Jurnal Iqra' Kajian Ilmu Pendidikan

E-ISSN: 2548-7892 & P-ISSN: 2527-4449

Volume 9, Number 1, June 2024

Developing E-Module Accounting Cycle based on Problem-Based Learning (PBL): Can it Improve Students' Critical Thinking Abilities?

Yeyen Suryani[1*], Iskandar[1], Fifit Nabhan Nurfitriani[1], Rani Tania Pratiwi[1], Muhammad Hasan[2], Nur Arisah[2], Nur Aeni[2], Akhtem A. Dzhelilov[3]

[1] *Universitas Kuningan, Indonesia*

[2] *Universitas Negeri Makassar, Indonesia*

[3] *University Institute of Media Communication, Media Technologies and Design, Republic of Crimea Russia*

yeyen.suryani@uniku.ac.id*

ARTICLE INFO

Article history:

Received

April 25, 2024

Revised

June 02, 2024

Accepted

June 25, 2024

ABSTRACT

The limitations of teaching materials in the new curriculum, namely the independent curriculum and technological advances. It has a good impact on education to support the achievement of 21st century skills. E-modules could be used as an alternative learning resource that was practical and contextual, because they could be used anywhere and the material presented was relevant to real life. The article aimed to produce e-module based on PBL valid, practical, and accounting cycles to determine the effectiveness of the e-module on students' critical thinking skills. The researchers used development research, adapting the ADDIE model (analyze, design, develop, implement, and evaluate). In testing the effectiveness of this e-module, there was a significant increase because the value of the learning effectiveness of students after being given treatment was higher than without being given treatment. The implication of this research showed that educators must implement PBL assisted by e-modules, especially in accounting subjects, to improve students' critical thinking. Students were able to formulate learning problems, analyze problems, students used clear language, and draw learning conclusions. It gave an implication provision for students to develop their critical thinking skills. An important implication for the future that could be made was by paying attention to designs that were more appropriate to student needs, integrating content that was relevant to real life, and providing adequate training to teachers, it can increase the effectiveness of the module in improving students' critical thinking abilities.

Keywords: *E-Module Accounting, Problem Based Learning, Critical Thinking Ability*

Journal Homepage http://journal.iaimnumetrolampung.ac.id/index.php/ji/

INTRODUCTION

Education is an essential human need that persists continuously. Where the learning process encourages interaction between teachers and students so that they can develop their potential to become quality human resources. Education functions to develop abilities and shape the character and civilization of a dignified nation in order to create a nation that is intelligent, has noble character, is healthy, knowledgeable, creative, independent, and becomes a democratic and responsible citizen (Barrett, 2013; Carvalho, 2016). With this education as an effort to empower humans that can be

carried out to develop personal potential, intelligence, and personality, with education structured based on the provisions of appropriate basic values, it will produce a quality generation of the nation that is in accordance with the goals of Indonesian education (Bahtiar et al., 2024). The success of continuing education is influenced, among other things, by the teacher's readiness in the learning process regarding the use of effective methods. The teacher's job is not just to convey knowledge, but there are many things that must be done, namely educating students to become complete humans. Thus, it is clear that teachers are required to have mastery of various abilities, such as how to teach, mastery of material, choosing various teaching methods, the ability to create appropriate learning tools or media, and having a good attitude and role model for teachers and their students.

Currently, the curriculum used in schools has a new curriculum, namely the independent curriculum. Which is interpreted as a learning design that provides the widest possible opportunities for students to learn happily (Aini, 2023; Ruaya et al., 2022; Sarnoko, et al., 2024). Freedom to learn focuses on freedom and creative thinking. Teachers still play an important role in the learning process. They have the task of taking action by providing positive things to students. With this independent curriculum, it is hoped that students can develop according to their potential and abilities and receive critical, quality, applicable, varied, and progressive learning (Due et al., 2023).

Based on the demands of the independent curriculum, it can be concluded that this learning is aimed at making students more active and more explorative. Teachers also participate in the learning process by taking action so that students gain a variety of experiences in the learning process (Febri et al., 2023). He revealed that the learning process consists of four elements of learning activities: objectives (outcomes that are expected to be mastered after experiencing the learning process), materials (material discussed in the learning process), methods (techniques used by teachers to build relationships with students), and assessment (how to master lessons during the learning process). Apart from that, the intense competition in the world of work in the future means that it is not enough for students to have basic thinking skills; it is important to think more critically (Pane et al., 2021) . Students' critical thinking abilities can be trained through the ability to solve problems or search for solutions (Sumarmi, 2021; Habibi et al., 2022; Raihana et al., 2023; Imran et al., 2022). We expect that in learning, students will require critical thinking skills by being able to observe, ask, try, reason, and communicate.

Learning that involves active students and can develop thinking skills is PBL. Where PBL provides opportunities for students to gain learning experience by being able to organize, research and solve problems. Development of E-modules combined with learning models that can improve students' critical thinking skills, one of which is problem-based learning. PBL is an approach that teaches students who are confronted with practical, ill-structured, or open-ended problems through stimulants (Jaenudin, Ahmad, Baedhowi, Muwarningsih 2017; Johan et al., 2023). With this PBL model, it is hoped that teachers, as instructors, must be able to apply learning according to the character of students by emphasizing evaluation activities and analyzing what happens (Seruni, 2020). The application of the PBL model can be done through teaching materials, one of which is in the form of an e-module, so that students can increase their understanding of the material and teaching and learning activities more effectively, which can increase understanding as seen from the results (Kurniati et al., 2021). According to Kardoyo et al. (2020), e-modules through problem-based learning

are effective in improving critical thinking skills. Students are more active in expressing opinions, critically creating ideas, and constructing their own knowledge with explanations of the material contained in the e-module. Therefore, it is hoped that this module, equipped with learning technology, will provide strategic results in realizing an optimal learning process to realize more optimal critical thinking skills.

In recent years, research on accounting learning media in problem-based learning has been developed by several previous researchers. (Nirbita, B. N., et al., 2018; Pramika, D., 2023; Susilowibowo et al. 2023) found that problem-based learning assisted by ICT media succeeded in improving students' critical thinking skills in accounting material. Furthermore, Yhonara et al (2022) used Powtoon media in problem-based learning on accounting material. The findings show that there is a significant interaction effect between the problem-based learning model and Powtoon learning media on student learning outcomes. Anggarini et al (2023) found that student learning outcomes increased after taking part in an accurate online-based accounting computer learning program. The evaluation question scores showed an increase in student learning outcomes after learning was carried out using a structured learning program, where 89% of students scored above the KKM. All media used in accounting learning can improve students' critical thinking skills and learning outcomes.

This research was conducted to complement these findings. However, the difference is that the e-module developed is based on a combination of constructivist learning theory and Dale's Cone Experience. This is important to do because there are differences in student characteristics in learning accounting, making the learning experience that students gain more concrete if the learning medium is more concrete. On the other hand, if students become more abstract in studying teaching materials, the less learning experience they will gain. Dale's cone experience shows that a person's learning outcomes are obtained through direct (concrete) experience, through the reality that exists in a person's sphere of life, then through artificial objects, up to verbal symbols (abstract) (Masters, 2013). The higher the top of the cone, the more abstract the medium for conveying the message. The learning process and teaching interactions do not have to come from direct experience; they begin with the type of experience that best suits the needs and abilities of the group of students faced by considering the learning situation (Yulifar & Aman, 2023). Direct experience will provide information and ideas contained in that experience because it involves the senses of sight, hearing, feeling, smell, and touch.

One form of formal education at the secondary education level is vocational high school. Vocational school is a secondary education level that prioritizes developing students' abilities in areas of expertise according to their chosen field. Vocational schools have many expert competency majors, one of which is the Accounting and Institutional Finance major. Seruni et al. (2020) argue that achieving predetermined competency standards is packaged into several subjects, which are grouped into adaptive, normative, and productive programs. Accounting subjects are included in adaptive programs, which function to form students as individuals who have extensive knowledge to adapt to changes that occur in the social environment and can develop themselves in accordance with developments in science and technology. With this subject, students are equipped with the ability to see problems that occur in the real world so that they can solve them with higher thinking skills, one of which is critical thinking skills (Shukla & Dungsungnoen, 2016).

Almost all students only listen to the teacher's explanation without any response from the students. Students are only fixated on the material provided without any

creative deepening from other sources, so that in this learning there is no effective interaction between the teacher and students. This happened at school. After direct observation, researchers found that the learning process was still teacher-centered, where teachers were more active in explaining the material than students. The role of students in the learning process is more passive, without any critical response regarding the learning material presented by the teacher, especially in AKL classes, where in accounting learning students are required to see problems that occur in the real world in the economy or finance so that they can solve problems. with critical thinking. This is also proven by the research data collected.

Table 1. Pre-research data on students' critical thinking abilities X AKL 2022/2023

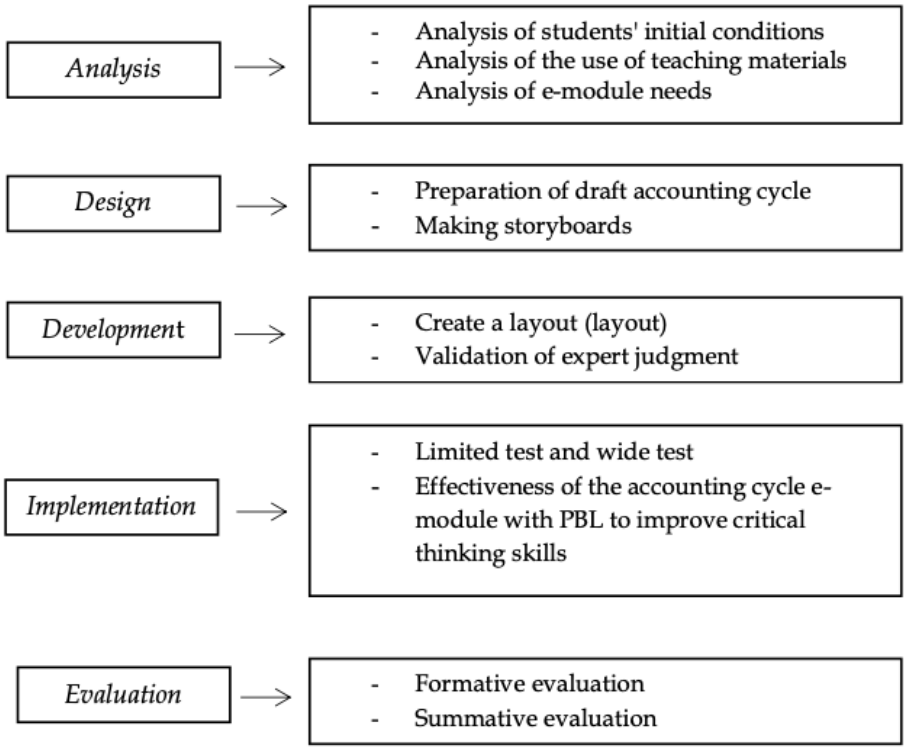
Class and School	Number of Students	KKTP	Above KKTP		Under KKTP	
			Amount	Percentage	Amount	Percentage
X AKL SMK Model Patriot IV Ciawigebang	25	70	5	20,00%	20	80,00%
X AKL 1 SMKN 4 Kuningan	35	70	9	25,71%	26	74,29%
X AKL 2 SMKN 4 Kuningan	37	70	7	18,92%	30	81,08%
X AKL 3 SMKN 4 Kuningan	36	70	10	27,78%	26	72,22%
Amount	133					

The table above shows that students' level of thinking is low, as evidenced by the number of students who get scores below the KKM of more than 50%. Based on direct observations carried out, various problems were found, starting with students who were less active, students who only depended on the explanations given by the teacher, and students who did not carry out the assignments given. There were still many students who did not fully understand the material. This is not in accordance with the learning objectives of the independent curriculum, where students are required to explore their abilities; the teacher only acts as a facilitator. So it is very necessary to have a solution, namely the need to develop learning resources that students can find and understand at any time. Based on the various problem studies that have been explained, the researcher is interested in conducting research by developing an Accounting Cycle E-Module based on PBL to improve critical thinking skills in class X AKL students at SMK Model Patriot IV Ciawigebang and SMKN 4 Kuningan.

METHOD

This E-module preparation research uses a research and development method called research and development (R&D). This research and development method produces a product in the form of an interactive basic accounting electronic module (e-module). The research design used in this research is a design developed by Shukla and Dungsungnoen (2016), namely the ADDIE development design, which includes five stages: analysis, design, development, implementation, and evaluation.

Figure 1. ADDIE development design



First, the analysis stage is carried out by analyzing the need for developing an accounting cycle e-module product based on problem-based learning based on student conditions, the need for media use, and an analysis of e-module needs. This e-module needs to be developed because, based on an analysis of student characteristics using the constructivism theory approach and Dale's Cone Experience, it shows that students' critical thinking abilities are low because learning experiences do not stimulate them. The learning experience gained by students will increase if the learning medium becomes more concrete. On the other hand, if students become more abstract in studying teaching materials, they will gain less learning experience.

Second, after the analysis stage has been carried out, the next step is to design the accounting cycle e-module based on problem-based learning, which will be created. Compile materials and create references for the accounting cycle e-module section that will be created. This stage takes the form of frameworks before carrying out product development; the framework in question is the storyboard.

Third, create an accounting cycle e-module based on service company accounting cycle material, with various stages going through, starting from analysis, design, and up to product development in the form of an e-module. In the development stage, researchers collect materials that can support developing e-modules. After that, the researcher produced the e-module and validated it with experts, namely material experts, media experts, language experts, and teacher responses.

Fourth, the implementation stage. At this stage, after the product has been validated by validation experts, they then implement the product developed in small groups. At this stage, the effectiveness of the problem based learning accounting cycle e-module in improving students' critical thinking abilities was also studied.

Fifth, evaluation. At this stage, evaluation is carried out as development progresses, so that deficiencies during the development process can be identified and resolved. At this stage, feedback is also requested from teachers, students and experts.

Development the quality of the product being developed will be known through validation.

$$\text{Average Score} = \frac{\text{Total score of each}}{\text{Number of assessments}}$$

Next, determine the percentage of results calculated using the following formula.

$$\text{Results} = \frac{\text{Total score obtained}}{\text{Maximum Score}} \quad \text{X } 100\%$$

Based on the percentage results, eligibility is then categorized based on the following criteria (He, Tian, & Xu, 2023).

Table 2. Feasibility categories in validation of the accounting cycle e-module

Rate	Eligibility Category
5	Very worthy
4	Worthy
3	Decent enough
2	Not feasible
1	Not really worth it

Based on the results of the data obtained on student responses to electronic books, it is then processed to obtain a percentage for each sapek in the student response questionnaire. This categorization is adapted from research conducted by Díaz and Sepúlveda (2023) as follows.

Table 3. Range of category percentages in student response questionnaires to the accounting cycle e-module (Díaz & Sepúlveda, 2023)

Persentase (%)	Category
75% ≤ x < 100%	Strongly agree
50% ≤ x < 75%	Agree
25% ≤ x < 50%	Don't agree
q < 25%	Strongly disagree

To test the effectiveness of the accounting cycle e-module with PBL in improving critical thinking skills, a gain score index analysis is used, which is calculated to determine the effectiveness of the treatment given. The following is the gain index formula according to Hake (2022), as follows:

$$(g) = \frac{\begin{matrix}Skor\ total\ masing - masing \\ \%\text{Pretest-}\%\text{Posttest}\end{matrix}}{\begin{matrix}\text{100-Pretest} \\ Jumlah\ penilaian\end{matrix}}$$

The calculation results are interpreted using the gain index as follows:

Table 4. Interpretation of Gain Index (Hake, 2022)

Indeks Gain	Interpretasi
Gain>0,70	Tall
0,30<Gain>0,70	Currently
Gain <0,30	Low

RESULT AND DISCUSSION

The results of the students' critical thinking ability test will provide information about the students' results before and after the learning process, whether in the experimental class or the control class. Based on data processing, the results of the pretest and posttest on the critical thinking ability aspect can be seen in the following table:

Table 5. Description of the results of critical thinking skills at Patriot IV Ciawigebang vocational school

Information	N	Minimum Value	Maximum Value	Average	Standard Deviation
Control pretest	25	43	79	61	9.33
Control posttest	25	59	88	76	6.56
Experimental pretest	25	50	80	68	9.51
Experimental posttest	25	67	91	84	5.75
Valid N	25				

Table 6. Description of the results of critical thinking skills at SMKN 4 Kuningan

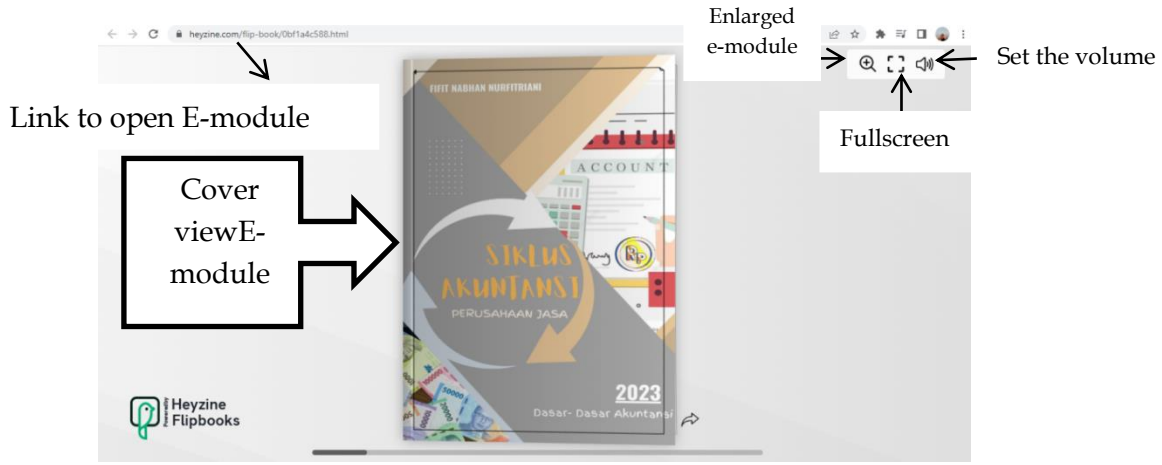
Information	N	Minimum Value	Maximum Value	Average	Standard Deviation
Control pretest	108	40	71	55	7,72
Control posttest	108	50	88	72	7,73
Experimental pretest	108	43	76	59	8,55
Experimental posttest	108	64	95	80	7,00
Valid N	108				

From the description of critical thinking abilities at Patriot IV Ciawigebang Vocational School and Kuningan 4 Vocational School, both after receiving treatment, the experimental posttest scores for students' critical thinking abilities showed a significant increase because the scores were higher than the critical thinking ability scores for the first class. By being given a problem-based learning treatment equipped with E-module teaching materials, it can be said to be effective because the value after being given the treatment is greater than the value before being given the treatment.

Furthermore, in this development research activity, the activities carried out are analyzing the initial conditions of students in terms of their critical thinking skills, then analyzing needs by observing and interviewing teachers at school. Based on the results of the initial interview in the needs analysis, it was stated that at school there were very few teaching materials needed by students in class because the curriculum used was a new curriculum (an independent curriculum), so the teaching materials used were not in accordance with the targets. In the learning outcomes that will be presented in the

accounting cycle E-module relating to the basics of accounting as well as explanations of all cycles in accounting, after the material plan and indicators have been created, the material content is then created in the form of material descriptions, sample questions, practice questions, and content that supports the implementation. process of making teaching materials. Preparing the draft E-module for this accounting cycle using Microsoft Word, saving it in PDF form, and then converting it with the help of a website in the form of heyzine.com. The second stage is design planning, which consists of drafting the accounting cycle and making a story board. It is hoped that this teaching material will make it easier for students to understand the basics of accounting learning material and help teachers in classroom learning, which creates more interesting and meaningful learning. Next, the development stage is carried out as a realization of the planning stage of the storyboard that has been prepared. The resulting e-module is as follows.

Figure 2. E-module display on the Heyzine website



Then, validate the product (accounting cycle) that has been created with content experts, language experts, and media experts. From validation tests from several expert judgments related to content, language, and student responses, average results were obtained with a total of >85% for each validation component. The results are obtained from the following data:

Table 7. Validation results from expert judgment

No	Validator	Resulting average	Category
1.	Content Validation	93,3 %	Very Worth It
2.	Media Validation	86,5%	Very Worth It
3.	Language Validation	93,3%	Very Worth It
4.	Subject teacher validation	96%	Very Worth It
	Overall Average	92,3%	Very Worth It

The fourth stage is the implementation stage. Based on the results of extensive trials related to the accounting cycle of the of the e-module as a whole from various aspects, students strongly agree with the existence of teaching materials that utilize this technology. In limited trials, the results obtained an average of 85.38%, and in extensive trials, they obtained an average of 87.08%. After the trial was carried out, the

researcher carried out a pretest and posttest on the subjects studied to produce the following data:

Table 8. Pretest and posttest results at Patriot IV Ciawigebang Vocational School

No	Information	Experimental class		Control class	
		Pretest	Posttest	Pretest	Postest
1.	Lowest value	50	67	43	59
2.	The highest score	80	91	79	88
3.	Average	67	84	61	76
4.	Average N-Gain	0,49 (Currently)		0,37 (Currently)	

Table 9. Pretest and posttest results at SMK Negeri 4 Kuningan

No	Information	Experimental class		Control class	
		Pretest	Posttest	Pretest	Pretest
1.	Lowest value	43	64	40	50
2.	The highest score	78	95	71	88
3.	Average	59	80	55	72
4.	Average N-Gain	0,49 (Currently)		0,37 (Currently)	

The results of the n-gain values at both SMK Model Patriot IV Ciawigebang and SMKN 4 Kuningan above are classified into the medium category, but it can be seen from the difference in n-gain obtained in the experimental class that it is higher compared to the n-gain value of the control class. This means that using the PBL e-module can effectively improve critical thinking skills.

The final stage is the evaluation stage. From the research carried out, the evaluation results were obtained, namely that, based on the results of content validation carried out at the development stage, the overall content presented in the accounting cycle e-module was based on the learning aspect and the material content aspect was declared suitable for use in the process. learning the basics of accounting. However, there are several suggestions given by experts, namely adding material on the basics of accounting to introduce students to accounting, adding varied learning media in e-modules with media from YouTube, or having games so that children can interact.

DISCUSSION

The use of the PBL e-module is effective in improving critical thinking skills, as can be seen from the experimental posttest score, which is higher than the elementary school class score, with the average score from before being given treatment, which shows an increase, so that PBL learning on the accounting cycle e-module teaching materials can improve critical thinking. By using PBL, it can be supported by appropriate learning facilities and media. The use of electronic modules is a learning tool or facility that contains material, strategies, limitations, and assessment techniques that are planned in an orderly and interesting manner to achieve normal skills as indicated by the level of completeness electronically. Murwaningsih (2017) revealed that the use of e-modules based on PBL significantly increases students' critical reasoning with the superiority of electronic modules compared to printed modules.

This finding is supported by the findings of Islahiyah (2021), which show that the e-module with the PBL model in the accounting material developed is valid and

suitable for use. Other shows that the average student learning outcome is 82,213, which means that student learning outcomes are very good (Savery, 2015). The learning outcomes of experimental class students are greater than those of the control class. Students' critical thinking has a positive relationship with students' learning outcomes (Espey; 2018). This shows that the development of e-modules with the PBL model in accounting learning with e-modules is very effective (Serevina, Astra, & Sari; 2018).

A significant increase in students' learning effectiveness scores after being treated with the use of the accounting cycle e-module in the basics of accounting subjects, with a design that displays attractive images and interactive videos, invites students to think critically with their learning using PBL and e-modules. This makes students enthusiastic and interested in learning the basics of accounting. This is different from the opinion of Chen et al. (2021), who revealed that if viewed from the perspective of the use of e-modules in PBL-based accounting learning, they have not been fully used as learning teaching materials because the use of e-modules cannot yet be realized due to limited facilities and infrastructure. Pratama (2023) found that integrated PBL-based learning through e-modules is difficult to apply to students compared to conventional learning because students often find it difficult to determine problems that suit the student's level of thinking. Apart from that, Yerimadesi (2023) said that implementing PBL-based learning has been used for a relatively long time in conventional learning.

Apart from that, Wazni (2022) believes that the obstacle experienced by teachers at the planning stage is the difficulty of determining the right problem. It can stimulate a good discussion atmosphere and stimulate students' intellectual development (Sukackė et al., 2022; Tursynkulova et al. 2023). The long-term barrier to planning and implementing learning is caused by teachers not being familiar with PBL learning. Specifically, in implementation, the obstacles experienced by teachers in implementing each stage of PBL lie in the third stage, when assisting with independent and group investigations. It is not easy for teachers to position themselves as facilitators, guiding, exploring deeper understanding, and supporting student initiatives. The factors of students' initial abilities, level and speed of thinking, and other heterogeneous aspects mean that teachers need to continue to train their sensitivity to be able to place themselves in the right position so that the inquiry process runs smoothly. In line with the opinion of Utomo (2023), the application of the PBL model with accounting e-modules and other e-modules is not always optimal; this happens because the facilities are not yet adequate (Huang et al., 2013). One of the facilities that is important in the learning process today is a projector (Hung, Dolmans, & van Merriënboer; 2019). The projector will certainly help the teacher present the material and make it easier for students to accept what is being explained. Pratama (2023) said that the development of PBL-based accounting e-modules significantly failed to improve students' critical thinking skills due to several factors. The PBL design used does not suit students' needs; there is a lack of integration of accounting content that is relevant to real-world situations (Kim, & Kee, 2013) and there is a lack of appropriate measurement for increasing students' critical thinking abilities (Wilder, 2015; Yu, 2021).

The development of PBL-based e-modules is not valid for improving students' critical thinking skills due to a lack of support and training for teachers or facilitators. Lacking an adequate understanding of PBL concepts and how to implement them effectively in accounting learning, instructors may not be able to guide students well through the learning process. Not only that, a lack of administrative support and

adequate resources can also be an obstacle to introducing this new approach in the learning environment (Made et al., 2023).

From the study above, the implication of this research is that educators must implement PBL assisted by e-modules, especially in accounting subjects, to improve students' critical thinking. With this, positive implications for students' critical thinking abilities can be described, namely: students are able to formulate learning problems, students are able to analyze problems, students use clear language, and students are able to draw learning conclusions. This positive implication will be a provision for students to develop their critical thinking skills. An important implication for the future that can be made is that by paying attention to designs that are more appropriate to student needs, integrating content that is relevant to real life, and providing adequate training to teachers, it can increase the effectiveness of the module in improving students' critical thinking skills (Kartikasari, 2023). This shows the importance of a contextual and in-depth learning approach to developing the critical skills required in accounting and other disciplines (Sarnoko et al., 2024).

This research has several limitations. First, the subjects used were limited to vocational school students, so these findings cannot be generalized to other levels of education. The two media developed need to be tested on a wider audience. Due to these limitations, future researchers wishing to conduct the same research can focus on several important things, namely the influence of the learning environment. Other researchers can expand their understanding of how learning environmental factors, such as support from teachers or physical classroom facilities, influence effectiveness. PBL-based e-modules improve students' critical thinking skills. Apart from that, it can also be done on the effectiveness of module development. Researchers can then evaluate the module development process, including problem identification, case design, and content integration, as well as its impact on achieving learning objectives and students' critical thinking abilities. By exploring these areas, research can provide deeper insight into how the development of a PBL-based accounting cycle e-module can effectively improve students' critical thinking abilities, even with limited access to journal and article resources.

CONCLUSION

First, the description of students' critical thinking abilities as seen from the pretest and posttest scores shows a significant increase. Judging from the experimental posttest score which is higher than the primary class score and the average score from before being given treatment to after being given treatment shows an increase so that learning PBLon the accounting cycle e-module teaching materials can improve critical thinking skills because the value after being given treatment greater than the value before treatment. Second, there was a significant increase in the value of students' learning effectiveness after being treated using the accounting cycle e-module in the basics of accounting subject, with a design that displayed attractive images, interactive videos, inviting students to think critically with their learning using PBL and this e-module make students enthusiastic and interested in learning the basics of accounting.

ACKNOWLEDGEMENT

Thank you to Universitas Kuningan, Indonesia, and Universitas Negeri Makassar, Indonesia, as well as the University Institute of Media Communication, Media Technologies, and Design, Simferopol, Republic of Crimea, who provided institutional support to realize this collaboration research.

AUTHOR CONTRIBUTION STATEMENT

YS is tasked with developing the article concept, writing research methods, and analyzing all data. I, FNN, and RTP are tasked with making improvements to article writing, interpreting findings, and presenting conclusions and recommendations. MH, NAR, and NAE are tasked with revising the article and correcting the entire text and language of the article. AZ supervises the writing and revision processes of articles.

REFERENCES

Aini, Q. (2023). Implementation of an independent curriculum in supporting students' freedom to create and learn. *Journal of Scientific Research, Education, and Technology (JSRET)*, *2*(3), 999–1008. https://doi.org/10.58526/jsret.v2i3.187

Anggarini, A. G., Astuti, E., Yusdita, E. E., Ulfatun, T., Pascua, R. J., & Nafizah, U. Y. (2023). Advancing accounting education: A comprehensive approach to inventory materials learning through online applications and the Smith-Ragan model. *Indonesian Journal on Learning and Advanced Education (IJOLAE)*, *6*(1), 62–85. https://doi.org/10.23917/ijolae.v6i1.23002

Bahtiar, M. D., Saputra, I. A. G., Hardini, H. T., Rohayati, S., & Multiana, A. (2024). Increasing student critical thinking through the development of public sector accounting practicum modules based on PBL. *International Journal of Multicultural and Multireligious Understanding, 11*(1), 318–327. http://dx.doi.org/10.18415/ijmmu.v11i1.5306

Barrett, T. (2013). Learning about the problem in problem-based learning (PBL) by listening to students' talk in tutorials: A critical discourse analysis study. *Journal of Further and Higher Education, 37*(4), 519–535. https://doi.org/10.1080/0309877X.2011.645464

Carvalho, A. (2016). The impact of PBL on transferable skills development in management education. *Innovations in Education and Teaching International, 53*(1), 35–47. https://doi.org/10.1080/14703297.2015.1020327

Chen, J., Kolmos, A., & Du, X. (2021). Forms of implementation and challenges of PBL in engineering education: a review of literature. *European Journal of Engineering Education, 46*(1), 90–115. https://doi.org/10.1080/03043797.2020.1718615

Díaz Quezada, V., & Sepúlveda Albornoz, M. (2023). Validation of an instrument to assess deductive reasoning in solving types of problems. *International Journal of Engineering Pedagogy (iJEP)*, *13*(7), 50–64. https://doi.org/10.3991/ijep.v13i7.40153

Due, L. R. D., Siswanto, & Imran, A. F. (2023). Development of e-modules based on articulate storyline 3 to improve accounting cycle learning outcomes. *JPI (Jurnal Pendidikan Indonesia), 12*(3), 490–499. https://doi.org/10.23887/jpiundiksha.v12i3.59688

Espey, M. (2018). Enhancing critical thinking using team-based learning. *Higher Education Research and Development, 37*(1), 15–29. https://doi.org/10.1080/07294360.2017.1344196

Febri, S., Murni, A., & Miga, S. (2023). Development of professional ethics and aesthetics e-modules based on PBLto improve students' critical thinking ability. *Jurnal Teknologi Pendidikan (JTP), 8*(2), 640–653. https://doi.org/10.24114/jtp.v8i2.3329

Habibi, M., Sunardi, & Sudiyanto. (2022). Identification of opportunities for utilizing e-modules with a PBL approach to facilitate learning in vocational high schools. *Jurnal Edutech Undiksha, 10*(2), 311–322. https://doi.org/10.23887/jeu.v10i2.52722

He, Y., Tian, K. & Xu, X. (2023). A validation study on the factors affecting the practice

modes of open peer review. *Scientometrics, 128*, 587–607. https://doi.org/10.1007/s11192-022-04552-x

Hung, W., Dolmans, D. H. J. M., & van Merriënboer, J. J. G. (2019). A review to identify key perspectives in PBL meta-analyses and reviews: Trends, gaps and future research directions. *Advances in Health Sciences Education: Theory and Practice, 24*(5), 943–957. https://doi.org/10.1007/s10459-019-09945-x

Huang, Y. M., Liao, Y. W., Huang, S. H., & Chen, H. C. (2013). A jigsaw-based cooperative learning approach to improve learning outcomes for mobile situated learning. *Educational Technology and Society, 17*(1), 128–140. https://doi.org/10.1007/s10459-019-09945-x

Imran, A. F., Priantinah, D., & Solikhatun, I. (2022). Development of accounting e-module to improve students' critical thinking ability. *Journal of Educational Science and Technology (EST), 8*(1), 1–8. https://doi.org/10.26858/est.v8i1.24109

Islahiyah, I., Pujiastuti, H., & Mutaqin, A. (2021). Pengembangan e-modul dengan model pembelajaran berbasis masalah untuk meningkatkan kemampuan pemecahan masalah matematis siswa. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 10*(4), 2107. https://doi.org/10.24127/ajpm.v10i4.3908

Jaenudin, A., Baedhowi, & Muwarningsih, T. (2017). The effectiveness of the e-module of economics learning on problem-based learning used to improve students' learning outcomes. Assehr, 158(ICTTE), 30–36. https://doi.org/10.2991/ictte-17.2017.32

Johan, U., Enda, A., & Auliana. (2023). The development of electronic student worksheets (e-LKPD) economic materials accounting cycle based on problem-based learning (PBL) companies. *Jurnal Riset Pendidikan Ekonomi, 8*(1), 86–94. https://doi.org/https://doi.org/10.21067/jrpe.v8i1.8425

Kardoyo, Nurkhin, A., Muhsin, & Pramusinto, H. (2020). Problem-based learning strategy: Its impact on students' critical and creative thinking skills. *European Journal of Educational Research, 9*(3), 1141–1150. https://doi.org/10.12973/EU-JER.9.3.1141

Kartikasari, N., Hudaya, R., Rizki, N., & Hanani, T. (2023). The development of project-based learning e-book: A case study from accounting bilingual classes in indonesia article information abstrak. In Riset Akuntansi Keuangan (Vol. 8, Issue 2). https://doi.org/10.31002/rak.v8i2.1068

Kim, K. J., & Kee, C. (2013). Evaluation of an e-PBL model to promote individual reasoning. *Medical teacher, 35*(3), e978–e983. https://doi.org/10.3109/0142159X.2012.717185

Kurniati, R. D., Andra, D., & Wayan Distrik, I. (2021). E-module development based on PBL integrated STEM assisted by social media to improve critical thinking skill: A preliminary study. IOP Conference Series: Earth and Environmental Science, 1796(1). https://doi.org/10.1088/1742-6596/1796/1/012077

Made S. K. S., Ketut W. N., & Gusti N. P. I. (2023). The Effect of problem-based blended learning towards students' critical and creative thinking skills. *JMKSP, 8*(1), 541–556. https://doi.org/10.31851/jmksp.v8i1.12915

Masters, K. (2013). Edgar Dale's pyramid of learning in medical education: A literature review. *Medical Teacher, 35*(11), e1584-e1593. https://doi.org/10.3109/0142159X.2013.800636

Nirbita, B. N., Joyoatmojo, S., & Sudiyanto. (2018). ICT media assisted problem based learning for critical thinking ability. *International Journal of Multicultural and Multireligious Understanding, 5*(4), 341–348.

http://dx.doi.org/10.18415/ijmmu.v5i4.295

Pane, A. N., Andra, D., & Distrik, I. W. (2021). The development physics e-module based PBL–Integrated STEM to improve higher-order thinking skills on static fluid material. In Journal of Physics: Conference Series (Vol. 1796, No. 1, p. 012086). IOP Publishing. http://dx.doi.org/10.1088/1742-6596/1796/1/012086

Pramika, D., Gunawan, H., & Yulaini, E. (2023). Android-based accounting learning media for independent learning for vocational high school students. *IJEBD (International Journal of Entrepreneurship and Business Development)*, *6*(1), 84–92. https://doi.org/10.29138/ijebd.v6i1.2088

Pratama, A., Faridah, E., Bukit, N., & Surya, E. (2023). Development of e-modules based on the socrates method to improve learning outcomes of madrasah ibtidaiyah students in mathematics subjects. *Pedagogik Journal of Islamic Elementary School, 6*(2), 213–228. https://doi.org/10.24256/pijies.v6i2.4318

Raihana, R., Hayati, N., Alucyana, A., Yuliana, Y., & Sartika, E. (2023). Pelatihan penulisan artikel ilmiah untuk publikasi bagi guru paud di kecamatan tandun. *Jurnal Pengabdian Masyarakat Indonesia, 3*(1), 31–37. https://doi.org/10.52436/1.jpmi.899

Ruaya, P. P., Kang, H. X., Reader, S., & Hidayat, T. (2022). Role of teacher competence to implement the independent curriculum. *International Journal of Science Education and Cultural Studies*, *1*(2), 94–108. https://doi.org/10.58291/ijsecs.v1i2.48

Sarnoko, S., Asrowi, A., Gunarhadi, G., & Usodo, B. (2024). An analysis of the application of pbl(pbl) model in mathematics for elementary school students. *Jurnal Ilmiah Ilmu Terapan Universitas Jambi, 8*(1), 188–202. https://doi.org/10.22437/jiituj.v8i1.32057

Savery, J. R. (2015). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning, 1*(1), 9–20. https://doi.org/10.7771/1541-5015.1002

Serevina, V., Astra, I., & Sari, I. J. (2018). Development of e-module based on PBL(PBL) on heat and temperature to improve student's science process skill. *Turkish Online Journal of Educational Technology-TOJET, 17*(3), 26–36. https://dx.doi.org/10.1080/00131911.2014.974511

Seruni, R., Munawaroh, S., Kurniadewi, F., & Nurjayadi, M. (2020). Implementation of e-module flip PDF professional to improve students' critical thinking skills through problem based learning. Journal of Physics and Education: Conference Series, 1521(4). https://doi.org/https://doi.org/10.1088/1742-6596/1521/4/042085

Shukla, D., & Dungsungnoen, A. P. (2016). Student's perceived level and teachers' teaching strategies of higher order thinking skills: A study on higher education institutions in Thailand. *Journal of Education and Practice, 7*(22), 211–219. https://doi.org/https://doi.org/10.1088/2207/2016

Sukackė, V., Guerra, A. O. P. D. C., Ellinger, D., Carlos, V., Petronienė, S., Gaižiūnienė, L. & Brose, A. (2022). Towards active evidence-based learning in engineering education: A systematic literature review of PBL, PjBL, and CBL. *Sustainability, 14*(21), 13955. https://doi.org/10.3390/su142113955

Sumarmi, Bachri, S., Irawan, L. Y., & Aliman, M. (2021). E-module in blended learning: Its impact on students' disaster preparedness and innovation in developing learning media. *International Journal of Instruction, 14*(4), 187–208. https://doi.org/10.29333/iji.2021.14412a

Susilowibowo, J., Listiadi, A., Rochmawati, R., & Widayati, I. (2023). The effectiveness

of using PBL-based cost accounting students' textbook on the cognitive achievements of student learning. *International Journal of Educational Research & Social Sciences*, *4*(1), 57–64. https://doi.org/10.51601/ijersc.v4i1.575

Tursynkulova, E., Madiyarov, N., Sultanbek, T., & Duysebayeva, P. (2023). The effect of problem-based learning on cognitive skills in solving geometric construction problems: a case study in Kazakhstan. *Frontiers in Education, 8*. https://doi.org/10.3389/feduc.2023.1284305

Utomo, W., Suryono, W., Jimmi, J., Santosa, T. A., & Agustina, I. (2023). Effect of STEAM-Based Hybrid Based Learning Model on Students' Critical Thinking Skills. *Jurnal Penelitian Pendidikan IPA, 9*(9), 742–750. https://doi.org/10.29303/jppipa.v9i9.5147

Wazni Nazara, A., Halang, B., & Rezeki, A. (2022). Respon siswa terhadap modul elektronik subkonsep sistem peredaran darah manusia berbasis problem based learning. *Jurnal Ilmu Sosial Dan Pendidikan (JISIP), 6*(2), 2598–9944. https://doi.org/10.36312/jisip.v6i1.2978/http

Wilder, S. (2015). Impact of problem-based learning on academic achievement in high school: a systematic review. *Educational Review, 67*(4), 414–435. https://doi.org/10.1080/00131911.2014.974511

Yerimadesi, Y., Warlinda, Y. A., Rosanna, D. L., Sakinah, M., Putri, E. J., Guspatni, G., & Andromeda, A. (2023). Guided discovery learning-based chemistry e-module and its effect on students' higher-order thinking skills. *Jurnal Pendidikan IPA Indonesia, 12*(1), 168–177. https://doi.org/10.15294/jpii.v12i1.42130

Yhonara, M. A., Astuti, E., & Styaningrum, F. (2022). The effect of Powtoon media and problem-based learning model on accounting student learning outcomes. *Jurnal Inovasi Teknologi Pendidikan, 9*(3), 258–268. https://doi.org/10.21831/jitp.v9i3.53635

Yu, Z. (2021). The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic. *International Journal of Educational Technology in Higher Education, 18*(1), 14. http://dx.doi.org/10.1186/s41239-021-00252-3

Yulifar, L., & Aman, A. (2023). Resources of history learning in conventional and modern continuum lines. *Cakrawala Pendidikan: Jurnal Ilmiah Pendidikan, 42*(3), 586–600. https://doi.org/10.21831/cp.v42i3.63713