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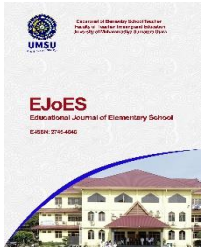

APPLICATION OF SMAB MEDIA (SMART BOX) TO IMPROVE 21ST CENTURY 4C SKILLS IN SCIENCE SUBJECTS AT SDS BINA SATRIA MULIA

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ARTICLE INFO	ABSTRACT
Article History Receive: 03-05-2025 Revision: 03-07-2025 Accept: 30-10-2025	*This study aims to improve students' 21st century skills 4C (Critical Thinking, Creativity, Collaboration, Communication) through the implementation of SMAB (Smart Box) media in science learning for grade IV at SDS Bina Satria Mulia. This study is a Classroom Action Research (CAR) which is carried out in two cycles, each consisting of the planning stage, action implementation, observation, and reflection. The subjects of this study were 20 grade IV students. Data collection techniques were carried out using observation sheets. The results showed that students' 4C skills increased significantly. In the pre-cycle stage, the average value of students' 4C skills was 57.25 with the completion of 21st century skills in the collaboration aspect of 35%. After the implementation of SMAB media in cycle I, the average value increased to 71.15 with a completion percentage of 60%. The increase continued in cycle II with an average value of 82 and learning completion reaching 100%. The implementation of SMAB media has proven effective in creating interactive, contextual learning and encouraging active student participation. This media facilitates students in critical thinking, working together, expressing opinions, and fostering creativity in understanding material science.*
Keywords	*SMAB Media (Smart Box), 21st Century Skills (4C), Science Learning*

1. INTRODUCTION

Education is a way of forming human abilities to use logical thinking or rationality as an answer to facing many problems that arise in the future. The world of education is undergoing a significant transformation, along with the development of technology and the demands of the times. This change requires students to have 21st century skills, which not only include mastery of science, but also include the development of four main competencies known as the 4Cs, namely: *Critical Thinking* , *Creativity* , *Communication* , and *Collaboration* (Ardiansyah *et al.,* 2022). These four skills are the main keys for the younger generation to be able to adapt, innovate, and compete globally in the future.

Education as a means of character formation and development of human potential must be able to answer these challenges. According to Ardiansyah *et al.,* (2022), education is a conceptual process that moves along with human development. Therefore, the education system must be designed not only to transfer knowledge, but also to shape students into creative individuals, critical in thinking, able to work together, and able to communicate effectively.

The objectives of national education as stated in Law Number 20 of 2003 concerning the National Education System emphasize the importance of forming students who are faithful, responsible, creative, and have noble character, and are able to compete globally (Malik & Latifah, 2022). This shows that the integration of 4C skills in the learning process is very relevant and urgent to be implemented.

However, the application of 21st century skills, especially 4C in classroom learning, still faces various obstacles. As stated by Subekti *et al.,* (2020), most teachers still use conventional approaches such as lectures and the use of whiteboards, which do not actively involve students in learning. As a result, students become passive, are not used to thinking critically, are less creative in solving problems, and are not used to working together or conveying ideas effectively.

A similar situation also occurred at SDS Bina Satria Mulia, especially for fourth grade students in the Natural and Social Sciences (IPAS) subject. Learning still focuses on memorization and does not provide enough space for students to develop the four 4C skills. Learning activities do not involve much group discussion (collaboration), problem solving (critical thinking), conveying ideas (communication), or exploring new ideas (creativity). This has an impact on low student participation and learning outcomes that have not met the Minimum Completion Criteria (KKM). Based on odd semester data, only 45% of students achieved a score of ≥70, while the rest (55%) have not reached the KKM.

To overcome these problems, innovation is needed in the approach and learning media that can encourage the development of 4C skills as a whole. One of the potential media to be used is SMAB (*Smart Box*), which is a technology-based learning media designed to support interactive, experimental, and collaborative learning. Through SMAB, students can conduct simple experiments, role-play, discuss, and communicate their ideas creatively.

SMAB media not only attracts students' attention, but also gives them space to think critically in solving challenges or simulations, communicate with friends and teachers during the discussion process, innovate and be creative in making projects or solving problems, and collaborate in groups to achieve common goals. Through the implementation of SMAB media in science learning, it is expected that students' 21st century skills, especially 4C competencies, can increase significantly. Thus, the education process not only produces graduates who are academically intelligent, but also resilient in facing social dynamics and future challenges.

This study is limited to the application of SMAB (*Smart Box*) learning media as an effort to improve 21st century 4C skills that focus on (*Collaboration)* in grade IV students at SDS Bina Satria Mulia. with a scope of material on changes in the state of objects. The research time was carried out within a certain period of time that had been determined by the school's learning schedule, so it did not cover the long-term effects of using SMAB media. With this limitation, it is hoped that the research results can be more focused and relevant in improving 4C skills focused on student collaboration on the material on changes in the state of objects.

Based on the background, problem identification and problem limitations that have been described, the objectives of this study are:

1. To find out the application of 21st century skills 4C student collaboration in science learning before using SMAB (*Smart Box*) media in grade IV science subjects at SDS Bina Satria Mulia .
2. To determine the application of 21st century skills 4C student collaboration in science learning after using SMAB (*Smart Box*) media in grade IV science subjects at SDS Bina Satria Mulia .
3. To find out the results of the application of 21st century skills 4C student collaboration while using SMAB (Smart Box) media in grade IV science subjects at SDS Bina Satria Mulia.

2. RESEARCH METHOD

The research method used in this study is Classroom Action Research (CAR). This study aims to improve 21st century skills that include critical thinking, creativity, collaboration, and communication (4C) through the application of innovative learning media in the form of SMAB (Smart

Box). The study was conducted in a direct classroom setting with grade IV students as subjects, so the approach used was participatory and reflective. The researcher implemented an action cycle consisting of four stages, namely planning, implementing actions, observation, and reflection. Each cycle aims to identify and improve the learning process so that students' 4C skills can develop optimally. Data were collected through observation, interviews, field notes, and 4C skills assessment instruments, then analyzed qualitatively and quantitatively to see the development of students' skills after the application of SMAB media.

3. RESULT

This analysis was conducted to answer the formulation of the research problem regarding how 21st century skills in the 4C aspect, especially collaboration, develop before, during, and after the use of SMAB media in science learning. This study uses observation data on student and teacher activities, observations of student collaboration skills, and the results of 21st century skills tests. All data were collected through observation and documentation techniques from pre-cycle to cycle II.

The results of the analysis showed that in cycle I, students' learning activities and collaboration skills were not optimal. Many students were not able to work together effectively in groups. However, after improvements were made to learning in cycle II by maximizing the use of SMAB media, there was a significant increase in students' learning activities and collaboration. This shows that the interventions carried out succeeded in encouraging more active and cooperative student involvement.

The observation sheet shows an increase in teacher performance and student activity. Teacher activity increased from 55.55% (pre-cycle) to 88.89% (cycle II) with very good criteria. Likewise, student activity increased from 66.66% to 90.47%. This increase shows that the use of SMAB media significantly improves the quality of interaction and learning activities in the classroom, especially in building cooperation between students.

In terms of collaboration skills, student completion also experienced a significant increase. In the pre-cycle, only 35% of students achieved the KKM, then increased to 60% in cycle I, and reached 100% in cycle II. This means that all students succeeded in achieving the set collaboration skill targets, showing a positive impact of using SMAB media on students' collaboration skills.

Overall, the use of SMAB (Smart Box) media has proven effective in improving 21st century skills, especially the collaboration aspect, in science learning. This media is able to create an interactive learning atmosphere, encourage discussion, group work, and mutual respect between team members. Thus, SMAB media can be an innovative solution in improving the quality of learning and preparing students to face the challenges of 21st century education.

4. DISCUSSION

Before the use of SMAB media, students' 21st century skills (4C: collaboration, communication, creativity, and critical thinking) were still classified as low to moderate. The results of pre-cycle observations showed less active student participation, with an average score of only 66.66% and only 35% of students achieving learning completion. Conventional learning that is dominated by lectures is considered less effective in developing these skills.

After the implementation of SMAB media in science learning, there was a significant increase. In cycle II, all students (100%) achieved KKM. This media has been proven to be able to encourage active student involvement through collaborative and contextual activities, thereby improving critical thinking, communication, and creativity skills.

During the two cycles of implementation, students' 4C skills developed gradually. In cycle I, 60% of students had completed it, and increased to 100% in cycle II, with student activity scores reaching 90.47% (very

good). This shows that SMAB media not only strengthens mastery of the material, but also fosters 21st century skills that are relevant to the demands of the independent curriculum and today's learning needs.

5. CONCLUSION

Before using SMAB (Smart Box) media, students' collaboration skills were still low with an average score of 57.25 and completion of only 35%. Many students were not yet able to work together, think critically, or express opinions confidently.

After the implementation of SMAB media, there was a significant increase. In cycle I, the average value increased to 71.15 with 60% completion, and in cycle II it reached a value of 82 with 100% completion.

During the implementation, students became more active in discussions, creative in completing tasks, confident in conveying ideas, and working well in groups.

SMAB media creates interactive and enjoyable learning, thus encouraging students' full involvement in the learning process.

Overall, SMAB media is effective in improving 4C skills, especially collaboration, in science learning for grade IV students.

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Collate acknowledgments in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (eg, providing language help, writing assistance or proof reading the article, etc.).

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