RESEARCH ARTICLE

Problem-Based Learning model in improving critical thinking ability of elementary school students

Samsul Susilawati[1]   **Triyo Supriyatno**[1*]

[1] Universitas Islam Negeri Maulana Malik Ibrahim, Malang 65144, Indonesia

Correspondence to: Triyo Supriyatno, Universitas Islam Negeri Maulana Malik Ibrahim, Malang 65144, Indonesia; Email: triyo@pai.uin-malang.ac.id

Abstract: So far, elementary schools have found problems with students' critical thinking skills, which could be improved by implementing thematic learning, so a learning model is needed to train students' critical thinking skills. The purpose of this study was to analyze whether there were differences in the level of effectiveness of the Problem-Based Learning model in improving critical thinking skills in thematic learning of students in grade IV SD/MI, namely SDN II Weringinanom Poncokusmo Malang, East Java, Indonesia. This type of research is Classroom Action Research using qualitative and quantitative approaches. The subjects used in the study were class IV teachers and 46 students. The results showed an increase from cycle I to cycle II. The implementation of the teacher cycle I was 80.73%, increasing to 91.76% in cycle II and 85.09%, increasing to 92.96% in cycle II on student implementation. Thus, the Problem-Based Learning model has improved integrated thematic learning in fourth-grade students at SD SDN II Weringinanom Poncokusmo Malang, East Java, Indonesia.

Keywords: Problem-Based Learning model, critical thinking, elementary school students

1   Introduction

One of the learning models that can be applied to IPS lessons is Problem-Based Learning (PBL). The advantage of PBL is that learning that uses competency mastery must be student-centred, providing learning and learning experiences that are relevant and contextual in life (Danniels & Pyle, 2022; Rahayu & Hartono, 2016). PBL learning was specially developed to help students develop thinking, problem-solving and intellectual skills. This learning provides students with as many opportunities as possible for various inquiries (discoveries) and motivation and will establish cooperation in completing assignments. Problem-Based Learning (PBL) is a learning that uses problems as a context for students to learn about critical thinking and problem-solving skills and acquire essential knowledge and concepts from the subject matter (Dahal et al., 2022).

Learning configurations help individual learning interactions, where cycles have fast and long-term stages (Eckhoff, 2019; Huang et al., 2012). As indicated by them, the learning system occurs considering the learning conditions: interior and exterior. Interior conditions: student capacity and availability. Temporary external conditions: planned course of ecological action. Outside condition planning is what they think of as a deliberate learning plan and applying a framework to effectively work on the nature of one's exhibits (Barianos et al., 2022).

Previous research that provides innovative and creative learning in elementary school learning makes learning fun and children become enthusiastic about learning, as in research conducted by (Barab et al., 2005; Hunter & Botchwey, 2017), who create innovative and creative learning designs that will make learning more fun and will make children more enthusiastic about learning (Lin & Acosta-Tello, 2017; Lloyd, 2009) also trying to make innovative learning, the researcher believes that if all learning is designed creatively and innovatively, it will increase children's abilities and education in Indonesia will be more advanced, because all elementary school children are interested in creative things, according to their age, they still like things that interest them. Some of the researchers above have tried their research on Mathematics (Gözüm, Papadakis & Kalogiannakis, 2022). This time we will create creative and innovative learning designs for Social Studies learning in Elementary Schools, which will later attract students' attention and make students enthusiastic about learning which will promote education to be better.

Social studies subjects have appropriate goals to form productive members of society (Afandi, 2011), social studies learning makes cooperation more as a resident and motivation and character development (Simanjuntak & Idrus, 2013). IPS can be applied in his personal life (Hutama,

2016; Octiara, 2017). This is the main point in determining how teachers can adapt these subjects to accommodate social studies learning objectives. The problem is that there needs to be more readiness and time for the teacher to provide a clear and exciting way to learn how to understand (Kalogiannakis & Papadakis, 2022). According to research results (Jauhar, 2018) said that imaginative support affects learning achievement, assuming that the course of inventive cooperation is low then, at that time affects student learning achievement.

In this article, we will discuss in detail how to design learning creatively and innovatively; previous studies have discussed many ways to create innovative and creative learning, but not on social studies subjects in elementary schools, so we will try to create a learning design. Creative and innovative Social Studies will later assist teachers in making Social Studies learning designs in Elementary Schools. Creative and innovative learning designs will make children who are studying, especially in elementary school, enthusiastic about learning because teaching these children attracts their attention. Therefore, this article explains how to make social studies learning designs that will later foster student enthusiasm in learning where learning is creative and innovative and can increase motivation, and student activity, which will make social studies learning even better.

2   Materials and methods

The type of research used in this research is Classroom Action Research. This research concerns repairing or solving problems in a class as a form of emphasis, refinement, or improvement of learning activities (Petousi & Sifaki, 2020). According to Sanjaya (2012: 44), "Classroom action research is the process of studying learning problems in the classroom through self-reflection to solve these problems by carrying out various planned actions in real situations and analyzing every effect of the treatment." Meanwhile, according to B. Uno (2012:41), "Classroom action research is research conducted by teachers in their classes through self-reflection, to improve their performance as teachers so that the learning process can run well, and student learning outcomes increase."

The research was conducted in Semester I, July – December 2022/2023. The research was conducted in two cycles. Cycle I consisted of 2 meetings, and cycle II consisted of one meeting. Cycle I was held on Saturday, 8 October 2022, at 07.30-11.30 WIB and Saturday, 15 October 2022, at 07.30-11.30 WIB, while cycle II was carried out on Saturday, 5 December 2022, 07.30-11.30 WIB. Research data sources were obtained from integrating thematic learning regarding teacher and student implementation during learning. The research data was collected using observation techniques, and the research subjects were teachers and fourth-grade students at SD SDN II weringinanom Poncokusmo Malang, East Java, Indonesia. For the research objectives to be achieved, the research instrument was used in the form of observation sheets. The aspects observed through the observation guidelines are those related to the implementation of learning on the teacher and student aspects. The data obtained in the study were analyzed using qualitative and quantitative analysis. Qualitative data analysis starts with examining data from data collection until all data is collected as explained by Miles and Huberman (in Sugiyono, 2012: 247-253) that "Qualitative data analysis techniques include three simultaneous activities: (1) data reduction, (2) data presentation, and (3) conclusion (evaluation)". Such an analysis phase is carried out until the data has been collected at each stage of data collection in each action. Meanwhile, the quantitative data analysis model is the assessment of student learning using the percentages stated in the Ministry of Education and Culture (2014: 150), with the following formula:

$$\text{Score} = \frac{\text{Total score obtained}}{\text{Maximum total score}} \times 100$$

The success rate criteria can be determined in Table 1.

Table 1   The success rate criteria

Rating	Score
Very good	91-100
Good	81-90
Enough	71-80
Not enough	$\leq$ 70

3   Results and discussion

Several journals and articles were analyzed about designing Innovative and Creative social studies learning using learning models at the elementary school level. Learning design is a

plan for a learning system depending on the requirements and learning targets and the transport framework so that it turns into a reference in its implementation to make learning exciting and effective by limiting students' difficulties in getting learning (Barak, 2013; Wasson & Kirschner, 2020). Learning configuration is also an efficient and fundamental plan to achieve learning goals (Eliasson et al., 2022). Excellent learning design, enforced by sufficient offices, combined with the teacher's creativity, will make it easier for students to achieve learning targets (Papadakis & Kalogiannakis, 2022). IPS learning in the learning system is intended to make discoveries that make students dynamic, imaginative, and inventive. Learning design is an ideal and appropriate use of various learning parts (Papadakis et al., 2021). To get an inventive lesson plan, the instructor can work on using objectives, learning materials, media, techniques, and assessments, for student learning climates (Tang et al., 2022). From then on, learning configurations will be framed and cause students to develop a desire to adapt because learning interests them. By utilizing this learning model, the learning system can cause students to become valuable people in their current circumstances.

The fluctuating learning model can work on the number of students after the learning system. The learning model is generally set depending on different information standards or hypotheses. Students can understand themselves "on the personal" and have enough to collaborate with other students to provide examples of the beneficial relational connections that the lesson plans get them at school. Social studies learning causes the character of students to change into characters who are intelligent, sensitive to climate, legitimate, love the country, and can protect national unity from all attacks. This is in line with research carried out innovative actions by designing integrative thematic learning based on local wisdom in learning (Hunter & Botchwey, 2017; Young et al., 2020). Integrative thematic learning can make students active in learning to gain experience and discover the studied knowledge.

Social studies learning is connected with various specific countries gathered in the same family. Social studies guidance in Indonesia is generally illustrated in two, IPS Education for universities and Social Sciences preparing important schools and assistants. Social studies preparing for school are significant, and assistants are described as realigning or diversifying the sociological and humanities disciplines, just as significant human activities are facilitated and presented intelligently and intellectually enlightening for educational purposes (Papadakis, 2017). While the importance of social studies education is in the choice of disciplines of sociology and humanities as well as fundamental human training that is coordinated and introduced experimentally and mentally for informational purposes, what is essential is refinement and choice of disciplines. That assessment implies that social studies instruction in universities and primary and secondary schools are in contrast (Karakose et al., 2022; Karakose, Polat & Papadakis, 2021). The important thing is that in terms of separate elements and determination of IPS, the material is equivalent, taken from the disciplines of sociology, economics, history, and geography (Qureshi & Qureshi, 2021). IPS is a must-have lesson for kindergarten, elementary, junior high, and high school students in tertiary institutions in Indonesia.

According to (Boyer et al., 2014; Danniels & Pyle, 2022; Tavangarian et al., 2004), The essence of learning design is that there are four components, namely: (1) When completing the lesson plan and the subjects to be taught, if there are not too many problems, pay attention that the creator makes an accommodative learning environment so that learning goals can be achieved. Students can feel great and encouraged in the learning system. Pre-learning and learning students can be affected by various physical and mental elements, including fatigue (Kastriti et al., 2022). A different thing that can affect the nature of student learning is the existence of showing material and the style of delivery of educators in conveying material. (2) Objectives Plans for these objectives continue to be made depending on the capacity or results students must have after learning. Assuming learning goals or skills are chaotic, learning objectives are classified as sub-competitive and easy to achieve. Again, lesson plans address students' needs with a dependable capacity to dominate under specific conditions. (3) Method The technique identified with the learning procedure must be intended to guarantee the perfection of the learning system. Strategy is a way or procedure that is considered appropriate in conveying the problem. This development is significant in the lesson plan because this technique determines the actual state of learning. Then again, learning-initiating abilities are also shown in a strategic sense. In this case, this technique is essential for a straightforward learning methodology. (4) Evaluation This idea sees assessing student learning outcomes as vital. Signs of achieving goals can be read from the evaluation of learning outcomes.

Evaluation is regularly carried out by addressing objective questions. Assessments should also be made possible using settings unlike perception hardware, meetings, surveys, etc. According to (Atiah, 2020; Wasson & Kirschner, 2020), learning design aims to:

(1) Please encourage students to continue learning both when they are at home and when they are at school.

(2) Growing the spirit of student discipline in learning.

(3) Bringing out student creativity through assignments from the teacher.

(4) Make yourself honest when doing exams or practice.

(5)) Always keep working on maintaining good grades in class

(6) Entrepreneurial attitudes emerge and pursue their respective fields.

Several social studies learning strategies can be implemented to develop student creativity, namely the Exposition Strategy, teaching materials are presented to students in a complete form, and students need to master teaching materials. For example, for students to gain the ability to determine the date and date of Indonesian independence, the material to be obtained is ready, the discovery of certain materials and strategies, and learning materials are needed so that strategy exhibitions are more suitable and Strategy discovery, activities discovered by students themselves through various things. Students are expected to be able to explain the events behind the creation of the Proclamation of Independence. Then the discovery strategy is appropriate because they need to absorb various information to achieve this skill.

Results of IPS Learning Research (Lestari, 2016) showed that with the learning model in social studies learning, students already have high learning activity because the teacher has designed fun learning, and students also experience an increase in learning outcomes or grades. Learning Theories in Learning Design are related to curriculum development or curriculum design. By studying learning theory, we can observe student behaviour. There is a difference between learning and learning theory, namely prescriptive and descriptive. Prescriptive means being able to estimate the progress of the learning system being carried out, while descriptive means being able to describe the ongoing learning process.

There are several learning theories in learning design:

(1) Behaviorism Theory The behavioristic learning hypothesis says that learning changes behaviour. Behavioristic specialists say that the learning system occurs when understudy behaviour changes, and when students do not react, understudy behaviour does not change, and this is not yet called learning. Moreover, the behavioristic learning hypothesis uses a disciplinary framework when the understudy's behaviour does not change. If learning cannot continue and cannot be re-educated, a condemning framework can create a restrictive effect on students and make students willing to adapt once more. For example, an educator asks a child to remember an augmentation and move on to the next day, but the child does not remember it and is approached to stay at the front of the class and may refuse to remember it.

(2) Cognitivism Theory The cognitivism learning hypothesis reveals that learning is an adjustment of understanding or insight. This learning hypothesis has more to do with learning systems than learning outcomes. The intellectual learning model reveals that human behaviour is controlled by insight and understanding of circumstances identified with learning objectives. The intellectual learning hypothesis also underscores that some states identify with the overall setting of the situation. Separating the state/subject into simpler parts or separating them and concentrating on them will make their significance disappear.

(3) Humanistic Theory The humanistic hypothesis accepts that learning purifies people, for example, liking everything in humans. Therefore, the humanistic learning hypothesis is more dynamic than the learning brain science field and closer to the exploratory reasoning fields, the character hypothesis, and psychotherapy. This hypothesis has more to do with the learning load than the learning system. The training and learning courses depend on students' beneficial experiences, which are then used as the premise of the material. As one of the humanistic figures Ausubel said, learning is significant absorption. What has been found is absorbed and ascribed to previously existing information. Persuasive variables and enthusiastic encounters are significant in concentrating on an opportunity.

(4) Theory of Constructivism The constructivist hypothesis is an informal way of thinking that emphasizes that our insights are a consequence of our development. As indicated by this hypothesis, information is formed by students who learn through communication with the material and meetings with the teacher that has been planned according to the learning objectives.

Various learning design models: ADDIE Model (Cahyadi, 2019; Tegeh & Pudjawan, 2015). In this model, five stages are proposed by their abbreviations:

(1) Analysis: Analyze needs to identify problems and appropriate answers to determine student capacities;

(2) Design: Identify explicit capacities, techniques, materials, and learning;

(3) progress: Used in learning programs Production of training projects and materials to be undertaken;

(4) Implementation: Implementation of learning programs by planning or implementing details of learning programs;

(5) Evaluation: Evaluation of learning projects and assessment of learning outcomes.

Dick and Carey Model This model has nine stages in learning, namely:

Level 1: Identity educational goals;

Level 2: Perform lesson analysis;

Level 3: Identify acceptance behaviour and student characteristics;

Level 4: Writing performance goals;

Level 5: Create Test Item Reference Criteria;

Level 6: Development of Educational Strategy;

Level 7: Development and Selection of Class Materials;

Level 8: Development and Application of Formative Assessment;

Level 9: Development and Application of Comprehensive Assessment.

ASSURE model This model was developed by (Heinich et al., 2012; Smaldino & Muffoletto, 1997); this stands for

(1) A: analyze the learner;

(2) S: state Objectives;

(3) S: select Methods, Media, and Materials;

(4) U: utilize Materials;

(5) R: requires Learner Participation;

(6) E: evaluate and Revise.

The Degeng Model contains eight stages in the lesson plan related to the elaboration model. That is,

(1) examination of objectives and quality in the field of study;

(2) investigation of requirements or learning assets;

(3) breaking down the attributes of learning;

(4) characterizing the reasons and content of learning;

(5) deciding on learning load-carrying techniques;

(6) Establish procedures and supervise learning;

(7) Manage organizational technique learning;

(8) Develop strategies for estimating learning outcomes.

The learning model is separated into three stages: the definition stage, the framework check and progress stage, and the assessment stage. Four factors have an effect:

(1) The utilization level, such as the instructive foundation or subject level;

(2) Using terms in the steps;

(3) The number of stages;

(4) Whether the ideas and standards used have been completed.

Designing IPS Lessons is a conscious effort to work on student information, abilities, and perspectives. Education is integral in creating broad-minded, profound, and inventive individuals.

Learning Social Sciences is essential to carry out creative IPS learning. Social studies learning emphasizes the development of attitudes and social skills on the development of attitudes and social skills that are useful for self-development individually or as members of society. To realize the social studies learning objectives, various improvement efforts are needed. The improvement effort carried out by the teacher is based on student-centred. To strive for a fun and challenging learning experience or a pleasant atmosphere or PAIKEM (Active, Innovative, Creative, Effective, and Fun Learning).

Innovation in social studies learning can be obtained through contextual learning because contextual things (containing real or concrete portraits) will facilitate students' understanding (Maharjan, Dahal & Pant, 2022). By having a concrete portrait of the sociocultural dimension in the classroom, it is hoped that students will learn in the realities of everyday life. Learning with contextual innovation in social studies uses typical values relevant to social studies. Based on research conducted by (Kristiawan & Rahmat, 2018; Nana & Surahman, 2019), The reality on the ground shows that teachers rarely develop learning tools that suit the characteristics of their students (Papadakis, 2018; 2022). Because the teacher only uses existing teaching materials without making his teaching materials, the learning process is still textual. The teacher only explains the material in the textbook, and the learning process is still textual; the teacher only explains the material in the book text while students only listen and record the teacher's explanation. The teacher is in control of learning. Most teachers have never prepared learning tools based on innovative learning models.

For this reason, learning tools are needed to improve student learning outcomes through process skills, etc., that use innovative learning models that allow students to learn directly about their natural surroundings. Generally, if the class activity is dominated by teacher activity, it must be changed to be dominated by student activity. It is changed from memory activity to thinking activity. There must be a change from learning to receiving and learning to discover.

Techniques to overcome the learning process that can generate motivation in students so they do not get bored in the learning process are to provide changes or innovations in learning, for example, telling students that with an increasingly developing era, we have to keep up with the times and this can also be done by holding group discussions. (Rahayu & Hartono, 2016). From the various research results that researchers have obtained in various journals about designing innovative and creative social studies learning, it can be said that in the learning process, using creative and innovative design models is well done because by developing learning models, learning is active and student-centred, so that students participate in the learning if students have participated and provoke curiosity and bring out the creativity in students.

Based on the research results, the following results were obtained: a. The essence of the Problem-Based Learning (PBL) Learning Model Problem Based Learning which is abbreviated as PBL, is a learning model that involves students solving a problem and can solve the problems they face according to the knowledge they have and accompanied by logical reasons so that students get experience to learn through the activities they do. In essence, Problem-Based Learning (PBL) is almost the same as Problem Solving (PS), but both have differences. In contrast, the differences include that PBL only presents problems without providing alternative answers to solving these problems. However, students will try to look for an excellent way to solve a problem that has been presented.

Characteristics of Problem-Based Learning (PBL). PBL learning has several characteristics, the characteristics of PBL (Loyens et al., 2008), namely

(1) asking questions or problems;

(2) focusing on relationships or discipline;

(3) authentic investigations;

(4) producing products/works and presenting them.

A similar opinion is described (Barak, 2013). The characteristics of PBL are

(1) PBL is a series of learning activities;

(2) learning activities are directed at solving problems;

(3) problem-solving is done by using a scientific thinking approach.

Agustini et al. (2020) states that PBL has several characteristics, including the following:

(1) learning begins with a problem;

(2) the problems given must be related to the real world of students;

(3) organizing learning around problems, not around scientific disciplines;

(4) giving great responsibility in form and directly carrying out their learning process;

(5) use small groups;

(6) Students must demonstrate what they have learned through products and performance.

The characteristics of PBL include orienting students to authentic problems or questions. Multidiscipline demands cooperation in investigating and producing works. Problems become the starting point for learning to understand concepts and principles and develop problem-solving skills scientifically. Strengths of Problem-Based Learning As with other learning models, Problem-Based Learning has strengths. The strengths of PBL are as follows:

(1) Focus on Meaningfulness, not facts. In traditional learning, students are required to remember much information and then retrieve their memories through exams. So much information that students have to remember in learning may not necessarily be retained by students after the learning process is over. Thus, there may be little information that students can retain after graduation. Problem-Based learning only presents information for students to remember. If Problem-Based Learning provides information, then this information must be used in problem-solving, resulting in a meaningful process.

(2) Improving Students' Ability to Initiative Because they have to actively participate in finding information to identify problems and solve problems, student initiative will be indispensable. The application of Problem-Based learning familiarizes students to take the initiative in the process so that, in the end, these abilities will increase.

(3) Skills and Knowledge Development. Problem-Based learning provides more meaning, real examples of application, and clear benefits from the subject matter (facts, concepts, principles, procedures). The higher the complexity of the problem required to be able to solve the problem. The more accurate the problem, the higher the transferability of students' skills and knowledge into everyday life.

(4) Development of Interpersonal Skills and Group Dynamics. Students need social interaction skills in the learning process and everyday life. The traditional learning process often produces social interaction skills because it focuses on scientific abilities. Problem-Based learning can provide both at once

(5) Development of a "Self Motivated" Attitude Problem-Based Learning which gives students the freedom to explore because students explore with other students under the teacher's

guidance, is a learning process that students like. With a fun learning situation, students will naturally be motivated to continue learning.

(6) Growing Student-Facilitator Relationships (not Student-Teacher) If the Teacher has experienced using Problem-Based Learning, usually the teacher will like Problem-Based Learning, the learning atmosphere feels more active, dynamic, and of good quality. Becoming a teacher guide can be more beneficial than just presenting the information. The student-facilitator relationship in Problem-Based Learning can be more enjoyable for teachers and students.

(7) Levels of Learning Achievement can be increased. Even though the breadth of material and depth of material compared to the diversity of skills and meaningfulness are still widely questioned, the learning process using Problem-Based Learning can result in student achievement in mastering material that is as broad and the same depth as traditional learning. With the diversity of skills and meaningfulness, students can achieve added value using Problem-Based Learning.

Implementation of the Problem-Based Learning Model Learning Stages Problem-Based Learning Model Besides having the strengths mentioned above, the learning model must also be carried out with certain stages. (Galkienė & Monkevičienėė, 2022; Wasson & Kirschner, 2020). They are as follows:

(1) finding problems;
(2) defining problems;
(3) collecting facts;
(4) compiling hypotheses (temporary guesses);
(5) conducting investigations;
(6) refining the problems that have been defined;
(7) concluding alternative solutions collaboratively;
(8) testing results (solutions) problem-solving.

Table 2 shows the application of the Problem-Based Learning Model in the IPS Learning Process in Schools Operationally.

Table 2　The activities of teachers and students during the learning process

No	Learning Stage	Teacher Activity	Student Activities
1	Found a problem	Providing problems raised from the background of students' daily lives.	Trying to find problems by conducting a careful study and analysis of the problems given
		Give a problem that needs to be clearly defined. Give a few facts about the context	Analyze the facts as a basis for finding problems
2	Defining the Problem	Encourage and guide students to use intrapersonal intelligence and early skills to understand problems. Guiding students gradually to define the problem	By using interpersonal intelligence and prior knowledge (Prior knowledge) trying to understand the problem Trying to define the problem using clear parameters
3	Gathering Facts	Guiding students to collect. Guiding students to search for information in various ways/methods Guiding students to manage information	Gather facts by using the experiences that have been obtained. Searching for information in various ways and by using the multiple intelligences they have Manage/regulate the information that has been obtained
4	Developing hypothesis (temporary conjecture)	Guiding students to compile answers/hypotheses (temporary guesses) to problems Guiding students to use multiple intelligences in developing hypotheses Guiding students to develop alternative temporary answers	Make connections between existing facts. Using multiple intelligences to construct hypotheses Trying to compile some tentative answers
5	Do an investigation	Guiding students to conduct investigations of the information and data they have obtained. In guiding students to carry out investigations, the teacher creates a learning structure that allows students to use various ways to know and understand their world	Investigate the data and information that has been obtained. In carrying out, investigations, students use their multiple intelligences to understand and give meaning to existing data and information
6	Refine the problems that have been defined	Guiding students to make improvements to the problems that have been defined	Make improvements to the problems that have been formulated
7	Summarize alternative problem solving collaboratively	Guiding students to conclude collaborative problem-solving alternatives	Make conclusions on alternative problem-solving collaboratively
8	Testing the results (solutions) of problem-solving	Guiding students to test results (problem-solving solutions)	Testing the results (solution) of problem-solving.

4   Conclusion

Integrating thematic learning using the Problem-Based Learning model can be observed from the teacher's and student's implementation. Implementation of teacher cycle I was 80.73%, increasing to 91.76% in cycle II, and 85.09% increase to 92.96% in cycle II on student implementation with outstanding ratings. Following the explanation above, the Problem-Based Learning model has improved integrated thematic learning in class IV Elementary School SDN II weringinanom Poncokusmo Malang, East Java, Indonesia.

Based on the conclusions that have been obtained in this study, the researchers put forward several suggestions for consideration: it is suggested to the teacher that the teacher should first understand the learning steps using the Problem-Based Learning model and that there must be good interaction between the teacher and students, students and teachers so that the implementation learning can run very well.

Conflicts of interest

The authors declare that they have no conflict of interest.

References

Afandi, R. (2011). Integrasi pendidikan karakter dalam pembelajaran IPS di sekolah dasar. PEDAGOGIA: Jurnal Pendidikan, 1(1), 85-98.
https://doi.org/10.21070/pedagogia.v1i1.32

Afolabi, M. T., & Oladokun, M. T. A. (2020). Information Literacy Skills, Availability of Information Resources as Factors Influencing Research Productivity of Academic Staff of Lead City University, Nigeria. Library Philosophy and Practice, 2020, 1-18.

Atiah, N. (2020). Pembelajaran Era Disruptif Menuju Masyarakat 5.0. In Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang, 605-617.

Barab, S., Thomas, M., Dodge, T., Carteaux, R., & Tuzun, H. (2005). Making learning fun: Quest Atlantis, a game without guns. Educational technology research and development, 53(1), 86-107.
https://www.jstor.org/stable/30220419

Barak, M. (2013). Impacts of learning inventive problem-solving principles: Students' transition from systematic searching to heuristic problem-solving. Instructional Science, 41(4), 657-679.
https://doi.org/10.1007/s11251-012-9250-5

Boyer, S. L., Edmondson, D. R., Artis, A. B., & Fleming, D. (2014). Self-Directed Learning: A Tool for Lifelong Learning. Journal of Marketing Education, 36(1), 20-32.
https://doi.org/10.1177/0273475313494010

Cahyadi, R. A. H. (2019). Pengembangan Bahan Ajar Berbasis Addie Model. Halaqa: Islamic Education Journal, 3(1), 35.
https://doi.org/10.21070/halaqa.v3i1.2124

Danniels, E., & Pyle, A. (2022). Inclusive play-based learning: Approaches from enacting kindergarten teachers. Early Childhood Education Journal, 1-11.
https://doi.org/10.1007/s10643-022-01369-4

Eckhoff, A. (2019). Public Displays of Children's Work in Early Learning and Elementary School Settings as Documentation of Children's Learning Experiences. International Journal of Early Childhood, 51(1), 73-91.
https://doi.org/10.1007/s13158-019-00233-8

Eliasson, S., Peterson, L., & Lantz-Andersson, A. (2022). A systematic literature review of empirical research on technology education in early childhood education. International Journal of Technology and Design Education, 1-26.
https://doi.org/10.1007/s10798-022-09764-z

Agustini, A., Rery, R. U., & Anwar, L. (2020). Creative Problem Solving (CPS)-Based Assessment Instrument for Critical Thinking Ability on Stoichiometry Materials. AL-ISHLAH: Jurnal Pendidikan, 12(2), 230-245.
https://doi.org/10.35445/alishlah.v12.i2.227

Galkienė, A., & Monkevičienė, O. (n.d.). Inclusive Learning and Educational Equity 5 Improving Inclusive Education through Universal Design for learning.
https://www.springer.com/series/13450

Hammarberg, K., Kirkman, M., & de Lacey, S. (2016). Qualitative research methods: when to use them and how to judge them. Human reproduction, 31(3), 498-501.
https://doi.org/10.1093/humrep/dev334

Heinich, R., Molenda, M., Russell, J., & Smaldino, Sharon. (2012). Instructional Media and Technology for Learning. International Journal of Distributed and Parallel Systems, 3, 8.

Huang, Y. M., Liang, T. H., Su, Y. N., & Chen, N. S. (2012). Empowering personalized learning with an interactive e-book learning system for elementary school students. Educational Technology Research and Development, 60(4), 703-722.
https://doi.org/10.1007/s11423-012-9237-6

Hunter, P. E., & Botchwey, N. D. (2017). Partnerships in Learning: A Collaborative Project between Higher Education Students and Elementary School Students. Innovative Higher Education, 42(1), 77-90.
https://doi.org/10.1007/s10755-016-9363-x

Hutama, F. S. (2016). Pengembangan Bahan Ajar Ips Berbasis Nilai Budaya Using Untuk Siswa Sekolah Dasar. JPI (Jurnal Pendidikan Indonesia), 5(2), 113.
https://doi.org/10.23887/jpi-undiksha.v5i2.8359

Jauhar, S. (2018). Pengembangan Bahan Ajar Ips Berbasis Pendekatan Sains Teknologi Masyarakat (Stm) Untuk Meningkatkan Kreativitas Siswa Di Sekolah Dasar. JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan, 2(2), 58.
https://doi.org/10.26858/jkp.v2i2.6946

Kristiawan, Muhammad., & Rahmat, N. (2018). Peningkatan Profesionalisme Guru Melalui Inovasi Pembelajaran. Jurnal Iqra': Kajian Ilmu Pendidikan, 3(2), 373-390.

Lestari, C. D. (2016). Pengembangan Bahan Ajar Kontekstual Untuk Mata Pelajaran Ips Sekolah Dasar. Perspektif Ilmu Pendidikan, 30(2), 105.
https://doi.org/10.21009/pip.302.5

Lin, P. J., & Acosta-Tello, E. (2017). A practicum mentoring model for supporting prospective elementary teachers in learning to teach mathematics. ZDM - Mathematics Education, 49(2), 223-236.
https://doi.org/10.1007/s11858-016-0829-1

Lloyd, G. M. (2009). School mathematics curriculum materials for teachers' learning: Future elementary teachers' interactions with curriculum materials in a mathematics course in the United States. ZDM - International Journal on Mathematics Education, 41(6), 763-775.
https://doi.org/10.1007/s11858-009-0206-4

Loyens, S. M. M., Magda, J., & Rikers, R. M. J. P. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. Educational Psychology Review, 20(4), 411-427.
https://doi.org/10.1007/s10648-008-9082-7

Mellon, C. A. (2015). Library anxiety: A grounded theory and its development. College and Research Libraries, 76(3), 276-282.
https://doi.org/10.5860/crl.76.3.276

Nana, N., & Surahman, E. (2019). Pengembangan Inovasi Pembelajaran Digital Menggunakan Model Blended POE2WE di Era Revolusi Industri 4.0. Prosiding SNFA (Seminar Nasional Fisika Dan Aplikasinya), 4, 82.
https://doi.org/10.20961/prosidingsnfa.v4i0.35915

Octiara, D. (2017). Pengembangan Bahan Ajar Ips Untuk Meningkatkan Keterampilan Sosial Di Kelas Vii Smp. Journal of Development Social Skills Students, 1-10.

Rahayu, E., & Hartono, H. (2016). Keefektifan Model PBL dan PjBL Ditinjau dari Prestasi, Kemampuan Berpikir Kritis, dan Motivasi Belajar Matematika Siswa SMP. PYTHAGORAS: Jurnal Pendidikan Matematika, 11(1), 1.
https://doi.org/10.21831/pg.v11i1.9629

Smaldino, S. E., & Muffoletto, R. (1997). The educational media experience in teacher education. TechTrends, 42(4), 37-40.
https://doi.org/10.1007/bf02818599

Studi, P., Pembelajaran, T., Pascasarjana, P., & Ganesha, U. P. (2014). Pengembangan Bahan Ajar Ips Berorientasi Ips. 4.

Tang, K. Y., Chen, C. C., Hwang, G. J., & Tu, Y. F. (2022). Did library learners benefit from m-learning strategies? Research-based evidence from a co-citation network analysis of the literature. Educational technology research and development, 70(5), 1719-1753.
https://doi.org/10.1007/s11423-022-10136-6

Tavangarian, D., Leypold, M. E., Nolting, K., Roser, M., & Voigt, D. (2004). Is e-Learning the solution for individual learning? Electronic Journal of e-Learnin. Electronic Journal of E-Learning, 2(2), 273-280.

Tegeh, I. M., & Pudjawan, I. N. J. K. (2015). Pengembangan Buku Ajar Model Penelitian Pengembangan dengan Model ADDIE. Seminar Nasional Riset Inovatif IV, 208-216.

Thanh, N. C., Thi, T., & Thanh, L. (2015). The Interconnection Between Interpretivist Paradigm and Qualitative Methods in Education. American Journal of Educational Science, 1(2), 24-27.
http://www.aiscience.org/journal/ajes

Simanjuntak, T., Idrus, A., & Muazza, M. (2013). Pengembangan Bahan Ajar IPS Terpadu Berkarakter SMP Kelas VII Semester I. Jurnal Tekno-pedagogi, 3(2), 25-34.
https://online-journal.unja.ac.id/pedagogi/article/view/2240

Wasson, B., & Kirschner, P. A. (2020). Learning Design: European Approaches. TechTrends, 64(6), 815-827.
https://doi.org/10.1007/s11528-020-00498-0

Young, F., Cleveland, B., & Imms, W. (2020). Correction to: The affordances of innovative learning environments for deep learning: educators' and architects' perceptions. The Australian Educational Researcher, (2020), 47, 4.
https://doi.org/10.1007/s13384-019-00356-w

Barianos, A. K., Papadakis, A., & Vidakis, N. (2022). Content manager for serious games: Theoretical framework and digital platform. Advances in Mobile Learning Educational Research, 2(1), 251-262.
https://doi.org/10.25082/AMLER.2022.01.009

Dahal, N., Manandhar, N. K., Luitel, L., Luitel, B. C., Pant, B. P., & Shrestha, I. M. (2022). ICT tools for remote teaching and learning mathematics: A proposal for autonomy and engagements. Advances in Mobile Learning Educational Research, 2(1), 289-296. https://doi.org/10.25082/AMLER.2022.01.013

Gözüm, A. İ. C., Papadakis, S., & Kalogiannakis, M. (2022). Preschool teachers' STEM pedagogical content knowledge: A comparative study of teachers in Greece and Turkey. Frontiers in Psychology, 13, 1-19. https://doi.org/10.3389/fpsyg.2022.996338

Kalogiannakis, M., & Papadakis, S. (2022). Educating preservice teachers to introduce educational robotics into their future preschool classroom. In Proceedings of The 12th Edition of the International Conference New Perspectives in Science Education March 16-17, Florence, Italy.

Karakose, T., Kocabas, I., Yirci, R., Papadakis, S., Ozdemir, T. Y., & Demirkol, M. (2022). The Development and Evolution of Digital Leadership: A Bibliometric Mapping Approach-Based Study. Sustainability, 14(23), 16171. https://doi.org/10.3390/su142316171

Karakose, T., Polat, H., & Papadakis, S. (2021). Examining Teachers' Perspectives on School Principals' Digital Leadership Roles and Technology Capabilities during the COVID-19 Pandemic. Sustainability, 13(23), 13448. https://doi.org/10.3390/su132313448

Maharjan, M., Dahal, N., & Pant, B. P. (2022). ICTs into mathematical instructions for meaningful teaching and learning. Advances in Mobile Learning Educational Research, 2(2), 341-350. https://doi.org/10.25082/AMLER.2022.02.004

Papadakis, S. (2018). Is pair programming more effective than solo programming for secondary education novice programmers?: A case study. International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), 13(1), 1-16. https://doi.org/10.4018/IJWLTT.2018010101

Papadakis, S. (2022). In-service teachers' beliefs about educational robotics in preschool classroom. International Journal of Technology Enhanced Learning, 14(2), 125-141. https://doi.org/10.1504/IJTEL.2022.121770

Papadakis, S., & Kalogiannakis, M. (2022). STEM, Robotics, Mobile Apps in Early Childhood and Primary Education: Technology to Promote Teaching and Learning. Lecture Notes in Educational Technology. Lecture Notes in Educational Technology. https://doi.org/10.1007/978-981-19-0568-1

Papadakis, S., Vaiopoulou, J., Sifaki, E., Stamovlasis, D., Kalogiannakis, M., & Vassilakis, K. (2021, April). Factors That Hinder in-Service Teachers from Incorporating Educational Robotics into Their Daily or Future Teaching Practice. In CSEDU (2) (pp. 55-63). https://doi.org/10.5220/0010413900550063

Papadakis, S. (2017). Evaluation of Greek Android mobile applications for preschoolers. Preschool & Primary Education, 5(2), 65-100 https://doi.org/10.12681/ppej.11208

Qureshi, A., & Qureshi, N. (2021). Challenges and issues of STEM education. Advances in Mobile Learning Educational Research, 1(2), 146-161. https://doi.org/10.25082/AMLER.2021.02.009

Kastriti, E., Kalogiannakis, M., Psycharis, S., & Vavougios, D. (2022). The teaching of Natural Sciences in kindergarten based on the principles of STEM and STEAM approach. Advances in Mobile Learning Educational Research, 2(1), 268-277. https://doi.org/10.25082/AMLER.2022.01.011

Petousi, V., & Sifaki, E. (2020). Contextualizing harm in the framework of research misconduct. Findings from a discourse analysis of scientific publications, International Journal of Sustainable Development, 23(3/4), 149-174, https://doi.org/10.1504/IJSD.2020.10037655