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Research Article

Enhancing Students' Understanding of the Rupiah's Characteristics and Security Elements Through Hands-On Investigation: Classroom Action Research

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Abstract
This study aims to improve the learning outcomes of grade X students in phase E, senior high school in Indonesia, on the material of characteristics and security elements of the Rupiah currency by applying the hands-on investigation model. The research method used is collaborative classroom action research between researchers, economics teachers, and lecturers, which is carried out in two stages, namely pre-cycle and cycle. Each cycle consists of planning, implementation, observation, and reflection stages. In cycle I, learning is carried out using the 3D method (seen, touched, and held up to the light) to identify the authenticity of Rupiah. In cycle II, using UV lights as additional media to detect invisible security elements enhances learning. The results of the study showed an increase in the average value of students from 55.64 (pre-cycle) to 71.39 (cycle I) and increased significantly to 88.91 (cycle II). The percentage of learning objective achievement also increased from 27% (pre-cycle), 61% (cycle I), to 90.9% (cycle II). The study results prove that the hands-on investigation model effectively improves students' understanding of the material and the authenticity of the Rupiah.

Keywords: hands-on investigation, learning outcomes, authenticity of Rupiah, classroom action research

INTRODUCTION

The circulation of counterfeit money is still one of the serious problems faced by Indonesia. Bank Indonesia (BI) and law enforcement officials annually uncover counterfeiting cases in various regions in daily transactions and large-scale circulation. For example, cases of counterfeit money circulation in the first quarter of 2025, which reached 3.3 billion Rupiah (Kumparan, 2025), in 2024, which reached 22 billion Rupiah (Kompas, 2024), and in 2023, worth 6.6 billion Rupiah (JPNN, 2023). The existence of counterfeit money not only harms the community economically but also weakens trust in the national financial system (Zulkarnaen, 2020). What is more, counterfeit money is often found in transactions in traditional markets (Hermawan, 2025), informal sectors such as MSMEs (Redaksi Bisnis KUMKM, 2024), and educational environments (Tempo, 2024). This condition shows that people are still vulnerable to becoming victims of counterfeit money circulation crimes.

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One factor contributing to the rampant circulation of counterfeit money is that many people, including students, do not understand the physical characteristics of the Rupiah and the security elements attached to Rupiah banknotes (Wardani et al., 2024). This ignorance becomes a loophole for specific individuals to deceive the public through counterfeit money made in such a way that it resembles real Rupiah money. Therefore, studying the characteristics and safety elements of the Rupiah banknote is very important, especially for the younger generation, as it will drive the nation's economy in the future.

The urgency of introducing and understanding the characteristics and elements of the Rupiah security is reflected through internalizing these materials in the Indonesian education curriculum, including the Independent Curriculum, in economics subjects. The Head of the Curriculum and Education Assessment Standards Agency (Badan Standar Kurikulum dan Asesmen Pendidikan, 2024) through his decision No. 032/H/KR/2024 concerning learning outcomes, stated that students in Phase E must be able to understand bank and non-bank financial institutions and products as a basis for recognizing, using, and managing financial products and services so that they can avoid financial risks in their lives. The Ministry of Education and Culture (Kemendikbudristek, 2022) details the learning outcomes through which it explains that the economic learning outcomes in Phase E are students understanding money as a resource that needs to be used and managed to meet current needs and planning future needs based on an understanding of the various benefits of banking and non-banking financial products. The two regulations emphasize the importance of students' understanding of the characteristics and security elements of the Rupiah as part of a legal cash payment instrument so that they can avoid the risk of cash transactions, such as the circulation of counterfeit money. Students are encouraged to understand the theory of payment instruments and have practical skills and vigilance when using payment instruments.

One of the important materials in learning outcomes about means of payment is the characteristics and elements of the Rupiah security (Hadiyanto et al., 2024). The material aims to enable students to recognize the authenticity of the Rupiah through its characteristics and security elements to distinguish between real and counterfeit money. When students know and understand the authenticity of the Rupiah, they will not be easily deceived in financial transactions amid the rampant circulation of counterfeit money in Indonesia (Wanne, 2025). Understanding the security elements in the Rupiah also supports students' awareness of the importance of maintaining and respecting the national currency as a symbol of state sovereignty (Bank Indonesia, 2021).

However, the conceptual and abstract characteristics of payment instruments often make it difficult for students to understand the material, so learning goals are not achieved (Amalina & Inayati, 2021). The non-achievement of the learning objectives in the material also occurs in class X / Phase E students. The learning media used, such as packaged books, PowerPoint presentations, and lecture methods, are less effective in improving students' understanding. As a result, the learning outcomes of students in the class on payment instruments showed low achievements, where the average scores were only 55.64, and only 27% of students completed. These results show that more innovative learning approaches and models are needed so that students can master the material and learning objectives better (Hamzah et al., 2024).

Solutions to the problem of not achieving learning objectives in materials, systems, and payment tools can be found through classroom action research (CAR). Classroom action research is a systematic and reflective process by teachers to overcome and solve specific problems in the classroom (Martyn, 2023). CAR allows teachers to

investigate and improve students' learning practices and learning outcomes (Beer, 2019). One of the alternative learning models that will be applied to overcome problems in class X is a learning model hands-on investigation.

Learning model hands-on investigation is a learning model that combines hands-on activities with group investigation. Ambarita et al. (2019) define the hands-on learning model as a learning model in which the teacher guides students to find their understanding of the material taught based on the results of their discoveries. Chen et al., (2020) and Cridlin (2007) emphasize that the learning model is hands-on is helpful to help learners remember information deeply and apply their theoretical knowledge to the real world. Group Investigation is a learning strategy emphasizing active participation and collaboration between learners to investigate a particular topic (Rosfiani et al., 2021). Group investigation allows learners to work in a group to explore and solve problems, thereby improving higher-level thinking skills and encouraging active learning (Komala et al., 2020). Thus, hands on investigation is a learning model that integrates hands-on activities (hands-on activities) with an investigation-based collaborative approach (Group Investigation), where learners actively build an understanding of the material through real-world exploration, direct observation, and group discussions and cooperation to investigate a topic or solve a specific problem.

Various studies have found the benefits and positive impacts of learning models hands on investigation, such as improving learning outcomes (Chen et al., 2020), improving technical and non-technical skills such as critical thinking and teamwork (Hsiao et al., 2022), as well as increasing student learning participation in the classroom (Adeika et al., 2024). Model hands-on investigation has also been shown to be helpful in the development of interpersonal skills (communication, collaboration, and problem-solving) (Ainiyah et al., 2022) and increase students' learning motivation (Utami, 2016).

Type hands-on investigation in line with the theory of constructivism and inquiry learning, where both involve learners in hands-on learning and experiential learning activities that require critical thinking and problem-solving (Hoppe et al., 2020). The theory of constructivism assumes that learners build their knowledge based on previous interactions and experiences (Grigorova, 2016). At the same time, inquiry learning provides opportunities for students to learn to discover through critical and systematic thinking (Asamad et al., 2024). Model hands-on investigation provides opportunities for students to observe and identify directly the characteristics of the Rupiah and its safety elements. Application of learning models, hands-on investigation. It is hoped that it can help improve students' understanding so that they not only understand the characteristics and security elements of the Rupiah as a theoretical means of payment, but also be able to apply it in daily life.

Despite its advantages, economics teachers in Indonesia still rarely use hands-on investigations. Most teachers still use lecture methods (Fauzia, 2017) and text-based media (Sari, 2017), so they do not support active learning that provides direct experience to students. In addition, several previous studies have developed learning media for central bank materials, payment systems, and digital means of payment in 2021 as animated videos (Safitri, 2018) and comics (Novalia & Okmayura, 2020). However, none of these studies have focused on the material on the authenticity of the Rupiah, especially in the context of recognizing its physical characteristics and security elements, so that there are research gap in developing learning that specifically directs students to recognize the authenticity of the Rupiah and distinguish it from counterfeit money practically and deeply.

This classroom action research aims to find solutions that assist teachers in designing engaging learning activities to increase student participation in learning, achieve the learning objectives that have been designed, and achieve optimal learning outcomes. The results of this study are expected to contribute to solving the problem of economic learning in the classroom through hands-on investigation in improving students' learning outcomes on abstract concepts such as means of payment.

METHOD

This research was conducted at SMAN 15 Surabaya, start from January to February 2025. The subject of the study is students of class X-4/phase E, consists of 36 students. This class was chosen because it experienced learning obstacles as indicated by the failure to achieve learning objectives. This study uses a collaborative classroom action research (CAR) method involving a research team, economics teachers, and lecturers. The collaboration aims to optimize the stages in each research cycle, so that research goals can be achieved optimally. on payment instruments. The learning objectives in the material consist of: (1) Students can correctly identify the characteristics and elements of Rupiah banknotes, (2) Students can distinguish between real money and counterfeit money through a hands-on investigation, and (3) Students can correctly communicate the importance of understanding the Rupiah as a symbol of state sovereignty.

CAR consists of two stages, namely pre-cycle and cycle. The pre-cycle stage is the stage before the intervention is carried out, namely, learning is carried out using the lecture method with learning media in the form of PowerPoint and learning resource package books. The cycle stage is a learning activity in which the teacher has intervened and improved it. Each cycle consists of four steps: planning, implementation, evaluation, and reflection by Khatter et al. (2024). The cycle will stop being implemented until it meets the achievement indicators, namely the learning goal achievement criteria (LGCA), and 80% of students have achieved the learning goals.

RESULT

Pre-Cycle

At the planning stage, teachers prepare learning tools that include Teaching Modules, learning media in PowerPoint presentations, evaluation instruments in multiple-choice questions, and observation sheets to monitor student involvement during the learning process. The planning of learning activities aims to ensure that the learning process runs systematically and in a directed manner according to the learning objectives. The implementation stage is carried out by learning activities in the classroom using the lecture method with pre-designed PowerPoint media. The teacher delivered material on the characteristics and elements of safeguarding Rupiah money, verbally and using PowerPoint media as a visual aid. Then, the teacher allows students to ask questions if there are things they have not understood. The question-and-answer activity was limited to discussions between students and teachers without involving practical activities directly.

At the evaluation stage, teachers conduct formative assessments to measure students' understanding of the material that has been taught. This evaluation is carried out through a multiple-choice test that contains questions related to the topics discussed and observations on the activity and participation of students during the learning process. The

evaluation results showed that the average score of students only reached 55.64, and only 27% of the total students achieved LGCA. These results indicate a low understanding of the material presented by students, especially in identifying the characteristics and elements of Rupiah security. Furthermore, in the reflection stage, the teacher analyzes the results of formative assessments and observation results to identify various obstacles that occur during learning. The reflection aims to find the factors that cause the low achievement of learning objectives and become a consideration in designing learning improvements in the next cycle. Based on the reflection carried out, it was found that the learning approach used is still conventional, namely through limited lecture and discussion methods, so that most students seem passive, lack enthusiasm, and have not been able to relate the concept of characteristics and elements of Rupiah security to the real context.

This condition shows that the learning approach is not optimal in making it easier for students to understand abstract and conceptual material. This is in line with the findings of Amalina and Inayati (2021), who stated that learning with conventional methods tends to make students passive and have difficulty understanding abstract and conceptual economic material. Similarly, Novalia and Okmayura (2020) found that the material is full of theories and media that are limited to PowerPoint, causing students to be less interested and have low learning motivation to learn the material. Therefore, an approach is needed to increase students' understanding and active involvement in learning.

Cycle I

Based on the reflection results in the pre-cycle stage, teachers plan learning in Cycle I by improving learning tools using a hands-on investigation model. The tools include teaching modules with student worksheet, learning media in the form of original Rupiah banknotes of various denominations, ranging from Rp1,000.00 to Rp100,000.00, and evaluation instruments. The purpose of the planning stage of the first cycle is to prepare learning that makes it easier for students to achieve learning goals by providing opportunities to be actively involved in the direct exploration of the learning object, namely the original Rupiah banknotes. At the implementation stage, learning activities are carried out by applying a hands-on investigation model focused on checking the authenticity of Rupiah banknotes through the 3D method, namely viewed, touched, and spied. Students directly practice checking money so that they not only understand in theory but also recognize the physical characteristics of real Rupiah banknotes through direct experience.

The evaluation stage is carried out through formative assessments in the form of multiple-choice tests and observations of student involvement during learning activities. The data from the evaluation became the initial data to determine the effectiveness of using the hands-on investigation learning model in understanding the characteristics and elements of Rupiah banknote security, so that students could distinguish between real and fake Rupiah banknotes. The results obtained in the first cycle showed an increase, where the average score of students increased to 71.39, and 61% of students achieved LGCA. The increase in learning outcomes and the percentage of students who achieve learning objectives support Chen (2022) statement that hands-on activity-based learning encourages students' involvement in learning, helping them recall information more deeply. Despite the increase, these results have not reached the indicator of learning

success because students who have completed the learning objectives have still not reached 80%.

In the reflection stage, teachers analyze the results of formative assessments and observations to discover obstacles during the learning process. As a result, it is known that the limitations of the media, which are only in the form of Rupiah banknotes, in detecting the security elements of the Rupiah in detail, make students' understanding less than optimal. The 3D method effectively identifies some standard features, such as the texture of the money (through touch), hidden images when illuminated, and print quality. However, the 3D method has not been able to detect special features that only appear under certain conditions, such as ultraviolet (UV-based) safety elements of invisible Rupiah banknotes, such as safety threads that emit special light (fluorescence), emission year codes, and special signs in the form of specific numbers or patterns that fluoresce when exposed to ultraviolet light. These features cannot be detected just by looking, groping, or exposing money because they are invisible to the naked eye in ordinary light. Therefore, for more comprehensive learning activities and improving students' learning outcomes, the use of additional aids such as UV rays is needed so that they can recognize all safety elements, both visible and hidden.

Cycle II

The planning stage is based on reflections from cycle I, which shows the need for additional learning media to strengthen students' understanding. Therefore, in cycle II, UV light was added as a visual aid to identify the security elements of the Rupiah banknote that are not visible to the naked eye. The learning plan is designed using a hands-on investigation model, but adds a variety of learning media, namely UV lights. In addition, media, teaching modules, and evaluation instruments are also adjusted to be more relevant and support learning goals. At the implementation stage, learning is carried out by continuing the application of the hands-on investigation model, accompanied by strengthening concepts and practices, namely, students not only use the 3D method, but also check the authenticity of money with the help of UV lamps. UV lamps allow learners to observe firsthand the features of money security that are not visible to the naked eye, such as glowing safety threads, hidden images, or special signs that only appear under UV light. Through this process, students gain real experience in identifying the authenticity of Rupiah banknotes and understand that protection against counterfeiting is designed in various forms of hidden visuals and technologies. In this way, students better understand the characteristics and security features of the Rupiah banknote, both visible and hidden.

The evaluation stage is carried out with post-intervention formative assessments to assess the extent of improvement in student learning outcomes and the achievement of learning objectives. The results of cycle II show a significant increase. The average score of students reached 88.91, and the percentage of students who achieved LGCA increased to 90.9%. These results indicate that the use of UV light aids has succeeded in helping students understand the safety elements of Rupiah banknotes more concretely. The improvement in learning outcomes reinforces the findings of Cridlin (2007) and Komala et al. (2020), who stated that collaboration in groups and hands-on learning experiences with appropriate media can improve students' conceptual understanding and critical thinking skills.

Finally, at the reflection stage, the teacher evaluates the learning outcomes and observations on student involvement and assesses the intervention's effectiveness in

cycle II. In addition, the observation results also showed that students seemed more enthusiastic, actively discussed, and showed a better understanding in identifying the characteristics and security elements of Rupiah banknotes. The intervention carried out in the second cycle was considered successful in overcoming previous learning obstacles and improving the quality of the process and overall learning outcomes. The learning results showed that 90.9% of students had exceeded the LGCA (>80%). Thus, the CCAR cycle could be stopped.

DISCUSSION

Based on the results of the research conducted through three stages of the cycle, there was a significant increase in student learning outcomes after implementing the hands-on investigation learning model. The improvement in student learning outcomes is summarized in Table 1.

Table 1
Development of student learning outcomes

Cycle	Average Value – Average	Percentage of LGCA
Pre-cycle	55.64	27%
Cycle I	71.39	61%
Cycle II	88.91	91%

Source: Authors' calculation results

In the pre-cycle stage, the learning process that is still conventional uses lecture methods and media in the form of power points so that it is not able to facilitate students to understand abstract and conceptual material in depth, which is reflected in the low average learning outcomes of 55.64 and only 27% of students achieve LGCA. Amalina and Inayati (2021); Novalia and Okmayura (2020) support these results by stating that learning with conventional methods tends to make learners passive and have difficulty understanding economic material that is abstract and conceptual. Powerpoint media causes students to be less interested in learning the material.

After intervention in the first cycle through the application of the hands-on investigation model with the practice of checking the authenticity of Rupiah banknotes using the 3D method (seen, touched, scanned (seen, touched), there was an increase in the average learning outcome to 71.39 and the percentage of students who achieved the LGCA increased to 61%. This shows that a direct experience-based approach can help students understand concepts more concretely. These results align with Chen (2022), who found that hands-on activity-based learning encourages student involvement in learning, thereby helping them remember information more deeply. Ryan et al. (2021) also found that learning through hands-on activities helps learners remember information longer and understand its relevance in the real world.

However, the evaluation results in the first cycle also show that many students still have not reached the LGCA. Based on the results of the reflection, it was found that the cause of learning difficulties was the limitation of learning aids or media in identifying the invisible elements of the Rupiah banknote security. Hardiman & Kusumantoro (2023) found 15 security elements for the paper Rupiah currency, with watermarking and microtext as the two most important elements that require a tool to see them. Therefore, in cycle II, improvements were made by adding a variety of media in the form of UV lamps to help students recognize safety elements that cannot be seen with the 3D method.

The improvement gave positive results, where the average learning outcome increased to 88.91, and learning completeness reached 90.9%. These results are supported by Chen (2022); Ting and Tai (2020); Shi et al. (2023), who state that hands-on-based learning is highly effective in improving conceptual understanding and real-world applicability because it actively engages learners in the investigative process. In addition, hands-on investigation can overcome learning difficulties caused by the abstract nature of the material because students can explore the learning object directly so that the learning outcomes are more meaningful (Adeika et al., 2024). The activity also encourages active involvement and curiosity, and builds students' observational skills (Nayak et al., 2024) on economic materials related to Rupiah banknotes' characteristics and security elements. Thus, applying practice-based learning can provide a more comprehensive understanding of the importance of recognizing and distinguishing real and counterfeit money and instilling the value of prudence in financial transactions.

Furthermore, using the hands-on investigation model improves learning outcomes and shapes students' critical thinking, problem-solving, and collaborative skills (Ajeigbe et al., 2023). These results are strengthened by Rosfiani et al. (2021); Komala et al. (2020), who emphasize that hands-on investigation learning strategies can encourage active participation, problem-solving, and high-level thinking through investigation activities carried out in groups. Thus, applying a hands-on investigation model that combines direct practice and collaboration has proven effective in improving the quality of economic learning, especially in abstract Rupiah banknote authenticity, theoretical, and conceptual.

CONCLUSION

The study results show that the application of the learning model, hands-on investigation, effectively improves students' understanding and learning outcomes on the characteristics and elements of safeguarding Rupiah money. In the pre-cycle stage, the achievement of learning outcomes is still low, both in terms of average grades and completion percentage. After the implementation of practice-based learning with an approach, Hands-on through the 3D method in cycle I, there was an increase, but it has not reached the completeness target. Improvements in the second cycle by adding learning media in UV lamps significantly increased student learning outcomes, both in average scores and completion percentages. This proves that the model hands-on investigation that integrates direct practice and visual aids can build a comprehensive understanding of students, both of visible and hidden safety elements.

Implication

This study has implication that economics teachers use a hands-on investigation learning model in delivering economic materials that are conceptual and abstract, such as payment systems and instruments. Additional media, such as UV lamps, must also be considered to enrich students' learning experience, especially in understanding the security elements of the Rupiah banknote that are not visible to the naked eye. In addition, schools can facilitate the availability of relevant learning media and support the creation of real-life experiential learning.

Limitation and Future Direction

Although the study results indicate that the hands-on investigation learning model effectively improves students' understanding of the characteristics and security elements of the Rupiah currency, this study has several limitations. First, the study was conducted in a limited scope in one school with relatively few participants, so the results cannot be generalized to a broader context. Second, the approach focuses on visual aspects and direct practice, so it has not accommodated other student learning styles, such as auditory or verbal. In addition, the long-term effect of this model on knowledge retention has not been studied. Further research can develop this model on other economic materials with similar characteristics.

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