Besides, teachers should have

digital ability needed in handling important technology development for connectivity (Antonietti et al., 2022). Technology development will help teacher create more creative and innovative learning system. Thus, teachers need to transfer their academic knowledge that should be learned in technology learning field that is considered too complicated by some people (AlAjmi, 2022). As explained by Djaja (2016), Herliandry et al. (2020), and Manasikana & Listiadi (2017), a teacher can make use of technology to create more creative learning process, as supported by Wijaya et al. (2016), stating that technology development will influence the quantity of learning media variations.

Lee et al. (2018) and Badua et al. (2011) state that the rate of technology development in education sector is in line with the rate of innovation. However, innovation resulting from technology development evidently does not occur simultaneously in the whole fields of education sector. One of educational fields that still needs innovation is accounting education, especially in accounting practice learning. Accounting practice one of accounting subjects that provides student direct and comprehensive practice on how to settle accounting cases (Ardiansyah, 2020). Lack of innovation in accounting practice learning has been explained by Rosani and Susanti (2017), in which the implementation of accounting practice learning in Vocational High School (SMK) has not operated optimally due to lack of practice materials such as accommodating module, LKS (student worksheet), and practice learning media. This causes accounting practice learning in SMK to remain using manual bookkeeping using printed worksheet (Yana, 2017). In addition, teachers also still apply the existing conventional learning model to accounting practice without realizing that students have different characteristics and abilities. Meanwhile, a number of studies show that the trigger that may attract stakeholders' attention is the quality of a company's financial statements (Achilli et al., 2022).

Apart from this, manual bookkeeping is the basic competence that needs to be achieved in accounting practice learning. Upon achieved basic competence, problems arise in manual accounting practice learning. The problems arising in accounting practice learning process eventually cause student to find it difficult to do manual bookkeeping practice, including time consuming, lack of writing orderliness, large quantity of paper used, and teacher's difficulty in correcting and scoring student's answers (Yana, 2017). One of the causes of these problems is non-maximal use of technology in accounting practice learning. Lee et al. (2018) and Olusegun (2016) confirm that (software) technology development plays an important role in accounting since it facilitates accounting cases processing and analysis, rendering them more effective and efficient. This shows that innovative learning media are needed as a supplement upon achieved basic competence in accounting practice learning, one of which is multimedia application based learning media (Kybartaitė et al., 2008; Puspitarini and Hanif, 2019; Yamamoto, 2014). Abdulrahaman et al. (2020) and Vagg et al. (2020) reveal that multimedia application is evidently effective in learning process since it may stimulate learning interest and improve learning experience, and facilitate teacher in identifying student's learning position.

Studies that develop VBA based learning media on Microsoft PowerPoint show valid results worth use, since interactive learning media can identify picture forming using thin lens and application in some optical devices through simple simulation (Novita et al., 2016). Excel VBA (Visual Basic for Application) in notarial office's financial statements evidently facilitates administrative staff's work in their reporting (Rachmaniah et al., 2022). The success in Excel VBA (Visual Basic for Application) learning media is evidently effective in simple harmonic oscillator potential learning showing that student's mastery is higher than learning without using media (Nurhayari, 2015). The performance of Excel VBA based learning media is evidently practical for use in physics learning in Vocational High School (SMK) (Safitri et al., 2020). Based on the results and role of Microsoft Office VBA in school learning, it reopens the opportunity for the researcher to innovate as supplement to learning media in accounting education sector.

This research focuses on innovating as supplement to multimedia application-based learning media in the form of Microsoft Excel Visual Basic for Applications (Excel VBA) in accounting practice learning. The difference in the learning media lies on its programming language of Excel VBA that is a derivative of VBA from Microsoft Office designed to work on Excel application (Madcoms, 2017). VBA not exists on Microsoft Excel, but also on the other office programs (Novita et al., 2016). Therefore, the existence of Excel VBA based learning media innovation as supplement will present solution to accounting practice learning in processing accounting data more easily and effectively. In addition, Excel VBA based learning

media have the advantage that they are observable from VBA programming outcome, including initial display and log display in application that are designed to distinguish a student's work from other student's work, availability of sheet containing exercises on accounting cases that can be controlled by teacher, attractively designed accounting worksheet, and learning media being designed to automatically display score graphics.

Excel VBA learning media can be accessed via laptop and computer without internet network. Use of Excel VBA based learning media is expected to improve student's abilities and skills in settling various accounting cases on the basis of technology. As stated by [Bernard and Senjayawati \(2019\)](#), using Excel VBA, student will complete financial statements arranging process more easily. In addition, the advantage of Excel VBA based learning media can facilitate teacher in scoring student's work automatically. As explained by [AlAjmi \(2022\)](#), the aid of Excel VBA (technology) can alleviate the workload teacher should assume. This minimizes miscalculation and improves credible scoring on student's works ([Suryani, 2020](#)).

LITERATURE REVIEW

Symbol Systems Theory

Initiated by [G. Salomon \(1977\)](#), the symbol systems theory explains the impacts of media designed on learning. Each of learning media has the ability of delivering their content through symbols used and learning media are said effective depending on their compatibility with student, assignment, and media content. According to [Salomon \(1977\)](#), media symbol system will influence student's acquired knowledge. [Fritz \(1952\)](#) explains that symbol is the realization of shape, image, motion, and sound that represent an idea. Symbol is also defined as real item, such as color and pattern. The symbol systems theory reveals that Excel VBA based learning media in accounting practice learning is expected to present efficiency and effectiveness in learning process. Besides, it is also to examine the reciprocal process between Excel VBA application and user.

Learning Media

Media are the form of intermediary of delivery of information, thinking, idea, or material delivered to receiver ([Baharuddin & Anggraini, 2021](#)). In the education world, media are physical instrument used by student in learning process by stimulating a message in learning in order to increase the efficiency and effectiveness of achieving a purpose ([Arsyad, 2014](#); [Menrisal & Putri, 2018](#)). Learning, meanwhile, is the process of interaction between teacher and student, either in class out of class, using various existing sources of learning ([Prasetyo, 2017](#)). Learning media are an instrument serving to deliver and explain learning message by stimulating student's attention, thinking, feeling and interest in learning activity ([Astuti et al., 2017](#); [Daryanto, 2016](#); [Sanaky and Faizah, 2013](#); [Tafonao, 2018](#)). Learning media have positive impact on learning process, facilitating teacher and serving as visual aid to deliver learning information with interesting stimulus in teaching-learning process ([Peprizal and Syah, 2020](#); [Putra, 2021](#)).

Media in education world serve as the facilities to achieve learning process purpose. The functions of learning media are explained by [Arsyad \(2014\)](#), including: (1) attention function: media serving to attract student's attention in concentration; (2) affective function: this can be viewed from how student enjoys learning using text with image; (3) cognitive function: it aims to accelerate student's understanding given that information is delivered using visual symbol or images; and (4) compensatory function: it gives an understanding to student who is weak in reading in the context of text understanding. In addition, learning media are also aimed to facilitate student in understanding learning materials with more clarity and be a visual aid for teacher in facilitating and improving student's concentration during learning process ([Astuti et al., 2017](#); [Bernard & Senjayawati, 2019](#)).

Accounting Practice Subject

Accounting is derived from the term account. Accounting is one branch of economics on financial reporting that is greatly needed in working world ([Mardetini et al., 2018](#)). Accounting can be learned through practice ([Saputri & Susilowibowo, 2020](#)). The definition of accounting according to the American

Accounting Association is the process of identification, recording, and reporting of economic information so as to help decision making for information user (Arifiyani & Susanti, 2021). Accounting science can be found in accounting expertise program, including SMK (Vocational High School) (Nurwandini & Susilowibowo, 2020; Saputri & Susilowibowo, 2020). Hard skill and Soft skill are the combination of sciences prepared in vocational education and are later expected to generate highly competitive human resource (S. Rahmawati & Susanti, 2019). One of the subjects to support expertise prospect in accounting is accounting practice subject. According to Sapruwan (2017), practice is the process of teacher's invitation for student to prove the theories taught in real life. Accounting practice learning can improve student's cognitive, psychomotor and affective abilities in financial reporting on a company's transaction (Prastowo, 2011; Yana, 2017). Through accounting practice, student will be taught directly on how to report transactional evidences in a company into financial statements.

Excel Visual Basic for Applications (VBA)

Microsoft Excel is a spreadsheet program aiming to facilitate user in inputting data and has been used by numerous big businessmen (Besacier, 2011; Madcoms, 2017). In accounting, Microsoft Excel also has important features in support of accounting education (Beaman et al., 2005). Microsoft Excel has been developed as computerized simulation from paper based worksheet accounting as a strategy in generating accurate and trusted financial statements (Jusoh & Ahmad, 2019; Olusegun, 2016). Lee et al. (2018) explain that Microsoft Excel is software often used in working world and must be applied in accounting education. The advantage of using Microsoft Excel in accounting education has been proven by Rachmawati (2017), that using Microsoft Excel as financial reporting media in accounting education shows better learning outcome than using manual financial reporting media.

ICT (information and communication technology) learning media greatly influences learning process, both in class and out of class. ICT learning media development in trigonometric learning shows student's improved achievement (Suryadi, 2017). This result is in line with the research conducted by Astuti et al. (2017) that learning media for android based physics mobile learning are worthy of use in physics learning process. The success in ICT based learning media making is confirmed by the research conducted by Meidyanti et al. (2021), in which smartphone (apk) media are also suitable for use as learning media for special journal material in accounting. Besides, application based learning media development for accounting education quiz improves student's learning interest effectively than text book learning (D. Rahmawati et al., 2016).

One of the programming languages that Microsoft Excel has is Visual Basic for Application (Oktaviani & Dewi, 2020). Visual Basic for Application (hereinafter VBA) is the development of windows on Microsoft Office program that may help user automate work and save time (David, 2019; Madcoms, 2017; Madcoms, 2014). Therefore, the presence of Visual Basic for Application can facilitate data accounting making and processing by making use of facilities and functions in Microsoft Excel (Bernard, 2018). A number of studies show that Microsoft Excel learning media are effective in learning process, one of which is the research conducted by Ihsan and Yuniati (2021) showing that Microsoft Excel effective and worthy of use in introduction to accounting subject since it presents optimal learning outcome and has good influence on student's self-efficacy. In addition, Suryani (2020) also reveals that Microsoft Excel is also designed in online accounting exam to reduce student's cheating and facilitate teacher's scoring with design as attractive as possible.

Besides, the effectiveness of use of Microsoft Excel VBA has been proven by the research conducted by Bernard (2018), in which mathematic student's creative ability will be better when Excel VBA media are used than without using media through a problem posing approach. Additionally, VBA based learning media also have its success in SMP PGRI, influencing student's reasoning through VBA for PowerPoint and Excel development (Rohaeti et al., 2019). Also, Excel VBA based learning media also help teacher give interactive description of mathematic materials and serve as teacher's visual aid in practical and efficient learning (Bernard & Senjayawati, 2019).

Excel VBA can also be an application program to calculate insurance premium accurately (Nuryanto et al., 2012). As revealed in the research conducted by Sukmawan and Utomo (2018), using

Excel VBA can predict more accurately sales by CV Agro Industri Malang that is facilitates user operating Excel VBA application for sale database. In addition, Excel VBA is time saving and facilitates corporate working system fast (Siregar, 2019). This is confirmed by Jacobs et al. (2016) certifying that Excel is an effective application of choice in support of managerial decision in a company and Excel has more complex abilities in data analysis efficiency (Ragland & Ramachandran, 2014). Excel (spreadsheet) that evidently performs effectively, user friendly and fast has been chosen as spectroscopic tool and chromatographic data handling tool (Vieira et al., 2019).

The aim of this research is to develop Excel VBA based media as supplement to accounting practice learning. The researcher's reason of supplementing media development is since the media can process data more easily and effectively, produce digital worksheet using programming in excel VBA, help student settle accounting cases to be processed into financial statements easily, and improve student's ability in using (computer) technology for accounting practice. This is confirmed by Hasana & Maharany (2017) that the presence of VBA makes attractive and innovative display in Microsoft Excel. This facilitates Excel VBA application users (Astuti & Bhakti, 2018). In addition, through Excel VBA based learning media, teacher can control any exercise given to student, facilitating teacher correcting student's work automatically. The presence of Excel VBA based learning media is expected to help teacher maximally achieve the goal of efficient and efficient learning.

METHODS

This research used Research and Development (R&D) method. Research and Development is a research method to generate certain product and test its effectiveness (Sugiyono, 2014). This research focused on application software development to produce product in the form of Excel Visual Basic for Applications (VBA) based learning media in Accounting Practice learning. This research used the ADDIE development model developed by Dick and Carey (1996) of (Analyze, Design, Develop, Implement, Evaluate).

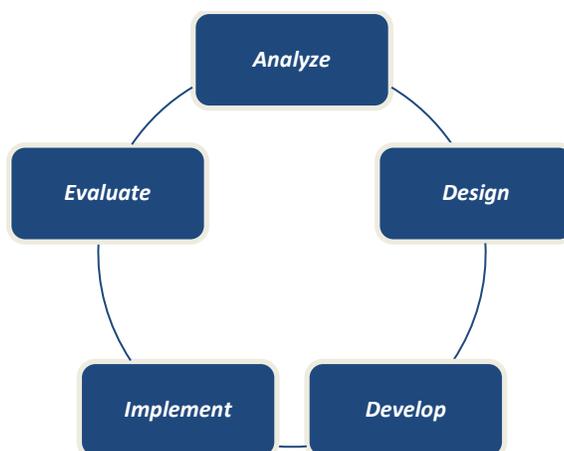


Figure 1. ADDIE Model's Research and Development Stages (Branch, 2009)

The research and development stages in ADDIE model could be divided into: (1) *Analyze*, in which main problem was determined initially, that was problem faced in accounting practice learning process at SMK N 2 Kediri by analyzing previous learning media to determine the learning media development needed. (2) *Design*, as a stage of planning a development product to apply needs analysis results. The planning covered initial design of media to be developed, arranging questions and answers exercise, arranging scoring design, and buttons in application making. (3) *Develop*, as the media development stage covering making of Excel VBA application and validation test by material and media expert using questionnaire made available by researcher. (4) *Implement*, a stage where product was applied to SMK accounting student to examining to what extent the application product's effectiveness in learning process. The subject of in the experiment class was Grade XI Institutional Accounting and Finance 1 students of

SMK N 2 Kediri. In addition, in this experiment the researcher distributed questionnaire to the students to measure and examine their opinion of Excel VBA based learning media. (5) *Evaluate*, where product tested was experimented on the students would be scored based on the questionnaire given to measure the developed product's effectiveness and efficiency.

The Excel VBA based learning media would be developed through two stages of validation, including: Stage (1) validation by media expert and material expert, stage (2) validation by field practitioners at SMK. Quantitative and qualitative data were collected at the validation stages. Validation by media expert and material expert used percentage data with the following validation criteria (Arikunto, 2010).

$$\text{Score Percentage (P)} = \frac{\sum \text{average total score}}{\text{Quantity of questions (n)}} \times 100\%, NA = \frac{\sum P}{n}$$

Table 1. Feasibility Criteria for Validation by Media Expert and Material Expert

Percentage	Interpretation	Description
76-100	Valid	Feasible/no revision
50-25	Fairly Valid	Fairly feasible/partial revision
26-50	Poorly Valid	Poorly feasible/partial revision
<25	Invalid	Unfeasible/total revision

In addition, table 2 shows the validation criteria from field practitioners at SMK for the development of Excel VBA based learning media as follows.

Table 2. Feasibility Criteria for Validation by Field Practitioner

Percentage	Interpretation	Description
76-100	Practical	Practical/no revision
50-25	Fairly Practical	Fairly Practical/partial revision
26-50	Poorly Practical	Poorly Practical/partial revision
<25	Non-Practical	Non-Practical/total revision

RESULTS AND DISCUSSION

The results of research and development using the ADDIE model show that the Excel VBA learning media are fairly feasible for development, especially in accounting practice learning. The series of stages in this development include: (1) Problem analysis conducted through observation and interview with teachers of SMK N 2 Kediri showed student's difficulty in accounting practice learning process due to manual bookkeeping and the completion process was time consuming. In addition, the covid-19 pandemic posed some difficulty to print worksheet of financial statements and to teacher to give exercise in printed form. Therefore, with the problems arising in the field, innovation is a necessity for learning media by making use of computer technology as the main device in accounting practice learning. This is based on student's friendliness with the currently developing technology. (2) Product designing, in which with the problems arising in the school environment, especially in institutional financial accounting class at SMK, the researcher designed software to be effectively used in accounting practice learning. In this stage, the researcher made the application design using Adobe Photoshop and Adobe Illustrator. The application design was made starting from welcome display, log in, dashboard, buttons in the application and worksheet of financial statements in png and jpg formats. Additionally, the researcher collected materials that were compatible with the prevailing curriculum to develop and design the application. As a result, innovation arose to design Excel VBA based learning media in accounting practice learning. (3) Product development, conducted by making components of the application and application instruction manual aiming to facilitate student in financial statements preparing process. In this development stage, the researcher combined the application designs made in Microsoft Excel and programmed them using Visual Basic for Application.

Thus, the VBA based application was in the form of Excel VBA, in which the files would be delivered to students in the form of Google Drive link or through WhatsApp group. below is the display of Excel VBA based application:



Figure 2. Welcome Display

Figure 2 is the welcome display of VBA for Excel in which user is presented with two choices, student and teacher, thus each user can only press one button as per their role, where teacher can press the “GURU” button and student can press the “SISWA” button.

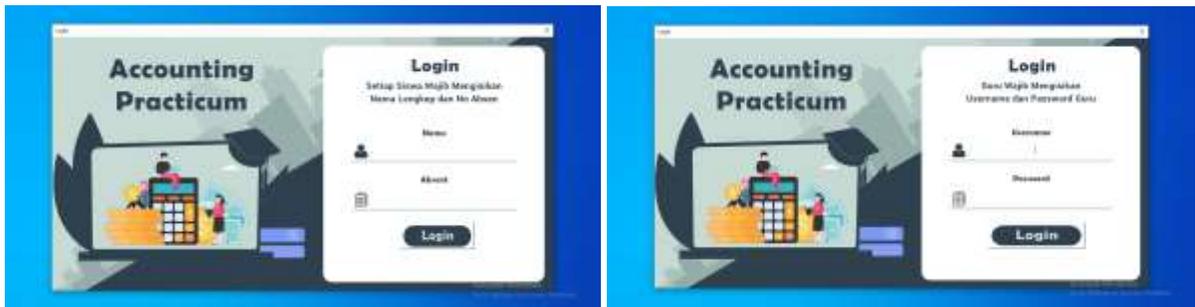


Figure 3. Login Page Display

Figure 3 is the login page display of VBA for Excel, where there is different display between student and teacher. For student, when login they must fill in their personal data including “Nama” and “Absen” aiming for identification by teacher for scoring. For teacher, login requires “Username” and “Password” that have been made available in the application to identify student’s work and score.



Figure 4. Login Failure Display

In case user inputs non-corresponding data to login, the system will reject login, as shown in figure 4.

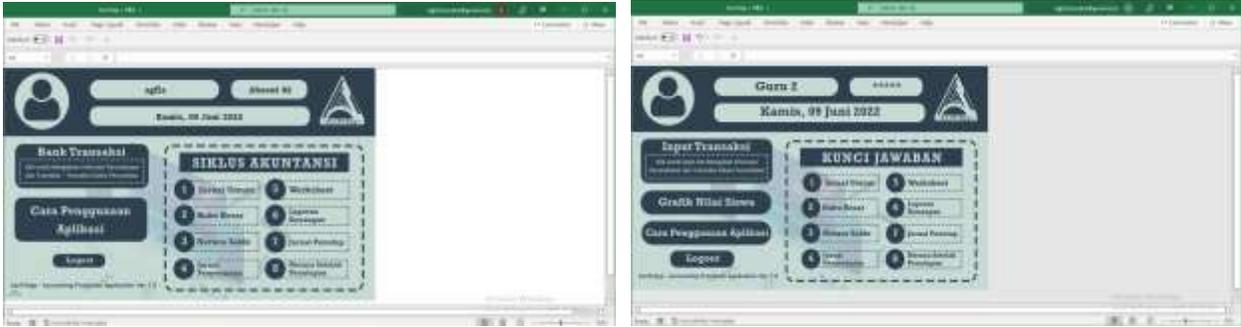


Figure 5. Dashboard Display

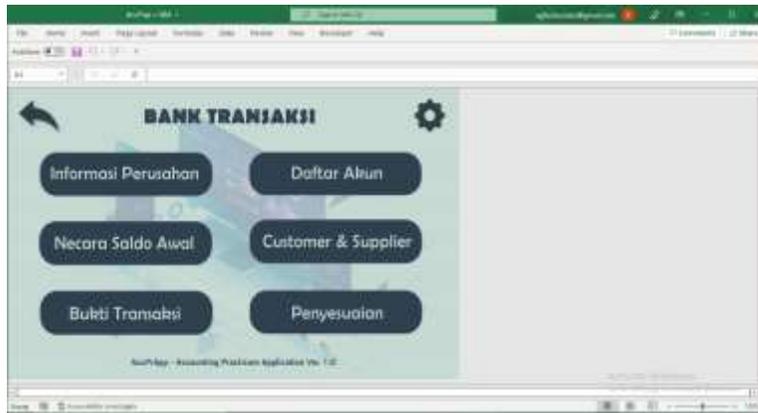


Figure 6. Transaction Bank Display

Figure 5 is the dashboard display composed of user identity and menus in the application covering: (a) transaction bank/transaction input menu, containing information of company, list of accounts, initial balance sheet, information of customer & supplier, and transaction evidences in reporting month (figure 6); (b) menu of how to use the application, containing how to use application during pre-operation; (c) logout menu, which is feature to close the application when user has finished using it. In this feature, data will be saved automatically; and (d) accounting cycle menu composed of (1) general journal; (2) general ledger; (3) balance sheet; (4) adjustment journal; (5) worksheet; (6) financial statements; (7) closing journal; and (8) balance upon closure (figure 7). What differentiates dashboard displays for student and teacher is the “Grafik Nilai Siswa” menu that can only be accessed from teacher’s dashboard.

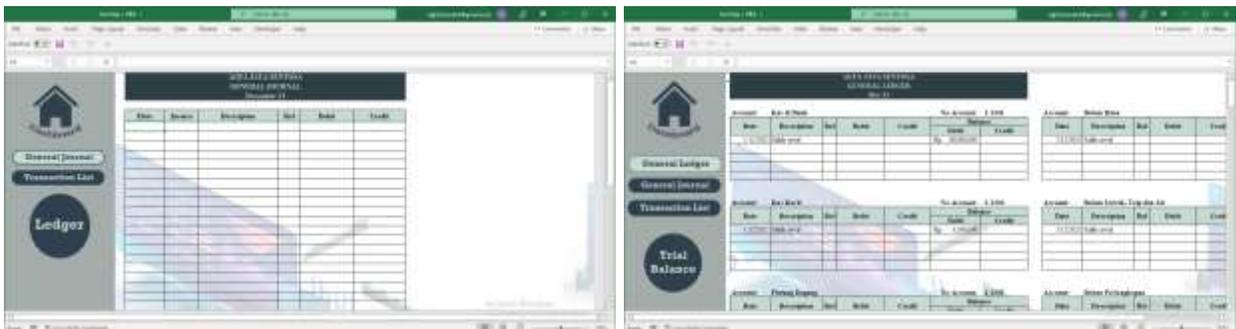


Figure 7. Workbook Display

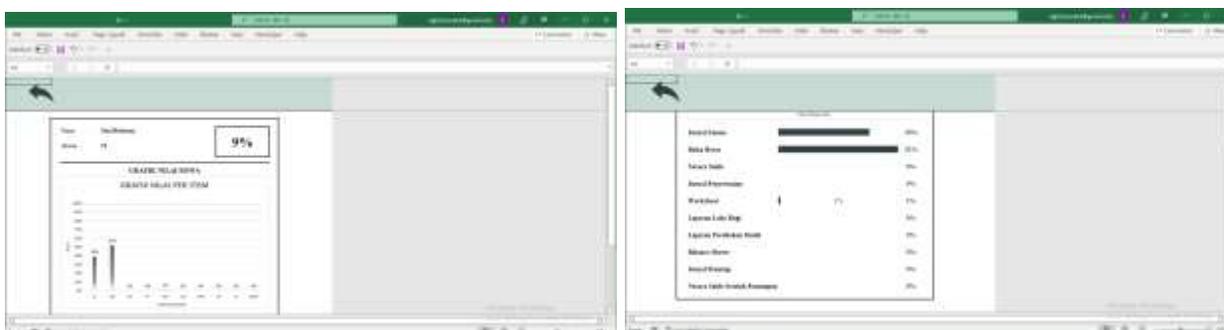


Figure 8. Student Score Graphic Display

Figure 8 is the student score graphic menu containing student's submitted works. This menu will facilitate teacher in correcting student's answer one by one in printed form.

Additionally, in the third stage of product development, the researcher tested product validation for feasibility and quality of the Excel VBA based learning media. Table 3 is the result of the validation test:

Table 3. Result of Validation Scoring by Media Expert

No	Scoring Indicator	ΣP	Percentage (%)	Category
1	Display Aspect	36	100	Feasible
2	Programming Aspect	28	100	Feasible
Total Score		64		
NP (%)				100.00

Source: Processed primary data (2022)

Validation process was conducted by IT expert, a lecturer of Education Technology, Faculty of Education Science, Universitas Negeri Malang. Media validity was measured from the scoring by media expert (table 3), in which the media developed has advantages in the following two aspects: (a) Application display aspect has interesting design from suitable combination of colors, images, layout, kind and size of font, and consistent placement of application buttons. In addition, the IT also gave suggestion to add image background into each student's worksheet. This aimed to attract student's attention to using the application and student would not be bored using the application during accounting practice learning process. (b) Programming aspect is easy to use due to the clear use application instruction manual. Therefore, in view of the validation learning media test result in table 3, the percentage is 100% and it is declared that the Excel VBA based learning media are valid and feasible to be applied to vocational high school (SMK).

As an IT expert, besides testing the feasibility of Excel VBA based learning media in accounting practice, also gave oral suggestion to the researcher that excel VBA based learning media would be more attractive when transparent images were added to financial statements worksheet and to add video link of how to use application in every sheet of excel VBA for a duration of about 3 minutes. In his opinion, additional transparent image accent and usage instruction via video would give student some impression with which they would be facilitated in receiving information and would not be bored during learning process. This is confirmed by Sukiyasa & Sukoco (2013) that learning material made either in the form of attractive image or video would facilitate student understanding and receiving information.

Validation of material expert shows that the exercise in the Excel VBA based learning media are valid since they have the following advantages: (a) Exercise conforms to the competence and goals to be achieved; (b) Variation and level of exercise presentation are fairly compatible, in which the exercises presented are relatively varied that give student thinking practice and skill in accounting case solving; (c) Discussion or answers presented in Excel VBA are clear, facilitating teacher in automatic scoring process with the learning media. Additionally, the answers in the learning media are accessible only for teacher. The practicality is categorized as valid (in conformity) since the result of question based on three aspects has percentage of 90.97% as explained in table 4. However, before experiment with the accounting students,

suggestion was given by the material expert to the researcher to adjust the exercise made to student's ability at SMK N 2 Kediri and to choose the accounting accounts taught in SMK N 2 Kediri, which were accounting account in Indonesian language.

Table 4. Result of Validation Scoring by Material Expert

No	Scoring Indicator	ΣP	Percentage (%)	Category
1	Exercise Presentation Compatibility Aspect	11	91.67	Feasible
2	Variation and Level of Exercise Presentation Aspect	13	81.25	Feasible
3	Exercise Discussion Clarity Aspect	12	100	Feasible
Total Score		36		
NP (%)				90.97

Source: Processed primary data (2022)

Validation by field practitioner shows that the learning media's practicality can be scored by the Excel VBA based learning media's ease of use in accounting practice learning process. The validation result can be viewed from the following three aspects: (a) Exercise given to student conforms to the expectation for honing student's competence in accounting sector in accounting practice learning; (b) From the perspectives of student's activeness in class, level of exercise and learning media given, they can encourage student to build their case analyzing knowledge, critical thinking and skill in financial reporting; (c) Excel VBA based learning media can facilitate student in financial reporting process. With the Excel VBA based learning media, student cheating will be reduced and teacher will be facilitated in scoring process. Additionally, computerized learning media innovation also has its weakness in its use, that not all students have computer or laptop as the mandatory instrument for learning media, thus the learning media are accessible at school laboratory. However, she also gave suggestion that the learning media should be accessible via smartphone since it is certain that all students have this sophisticated device. Therefore, the media are categorized as practical since the question based on three aspects has percentage of 97.23% as explained in table 5.

After validation test by media expert and material expert, the product was experimented on students (user group). (4) Experiment of Excel VBA based learning media was conducted on 31 grade XI financial and institutional accounting 1 (AKL 1) students in SMK Negeri 2 Kediri in accounting practice subject at TIK Laboratory of SMK Negeri 2 Kediri. The learning media experiment was conducted after learning media and teaching materials were revised by the experts. Experiment was conducted by giving service company cases to be processed into IT based financial statements. Given accounting practice is one of the subjects giving student skill in transactional evidences reporting process in a company in the form of financial statements that will later be beneficial and useful in the working world, this will generate competent SMK graduates.

Table 5. Result of Validation Scoring by Field Practitioner

No	Scoring Indicator	ΣP	Percentage (%)	Category
1	Exercise Presentation Compatibility Aspect	11	91.67	Practical
2	Variation and Level of Exercise Presentation Aspect	24	100	Practical
3	Interactivity Aspect	8	100	Practical
Total Score		43		
NP (%)				97.23

Source: Processed primary data (2022)

Table 6. Student's Practicability Result

No	Scoring Indicator	ΣP	Percentage (%)	Category
1	Exercise Compatibility Presentation Aspect	466	93.95	Practical
2	Display Aspect	683	91.80	Practical
3	Use and Benefit Aspect	816	94.01	Practical
	Total Score	1965		
	NP (%)			93.25

Source: Processed primary data (2022)

(5) Evaluation on Excel VBA based learning media experiment on student shows that Excel VBA learning media are feasible and practical to be applied to in accounting practice learning. In general, Excel VBA based learning media have the following advantages: (a) Attractive application display; (b) Selecting appropriate color and font; (c) Selecting and placing consistent buttons; (d) Easy-to-understand instruction manual; (e) Orderly arranged worksheet; (f) Easy data input process; and (g) Varied exercises. Therefore, the whole evaluation on student is scored 93.25%, which is categorized as feasible for the Excel VBA based learning media to be applied to SMK Accounting (table 6).

Effectiveness of the Developed Model

Assessing the effectiveness of the developed model was carried out using paired sample test analysis of the pre-Test and post-Test values in the experimental class. Before conducting the test for differences, the normality test was implemented to uncover whether the data was normally distributed or not.

Normality Test

The results of the normality test using the Shapiro-Wilk test on pretest scores (manual bookkeeping of accounting cycle) and posttest (bookkeeping of accounting cycles based on Excel VBA) are shown in the following table.

Table 7. Normality Test

Data	Significant value of Shapiro-Wilk test results
Pretest	,543
Posttest	,008

The data is normally distributed if the significance value is > 0.05 for the pretest and posttest data. This shows that in table 7 the pretest significance score is > 0.05 and the posttest significance score is < 0.05 . Based on these results, it can be concluded that the data is not normally distributed. In addition to the results of the data analysis being distributed abnormally, it cannot be done with the parametric test using the t test. This moves the difference test analysis being diverted to using a non-parametric test, namely the Wilcoxon test which aims to compare two conditions when the same student participates in each condition and the data not normally distributed. The results are as shown in the following table.

Table 8. Wilcoxon Test Rank

	N	Mean Rank	Sum of Ranks
Pre-Test – Negative Ranks	0 ^a	,00	,00
Post-Test Positive Ranks	31 ^b	16,00	496,00
Ties	0 ^c		
Total	31		

a. Post-Test $<$ Pre-Test

b. Post-Test $>$ Pre-Test

c. Post-Test = Pre-Test

Table 8 shows the results of data processing using the Wilcoxon test, which can be concluded that negative ranks = 0 indicates that there is no decrease from the pretest scores to the posttest scores of the students. The positive ranks indicate that 31 students experienced an increase in learning outcomes from pretest to post-test. The mean rank shows an increase to the amount of 16.00. The results of the Wilcoxon signed rank test that the asymp. Sig. (2-tailed) is in the amount of ,000. The significance result (Sig.) is <0.05 which indicates that there is a difference between learning outcomes before and after using Excel VBA-based learning media or it can be concluded that there is a significant influence on the use of Excel VBA-based learning media in accounting practicum learning.

The result of research and development in the form of Excel VBA based learning media is considered conforming to the research objective of creating effective learning media as a supplement to be used in accounting practice learning of grade XI SMK Accounting. This research shows that Excel VBA software-based learning media are feasible and effective as supplement to accounting practice learning. This is because the students have achieved the basic competence in manual accounting practice learning. Excel VBA has interesting features, from Excel dashboard display that according to [Harmastuti and Setyowati \(2018\)](#) has the advantage of displaying attractive graphic and can be the main capital for designing corresponding and consistent dashboard display, button placement, choice of image, font, and color. This is confirmed by [Hasana and Maharany \(2017\)](#) that VBA programming can make Microsoft Excel's display more attractive, practical and innovative. This clearly can create comfortable, conducive and non-boring class condition due to reciprocal process between student and the Excel VBA software programmed and can establish good relationship between student and teacher. This result is confirmed by [Astuti and Bhakti \(2018\)](#) that using VBA based Excel application as learning media in class makes learning more effective and comfortable. This is because Excel VBA based learning media in accounting practice learning offer many benefits to student and teacher, including: 1) Available application instruction manual; 2) Available orderly presented case exercises and worksheets, 3) Links are available in working process in the next sheet until the last sheet, thus in case of journaling mistake, the ones corrected on the worksheet are general journal, big book, and balance sheet before adjustment, that will be automatically modified in the next sheets up to financial statements sheet, and 4) Available automatically produced score graphic that is accessible only to teacher.

Excel VBA based learning media are capable of training student's skill in using Microsoft Office software to prepare financial statements with computer aid. This research result is supported by the research conducted by [Bernard and Senjayawati \(2019\)](#) that using Excel VBA, student will have their understanding improved and will complete case given more easily. In line with this, the research conducted by [Rachmawati \(2017\)](#) shows that using Microsoft Excel as financial reporting media, student's learning outcome is higher than using manual recording media. The paperless learning media give users (student and teacher) an impression that accounting practice cannot only be performed manually using printed worksheet, but also using technology aid, which is more effective. This conforms to the research conducted by [Olusegun \(2016\)](#) that technology facilitates financial statements processing, making it effective and efficient. Therefore, the emphasis of learning media is on the balance in maximizing class learning activity between student and programmed computer.

The experiment result shows that use of Excel VBA based learning media in accounting practice learning is valid, feasible, effective and attractive to student in accounting cases completion process compared to manual completion. This is confirmed by the research conducted by [Ihsan & Yuniati \(2021\)](#) that Microsoft Excel based interactive learning media are declared feasible and effective for use in introduction to accounting subject and the interactive learning media have better influence on student's learning outcome and self-efficacy compared to the use of conventional media. Excel VBA based learning media can also minimize cheat between students and facilitate teacher in scoring student's works. Therefore, teacher only serves as facilitator who gives instruction, guidance and explanation to student ([Ningsih, 2018](#)). This shows that the use of multimedia in accounting practice learning can reduce

conventional (manual) learning's weaknesses and facilitate teacher in identifying student's learning position.

Other research shows that Excel (Spreadsheet) based learning media innovation can increase and attractive student's curiosity in physics learning process, making learning easier to understand (Putranta & Kuswanto, 2018). Success in Excel based learning media has also been shown by the research conducted by Oktaviani and Dewi (2020), in which the use of Excel VBA in mathematics learning has positive response from student as identifiable from student's motivation at percentage of 69.5%. The success is confirmed by the research conducted by Rohaeti et al. (2019) that Visual Basic Application (VBA) for Excel and PowerPoint based learning media are feasible for application in in-class learning for Junior High School (SMP) students on opportunity material using an Open-Ended approach. Therefore, the presence of Excel VBA based learning media innovation as a supplement to accounting practice learning for SMK Institutional Financial Accounting Department students helps teacher achieve effective and efficient learning.

CONCLUSION

Based on the research and development results above, we may conclude that: 1) product resulting from the development was in the form of Excel VBA based learning media for supplement in accounting practice learning, 2) Excel VBA based learning media for student consist of transaction bank, how to use accounting cycle worksheet and application, 3) Excel VBA based learning media for teacher consist of transaction input, how to use the application, graphic of student's scores and key answers on accounting cycle worksheet, 4) the result of Excel VBA based learning media validation shows that the learning media are feasible for application in accounting practice learning as supplement, 5) Excel VBA based learning media are effective for application in accounting practice learning, and 6) additionally, the research and development contribute to the school in the form of Excel VBA based learning media in accounting practice learning and give teachers guidance in the application operation that novelty is needed for the exercise in the transaction bank sheet and worksheet.

The Excel VBA based learning media research and development still are still limited in students' lack of laptop that not all of them have the device and lack of persuasive and systematic approach in Excel VBA based learning media application with user due to limited time. Excel VBA based learning media also have not been equipped with notification feature in case user answers a question wrong since the research and development produce Excel VBA based learning media in accounting practice learning without internet connection. Therefore, further research is expected to develop Excel VBA application accessible through school's web accounting practice or web e-learning using internet access for maximization of learning media of every educational institution in Indonesia. In addition, the Excel VBA application is expected to be accessible via teacher and student's smartphone. Further research can develop other program by making use of Excel VBA in financial sector in public environment.

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