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Literature Study: Application of Self Assessment in Improving Character Quality, 21st Century Abilities, and Physics Learning Results

Dhea Febriya[1], Festiyed[1*], Nur Hikmah[1], Fatni Mufit[1]

[1] Physics Education Masters Study Program, Faculty of Mathematics and Natural Science, Universitas Negeri Padang, Padang, Indonesia.

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Corresponding Author:
Festiyed
festiyed@fmipa.unp.ac.id

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Abstract: This study aims to examine the literature related to the application of self-assessment in improving character quality, 21st century abilities, and physics learning outcomes. The method used is library research or literature study by collecting international and national articles over a 10 year range (2013-2022). This research begins by analyzing appropriate assessment in 21st century education and its real application in the education sector. The research results show that the implementation of self-assessment is not yet comprehensive in every school and level of education. High school in grade X is a school that often implements self-assessment in learning physics. However, self-assessment does not only play a role in improving physics learning outcomes, but also improving the quality of student character, Higher Order Thinking Skills (HOTS), scientific attitudes, knowledge and (intellectual) skills, student attitudes, critical thinking skills in scientific literacy, TPACK for prospective physics teachers, students' scientific literacy, students, honest attitude, responsible attitude, and student cooperation.

Keywords: 21st Century Abilities; Character Quality; Physics Learning Outcomes; Self-Assessment.

Introduction

The rapid development and change of the 21st century in science and technology is changing the competence of the intended goals of science towards useful values for society (Demircioglua, 2022) . The goal of 21st century learning is to equip students with conceptual knowledge and scientific literacy skills that are assembled in a good character with adequate 21st century abilities, and high learning outcomes (Dirman & Mufit, 2022) . 21st century assessment

in the learning process is also the most important benchmark to see the development of student quality (Afriana & Festiyed, 2022) .

Assessment of 21st century learning refers to 3 aspects that can be carried out both formatively and summatively, namely assessment as a learning process (assessment as learning), assessment for the learning process (assessment for learning), and assessment at the end of learning (assessment of learning) (Aditomo , 2022) . The assessment is designed as a learning assessment to see student progress, monitor student learning outcomes, and detect the need to improve student learning outcomes on an ongoing basis. (Wicaksono et al., 2022) . In the learning process, formative assessment is the main choice in assessing students, one of the formative assessments is the assessment for learning approach through self-assessment.

Physics as a branch of science that studies natural phenomena and the process by which these symptoms occur, which is studied using mathematical modeling, creates difficulties for students in interpreting the physical phenomena that occur, so studying it must have elements of good ability and self-confidence (Nafis, 2015) . Developing students' abilities in physics lessons is one of the keys to success in increasing their ability to adapt to technology, improving their ability to solve

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physics problems, and their self-confidence (Surjanem, 2015) .

Physics subject which is one of the science clusters that supports the goals of 21st century education refers to critical thinking skills, problem solving skills, innovation skills, and collaboration skills (Oral & Erkilic, 2022) . The changing learning system and competency learning outcomes require the assessment system for students to also change. Learning physics requires appropriate strategies, aligned activities, and appropriate assessments so that learning objectives can be achieved effectively (Pantiwati, 2015) . Therefore, measuring the ability of students to assess learning readiness requires self-assessment as the main provision in improving the quality of student learning outcomes, especially in learning physics.

Self - assessment is a method of assessment that provides opportunities for students to take responsibility for their own learning. Self-assessment aims to assess students' abilities with the previous criteria so as to be able to build students' awareness to make changes and improvements to achieve better results during the learning process in the future (Apipah et al., 2018) . Self-assessment is an assessment part of the 2013 curriculum, which is the most effective assessment technique in shaping student character (Wijayanti, 2017) . The character that is formed from the assessment above will have a positive impact on the formation of the student's personality. If a positive personality has been formed (self-actualization) then intellectual development (knowledge and skills) will also increase.

By carrying out self-assessment in physics learning, teachers position students to take part in learning in accordance with the 21st century student-centered learning system. During the self-assessment , students must be able to analyze the quality of their learning and assignments, assess the extent to which learning objectives have been achieved, identify their own strengths and weaknesses, and make appropriate revisions (Muliaman et al., 2022) . There are still many students who are unsure of their abilities and 21st century abilities that are still low, and the application of self-assessment which is still little used by teachers at school is one of the factors for the low physics learning outcomes, character quality, and 21st century educational abilities of students because teachers do not have comparison data to see student development before and after learning (Çepni & Temizba, 2015) .

Research conducted by (Asriningrum et al., 2013) the application of self-assessment can improve the quality of student character in learning basic physics. Research by (Wahyuningsih et al., 2016) the application of self-assessment can improve the scientific attitude of high school students. Research by (Utami & Guntara, 2021) the application of self-assessment improves the TPACK abilities of prospective physics teacher students. Research conducted by (Muliaman et al., 2022) the application of self-assessment increases the scientific literacy abilities of high school students. While research by (Tamaela, 2022) the application of self-assessment is able to improve students' higher order thinking skills, honest attitude, and responsible attitude in straight motion physics lessons. Based on the literature related to the application of self-assessment, the purpose of this study is to identify and present an analysis of the application of self-assessment (self-assessment) from relevant studies that have been carried out previously in improving the quality of character, 21st century abilities, and physics learning outcomes.

Method

This research is qualitative research with a library research method. According to Danandjaja (2014) in (Sari & Asmendri, 2020) library research is a scientific method of systematic bibliographic research, which includes collecting bibliographical materials, related to research objectives, collection techniques using the bibliographical method, and organizing and presenting data . In this study data collection was carried out using documentation techniques, where the data obtained was collected and analyzed. Sources of data were obtained based on information contained in literature sources such as the results of similar previous studies, journals, international and national articles, and reference books.

The research activity stage in this article according to Zed (2004) in (Adlini et al., 2022) consists of four steps, namely preparing equipment, in this research the equipment prepared is a laptop, internet network, notes and stationery; after that, compiling a working bibliography, in this research recording primary sources and backup sources, grouping articles based on year and research variables; then, managing time, in this research it is important to schedule time in compiling articles from the time of data collection, data grouping, and targeted source analysis within one month of writing; and the last, read and make research notes, in this research the sources obtained must be read in detail and recorded sources that meet the criteria for analysis.

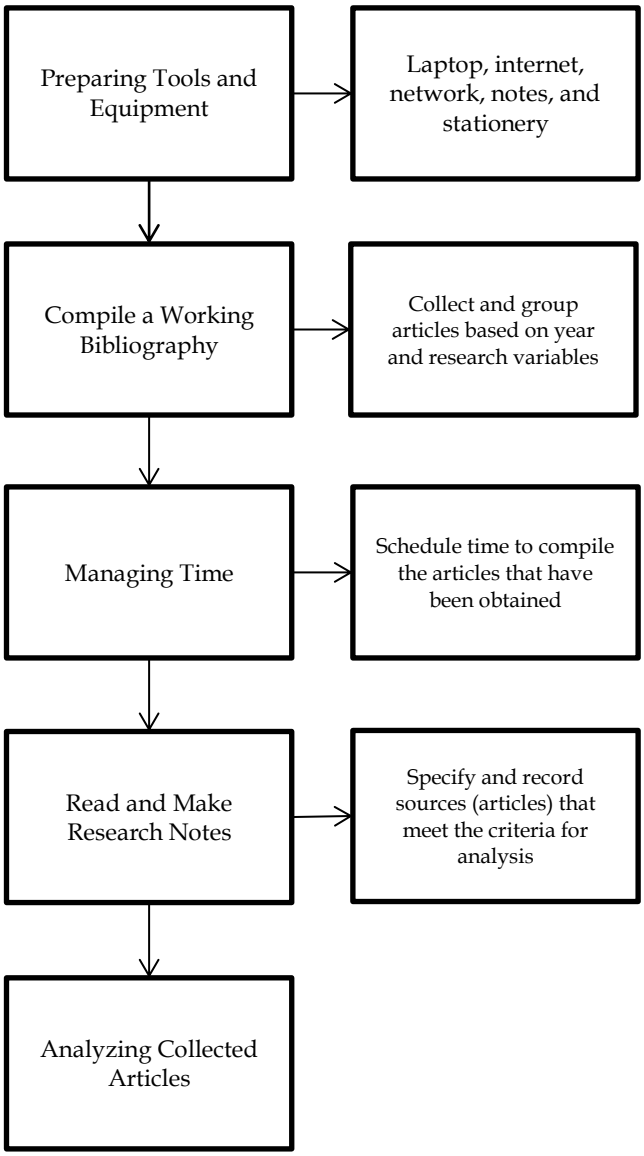

Figure 1. Research Activity Stage

Results and Discussion

Literature on the implementation of self-assessment in learning was obtained from articles published in the last 10 years (2013-2022). The selected article is the application of self-assessment in the sciences (physics, biology and chemistry). Based on article data obtained by researchers, self-assessment can significantly improve learning outcomes. The initial evaluation given by the teacher to students helps them detail deficiencies in themselves that need to be corrected, such as numeracy skills, analytical skills, problem solving abilities, and difficulty collaborating. So that students become better prepared in the learning process and carry out the learning process well. Self-assessment can train children to behave honestly because the assessment is carried out objectively, helps improve 21st century abilities because students are accustomed to improving skills that were not mastered at the initial meeting, and student learning outcomes become better (Hairida, 2018) .

Self-assessment is one way that educators use to reveal students' strengths and weaknesses in analyzing concepts, so that students' competence in analyzing concepts becomes better than before. The results of the literary data state that the application of self-assessment has proven to be able to minimize obstacles in analyzing concepts and compiling conceptual frameworks, because one of the material studies that requires concept analysis skills is junior high school/high school/vocational school physics material (Tamaela & Sopacua, 2020). The implementation of self-assessment has provided space for teachers and students to find out their abilities. Thus , self-assessment helps students prepare the right concepts.

Self-Assessment Objectives

Self-assessment is an authentic assessment that is used to measure students' attitudes which is carried out independently which aims to provide feedback to students so that they can improve attitudes and ways of learning (Budiarti & Istiyono, 2023) . The application of self-assessment is carried out at the end of physics learning and is given a time limit until the next physics meeting. The habit of self-assessment must be carried out because this is still something new for students. By carrying out self-assessments continuously, students indirectly become in the habit of self-introspection and encourage students to improve themselves (Wahyuningsih et al., 2016) .

Self-Assessment Steps

Self-assessment is carried out based on clear and objective criteria with the following steps: first, determine the competency or aspect of ability that will be assessed; second, determine the assessment criteria that will be used; third, formulate an assessment format that can be in the form of scoring guidelines, a checklist, or assessment scale; fourth, asking students to carry out self-assessments; fifth, teachers reviewing samples of assessment results randomly to encourage students to always carry out self-assessments carefully and objectively; last, providing feedback based on the results of reviewing samples of assessment results (Adawiyah & Haolani, 2021) .

Implementation of Self Assessment

Based on the results of a collection of studies, 10 articles were selected as the application of self-assessment in the sciences (physics, biology and chemistry). The results of the researcher's analysis conducted through literature study found that the application of self-assessment was not comprehensive in

every school and level of education. The application of self-assessment based on literature is applied only at two levels of education, namely High School (SMA) and University. High school in grade X is a school that often implements self-assessment in learning physics. The results of the data review are presented with details, authors, years, science subjects, materials and educational level in Table 1.

Table 1. Library Review Data

Writer	Year	Science Subjects	Material	Level of education
(Asriningrum et al., 2013)	2013	Physics	Basic Physics	University
(Ardiana & Sudarmin, 2013)	2013	Chemistry	Redox (Class X)	Senior High School
(Wahyuningsih et al., 2016)	2016	Physics	Physics (Class X)	Senior High School
(Wijayanti, 2017)	2017	Biology	Biology (Class XI)	Senior High School
(Hairida, 2018)	2018	Chemistry	Chemistry (Class X)	Senior High School
(Setyarsih & Lestari, 2020)	2020	Physics	Global Warming (Class XI)	Senior High School
(Utami & Guntara, 2021)	2021	Physics	Physics	University
(Muliaman et al., 2022)	2022	Physics	Physics	Senior High School
(Tamaela, 2022)	2022	Physics	Straight Motion (Class X)	Senior High School
(Budiarti & Istiyono, 2023)	2023	Physics	Physics	Senior High School

Table 2. Data on Student Improvement Results

The results of applying self-assessment to the Science Material Cluster	
Material	Enhancement
Physics	Improving the quality of student character (Asriningrum et al., 2013)
Chemistry	Improvement of higher order thinking skills (Higher Order Thinking Skill/ HOTS) (Ardiana & Sudarmin, 2013)
Physics	Improved scientific attitude (Wahyuningsih et al., 2016)
Biology	Increased knowledge and skills (intellectual) (Wijayanti, 2017)
Chemistry	Improvement of students' attitudes with good criteria (Hairida, 2018)
Physics	Increasing critical thinking skills in scientific literacy (Setyarsih & Lestari, 2020)
Physics	Improved TPACK for prospective physics teachers (Utami & Guntara, 2021)
Physics	Increasing students' scientific literacy (Muliaman et al., 2022)
Physics	Increasing students' higher order thinking skills , honest attitudes, and responsible attitudes (Tamaela, 2022)
Physics	Increasing the attitude of responsibility and cooperation of students (Budiarti & Istiyono, 2023)

Based on the data results in Table 1, it shows that the implementation of self-assessment has a positive effect on improving desired learning outcomes, especially in physics learning. However, this literature is still limited because the application of self-assessment at the educational level has not yet been discovered below who have studied science clusters such as Elementary Schools and Junior High Schools. In addition, research subjects at the high school level (SMA) did not apply self-assessment in class XII and at the university education level it was also carried out in semesters 1 and 2, so the researchers concluded that self-assessment is effectively implemented at the lower grade level at the high school and university education levels.

Physics is the material most often used in the application of self-assessment allowing students to reflect on their own understanding of physics material. By doing self-assessment, students can identify their strengths and weaknesses in understanding certain physics concepts. This allows them to evaluate how far they have achieved their learning objectives and which areas need improvement. By integrating self-assessment into learning physics, students can develop deeper understanding, improve metacognitive skills, and take control over their own learning process. This can have a

positive impact on student achievement and confidence in learning and understanding physics concepts. The results of data analysis based on the increase caused by the application of self-assessment in learning the sciences are presented in Table 2.

Based on the results of the data in Table 2, it shows that the application of self-assessment to the science cluster has a positive post-learning impact with various improvements. Self-assessment in learning physics does not only play a role in improving physics learning outcomes, but also improving the quality of student character, students' Higher Order Thinking Skills (HOTS), scientific attitudes, critical thinking skills in scientific literacy, TPACK for prospective physics teachers, students' scientific literacy, education, honest attitude, responsible attitude, and student cooperation. Self-assessment in chemistry learning improves higher order thinking skills (HOTS) and good attitudes of students. Self-assessment in biology learning increases students' knowledge and (intellectual) skills.

In biology lessons with the Phanerogamae plant diversity course, self-assessment has an important role in the learning process, namely making it easier to understand the material, being able to measure abilities, being fun, being more independent, being more free, develops the mind more, is more varied and not boring, and is more independent (Muzayyinah, 2011).

Self-assessment can also improve students' character by appearing polite and behaving politely in vocational high schools (Chasanah & Triyanto, 2017). Apart from that, self-assessment can also improve the performance of school principals (Sa'idu, 2021)

Conclusion

The application of self-assessment as the first step in starting physics lessons was responded to by students with a positive response. They think that by knowing the initial abilities they have, they can change and improve the way they learn so that they know what to do to achieve learning goals optimally. By developing character qualities, 21st century abilities, and physics learning outcomes through self-assessment, students can become more independent, adaptive, and successful learners in learning and understanding physics concepts and facing challenges in real life. This research should be continued by increasing the variety of research subjects at the school and class levels so that self-assessment presumptions can improve learning outcomes are further strengthened and can be used more by teachers on students, especially in learning physics. In addition, the validity in compiling self-assessments is further enhanced because the accuracy of student self-assessments is still low.

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The author's contributions include D. Febriya and N. Hkmah: collecting data, analyzing data, writing original drafts, and so on; F. Mufit and Festiyed: focus on methodology, and review of writing.

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The authors declare no conflict of interest.

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