A Bibliometric Analysis of Minimum Competency Assessment Research with VOSViewer Related to the Impact in Physics Education on 2019-2020

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Abstract. This study discusses the Asesmen Kompetensi Minimum (AKM) or Minimum Competency Assessment using bibliometrics, the top 5 articles and authors. The method used is the literature review using Harzing's Publish or Perish application on March 9 and 16, 2021, with keywords "Asesmen Kompetensi Minimum" and "Minimum Competency Assessment" from the Google Scholar database and then processed by the VOSViewer application. The data obtained were 593 articles in Indonesian and 507 articles in English. The results of the bibliometric study obtained five clusters in Indonesian and English. Minimum competency assessment in Indonesian relates to eliminating the national exam, while English relates to student readiness. Top authors and articles discuss science learning, learning activities and mathematical literacy analysis skills. The top five articles in Indonesian and English, there is one study on applying minimum competency assessment and literacy skills in minimum competency assessment, which can also increase knowledge of physics in static and dynamic electricity materials. The conclusion obtained is that there is still minimum research on minimum competency assessment. The impact of this research on physics learning can be applied to static and dynamic electricity, and the top articles and authors discuss the discussion of science learning and PISA design in the pandemic era.

1. Introduction

Education in Indonesia has not run optimally. Especially in learning physics because of the low learning outcomes of students at school [1]. Many students are not interested in learning physics so that it has an impact on learning achievement [2]. In this case, only a few students took physics in the national exam.

Evaluation of student achievement results, namely by providing an assessment that students can pass or not. According to Khamim [3], the national exam is an evaluation system used for traditional primary and secondary education in Indonesia. The national exam is defined as a measuring tool for evaluating the learning process. There are evaluation of learning activities and controversy in the community. The
issuance of the National Education System Law No. 20 of 2003, namely education, is a conscious, planned effort to create an atmosphere of learning and the learning process.

To achieve national education standards, a continuous monitoring process is necessary. The results obtained from the evaluation of education standards can be used as a milestone for improving the quality of education. The drawback of the national exam is that it is not effective in improving the quality of education. The implementation of the national exam is not carried out transparently so that the related parties do not understand the assessment process. The value of the national exam is used as a determining factor for graduation [4], which results in students cheating in working on questions [5].

The advantage of the national exam is that it can be used as an educational evaluation by applying educational standards and can be considered as a mapping of the quality of education in academic units. National exams can also develop existing learning [6] to stimulate students to become better at taking educational programs. The National Examination is given only in certain subjects, while Permendikbud will hold the exam is conducted for all subjects. Nadiem Makarim made a breakthrough called the National Assessment. The National Assessment consists of a Minimum Competency Assessment and a character survey.

Several studies on Minimum Competency Assessment have been carried out, such as student readiness [7,8], online learning [9], pedagogy [10], critical thinking [11], design PISA [12], perceptions of prospective teachers [13] and on children with special needs [14]. An article discusses the Minimum Competency Assessment from the Perdana [7] regarding SMA and SMK students' readiness to face the Minimum Competency Assessment questions. However, there are no articles that discuss Minimum Competency Assessment using bibliometric maps. In this study, we will explore the Minimum Competency Assessment (AKM) using a bibliometric map included in the new topic, find the top 5 articles based on the Minimum Competency Assessment (AKM), and find the top authors.

2. Method
The method used is by using a literature review which is a literature review method by summarizing several articles on a particular topic. The search for research articles was carried out using Harzing's Publish or Perish application on March 9 and 16, 2021, using the keyword "Asesmen Kompetensi Minimum" in Indonesian language articles and "Minimum Competency Assessment" in English articles. Then look for the top 5 articles related to keywords and the article year ranges from 2020-2021 as the article on Minimum Competency Assessment is a new topic. Then the data is stored in .ris form, which is then analyzed using the VOSviewer application to get a visualization in a bibliometric map. There are 593 articles in Indonesian and 507 articles in English taken from the Google scholar data used in the study, then the articles obtained are analyzed in the form of a bibliometric map. The research procedures can be seen in Figure 1.

![Figure 1. Research flowchart](image-url)
3. Results and Discussion
The results obtained from Harzing's Publish or Perish application in Indonesian and English language articles are the year of publication, year of citation, paper, citation, citations per year, citations per paper, author per paper, and h-index in Table 1.

Table 1. Results of Harzing's Publish or Perish application on Indonesian and English language articles.

| Result          | Indonesian language | English language |
|-----------------|----------------------|------------------|
| Publication year| 2020-2021            | 2020-2021        |
| Paper           | 593                  | 507              |
| Citations       | 217                  | 789              |
| Citations per paper | 0.37              | 1.56             |
| Author per paper| 1.80                 | 2.25             |
| h-index         | 6                    | 9                |
| g-index         | 11                   | 25               |
| hI-norm         | 5                    | 4                |
| hI-yearly       | 1.67                 | 4                |

The data of the articles in Table 1 was restricted in year 2020-2021. The number of papers on the Minimum Competency Assessment in Indonesian is more than in English, insignificant. However, in terms of citations, citations per paper, and authors per paper, articles in Indonesian are less than in English. The h-index (the article referred to) in Indonesian is also less than in English.

After the h-index will appear the g-index (suggested authors based on the publication). The articles in Indonesian are less than in English. The hI-norm (index h- on individual/author) in Indonesian language articles is more numerous than English. However, in hI-annually (the number of single authors who write the same articles per year) in Indonesian is less than in English.

After analysing Indonesian and English articles using VOS viewer by mapping the title and abstract to determine the minimum number, there are several colours, and each colour has a relationship between one topic and another. There are two visualisations when analysing using VOS viewer: network visualisation and density visualisation with different functions. In-network visualisation explains the attachment of the topic to the title and abstract. In contrast to network visualisation, density visualisation describes frequently used topics marked in bright yellow and the larger the text of the bibliometric map visualisation.

Bibliometric maps in Indonesian language articles are obtained 15 words in 5 clusters, namely red, yellow, green, blue and purple that showed in Figure 2. Figure 2 shows the studied clusters. The first is the red cluster consisting of the national exam keywords, minimum competency and character survey, replaced and future. In the yellow cluster, there are assessment keywords and Indonesia. In the green cluster, there are the words AKM, teacher, improvement, and outcome. In the blue cluster, there are keywords PISA, aspect and literacy. In the purple cluster, there are students' keywords and skills. This shows that there are several keywords in each cluster.
Figure 2. Visualization network of Indonesian language article

Figure 3. Visualisation density of article in Indonesian

Figure 3 shows the frequently used keywords, which are written in more giant letters and lighter colours. This article has the keywords teacher, improvement, Indonesia, AKM, PISA, national exams, and minimum competencies and surveys. These data can search for novelty AKM and outcomes. For example, the AKM already running in Indonesia aims to develop students’ potential by involving literacy and numeracy.

The implementation of AKM activities is carried out for students at the primary and secondary school levels, as has been done by Widianti & Hidayati [16]. Students can memorise theory and be able to participate with the community, such as research done by Sidiq & Muqowin [15]. This AKM learning is also carried out for children with special needs through independent learning, as has been done by Asfiati & Mahdi [14]. The results of AKM can hone thinking skills to improve students’ skills, as in the research of Lestari, Ambarsari, Prahani, Jauhariyah, Yantidewi and Deta [17].
Figure 4. Visualization of keywords relating to AKM in Indonesian articles

In Figure 4, it can be seen that the AKM keywords relate to PISA, national exams, minimum competencies, and surveys, replaced, improvement, and teachers. From the keyword results, it can be seen that AKM is related to the minimum competency and the survey. In this case, the minimum competence consists of two competencies: literacy (reading) and numeracy (mathematics). According to the Nudiati & Sudiapermana research [18], there is six basic literacy knowledge: reading and writing, numeracy, science, digital, finance, culture, and citizenship. Then this basic literacy is shortened to only two aspects, according to the research of Ayuningtyas & Sukriyah [19].

AKM is implemented in 2021 in Indonesia to improve the quality of education at the education level unit, as in Muntholi’ah research [20]. This was done because he saw no improvement in the quality of education in Indonesia when determining the national exam as a graduation competency, and there were pros and cons. The new system, which the Minister of National Education created, will also impact universities, especially in the teacher training department, to organize the teaching and learning process. The learning process is used only to use theory, causing misconceptions in students. Therefore, there are various ways to reduce misconceptions in students, such as one in Hidayatulloh, Humairoh, Wachidah, Iswati and Suliyanah research [21], but there is AKM because the questions given are related to everyday life.

Bibliometric maps of English articles obtained 19 words in 5 clusters, namely red, yellow, green, blue and purple that showed in Figure 5.

Figure 5. Visualization network of english article
Figure 5 shows the studied clusters, and it can be seen that the English articles found more keywords. The first is the red cluster which consists of the keywords competency, competency test, attitude, and readiness. In the yellow cluster, there are keywords, minimum completeness criterium and motivation. The words Indonesia, issue, minimum number, quality, and outcome are in the green cluster. In the blue cluster, there are the keywords student, mathematics, PISA and international student assessment. In the purple cluster, the keyword is assessment and teacher. This shows that there are several keywords in each cluster.

![Figure 5](image)

**Figure 6. Visualization density of english articles**

Figure 6 shows the frequently used keywords, for example, the competence used by students in learning. Competence in students is divided into two, namely literacy (reading) and numeracy (mathematics) competencies, as in the research of Mauizdati [22]. This competency is carried out to replace the national exam as an existing education system, like Alawiyah research [23]. Students now prefer to memorize formulas so that literacy (reading) is needed to add insight to students, such as research by Rafiqoh [24]. The results of the application of this competency will foster students’ enjoyment of literacy (reading), such as research by Fadila, Suliyanah and Deta [25]. This competence is contained in a new system called independent learning, as in the research of Prahani, Deta, Yasir, Astutik, Pandiangan, Mahtari and Mubarok [26].
Figure 7. Visualization of keywords relating to assessment of English articles

In Figure 7, it can be seen that the assessment keywords relate to issue, minimum number, quality, Indonesia, motivation outcome, competency, PISA, student, mathematics, minimum completeness criterium, student competency, teacher, aspect, attitude, readiness. In this case, the keyword assessment is related to competency. This competency assessment improves the quality of education by using online learning, as in Chainchumpa and Temdee [9].

In Indonesia, a competency assessment has been prepared, which is named AKM. Currently, Indonesia is implementing independent learning, as in Yamin & Syahrir research [27]. The government makes competency assessments to support learning with independent learning, such as research by Setiawan, Sa’dijah, and Akbar [28]. Competency assessment is carried out to assess the course of learning as in the research of Coates, Karen, Wilson, and Sadberry [29]. The competency assessment was also carried out to assess students' interest in reading, not only memorizing as in the Perdana Research [7].

Table 2. Harzing's publish or perish in Indonesian language articles

| Rank | Author                        | Title                                                                                           | Year |
|------|-------------------------------|-------------------------------------------------------------------------------------------------|------|
| 1.   | Sari, Daulay, Yuliani and Epriani [30] | Penghapusan ujian nasional tahun 2021 dalam perspektif guru SMA di kota Tebing Tinggi.         | 2021 |
| 2.   | Novita, Mellyzar and Herizal [13] | Asesmen nasional (an): pengetahuan dan persepsi calon guru.                                    | 2021 |
| 3.   | Aisah, Zaqiah and Supiana [31] | Implementasi kebijakan asesmen kemampuan minimum (AKM): analisis implementasi kebijakan AKM. | 2021 |
| 4.   | Mustofa [32]                  | Kompetensi numerasi siswa SMK ditinjau dari gender dan berbagai kesulitananya.                 | 2020 |
| 5.   | Hidayah [33]                  | Asesmen ujian nasional dari masa ke masa dan solusinya.                                       | 2021 |

Table 2 describes the top 5 articles in Indonesian related to the Minimum Competency Assessment in Harzing's Publish or Perish application. The article was written by Sari, Daulay, Yuliani, and Epriani.
The first research from Sari, Daulay, Yuliani and Epriani [30]. This research wants the opinion of high school teachers in Tebing Tinggi to find pros and cons in eliminating the national exam into a mini-mum competency assessment and character survey. Teachers who refuse to change the national exam are deemed not ready to face the minimum competency assessment and character survey, and there is a lack of socialization from the government regarding this matter. However, teachers who accept this change feel that the change can improve the quality of education in Indonesia. With the new government policy, all teachers should be ready to accept the replacement of this system.

The second research from Novita, Mellyzar, and Herizal [13]. This study asks prospective teachers from the mathematics education, physics education and chemistry education courses at the University of Malikussaleh. It turns out that only 49% of prospective teachers understand the national assessment correctly. Many people do not understand the implementation of the national assessment, including the form of questions, the parties involved, the reasons for the national assessment's formation, and the national assessment's output. Therefore, the government should provide socialization to the public before implementing new policies.

The third research from Aisah, Zaqiah, and Supiana [31]. This study discusses the implementation of the minimum competency assessment in the community. Researchers disseminate information to the community, including the objectives, benefits, people involved, and the minimum competency assessment program mechanism. After conducting the research, all people's new policies implemented by the Ministry of Education and Culture were accepted. This study shows that the community has started to recognize the minimum competency assessment, but this study does not discuss the content or components of the minimum competency assessment.

The fourth research from Mustofa [32] discusses the difficulties of numeracy competence in the Minimum Competency Assessment by differentiating gender in vocational students. It turns out that there is no difference in numeracy abilities between men and women. However, students still have difficulty working on numeracy problems. Therefore, schools need to provide learning that can train students in working on numeracy questions to become skilled and accustomed to working on numeracy questions.

The fifth research from Hidayah [33], according to PISA, this study discusses changes to the national exam from 2005-2020, later changed to the Minimum Competency Assessment. Changes to the national exam were made to improve the quality of education. The national exam is considered burdensome for students because the material submitted is too much so that students are more dominant in memorizing. Therefore, the national exam will be replaced with a Minimum Competency Assessment which involves literacy and numeracy skills.

Table 3 describes the top 5 articles in English related to the Minimum Competency Assessment. The article was written by Perdana [7]; Aunurrahman [8]; Ismail, Mudjiran, Nevityarni, and Nirwana [34]; Nusantara, Zulkardi, and Putri [12] and Wigati, Wardono, and Purwanto [35].

The first research from Perdana [7] that discusses high school and vocational high school student's readiness to face the Minimum Competency Assessment questions. It turns out that the questions given by the teacher are different from the questions in the Minimum Competency Assessment, so that students are still not ready to face the Minimum Competency Assessment. Before the government carries out a Minimum Competency Assessment, examples of questions should be given about it. Therefore, students can prepare it.

The second research from Aunurrahman [8] discusses the readiness related to implementing the minimum competency assessment and character survey in 2021 for elementary school teachers. However, some teachers think that curriculum changes are too fast so that they cannot take advantage of existing technology as a communication and information system and the principal is not maximally involved in engaging teachers in exploring new policies so that many teachers do not understand the minimum competency assessment and character survey. Socialization should be carried out to parties who play a role in the Minimum Competency Assessment to prepare adequately.
Table 3. Harzing's Publish or Perish in English Articles

| Rank | Author | Title                                                                 | Year |
|------|--------|----------------------------------------------------------------------|------|
| 1.   | Perdana [7] | Analysis of student readiness in facing minimum competency assessment.          | 2021 |
| 2.   | Aunurrahman [8] | Taxonomy of educational problems in support of readiness for the implementation of minimum competency assessment and character survey in elementary schools | 2020 |
| 3.   | Ismail, Mudjiran, Neviyarni, and Nirwana [34] | Creative approach guidance and counseling facing independence learning policy minimum competency assessment and survey characters in the industrial revolution 4.0 | 2020 |
| 4.   | Nusantara, Zulkardi and Putri [12] | Designing PISA-like mathematics problem in covid-19 pandemic (PISAComat) | 2020 |
| 5.   | Wigati, Wardono and Purwanto [35] | Analysis of Mathematical Literacy Skills through PMRI Approaches of Elementary School Students | 2020 |

The third research from Ismail, Mudjiran, Neviyarni and Nirwana [34]. This research analyzes the era of 4.0 counselling guidance needs to be done to determine students' intelligence, interests, personality, creativity, attitudes, and achievements using the minimum competency assessment approach and character surveys. The application of the Minimum Competency Assessment impacts the field of counselling, and the results of this application can increase HOTS thinking in students.

The fourth research from Nusantara, Zulkardi and Putri [12]. This study discusses mathematical problems similar to PISA questions using literacy and numeracy knowledge methods in pandemic conditions called PISAComat. Students are grouped into small groups, then given PISA questions changed using language that is easy to understand. From the results received, students can understand and solve PISAComat questions. In addition, this method can involve the ability of reasoning and students. With the PISAComat method, students can freely express their opinions and not stick to existing formulas.

The fifth research from Wigati, Wardono, and Purwanto [35]. This study discusses the analysis of mathematical literacy in elementary students using the PMRI approach. This PMRI approach applies mathematics learning that is linked to student experiences. Mathematical literacy skills in elementary students are still lacking. This can be seen from solving math problems associated with everyday life. After being given the PMRI approach, students understand how to process math problems. So this PMRI approach can be one of the methods that can be used in discussing the Minimum Competency Assessment.
Figure 8. Visualization of top author in Indonesian language articles using minimum competency assessment keywords

Figure 8 explains that the authors are not tied to each other, namely Rahmawati, Agung and Hidayati. In the research written by Rahmawati & Rahmawati [36] discusses that science learning at elementary schools in the pandemic era is oriented towards science and technology literacy skills and builds students' character by making the learning atmosphere comfortable. Susanti, Agung & Wulandari research [37] discusses the activeness of learning mathematics using the Inside-Out Circle model. It turns out that this research can be used as an improvement in students' learning skills and creativity because the Inside-Out Circle model can generate mathematical learning suitable for use in the ongoing Minimum Competency Assessment. Widianti and Hidayanti research [16] discusses analyzing mathematical literacy skills in junior high school students. This research has been described in Figure 3 (visualization of density articles in Indonesian).

Figure 9. Visualization of top author in English language articles using minimum competency assessment keywords

Figure 9 above explains the top author who wrote three articles about the Minimum Competency Assessment in English. Three authors are linked to each other, namely Nusantara, Zulkardi, and Putri. Nusantara writes that research, Zulkardi, and Putri [12], are included in the top 5 articles, which have been described in Table 3.
Minimum Competency Assessment Research that impacts physics education, namely literacy skills, can be applied to physics material associated with everyday life. Students only read at the exam time, but this literacy needs to be done before doing a practicum in the laboratory. However, as a teacher, the teacher must design activities in the laboratory that are fun for students, such as Admoko & Supriyono research [38]. In addition, literacy skills can also increase knowledge of physics on static and dynamic electricity material [39]. Numerical abilities can also be applied to physics education as the calculation of formulas in physics problems.

Research on the Minimum Competency Assessment has limitations in conducting research. The limitations of this research on Minimum Competency Assessment are only found in 2020-2021 because it is still a new topic, 2021 is not over yet, so many new studies have not been included in this research. With increasing days, there must be many people researching the Minimum Competency Assessment. Therefore, it is necessary to do further research on Minimum Competency Assessment.

4. Conclusion
The Minimum Competency Assessment is divided into literacy (reading) and numeracy (mathematics) competencies. Literacy skills in the minimum competency assessment can be applied to physics material associated with everyday life and can also increase knowledge of physics on static and dynamic electricity material. Numerical abilities can also be applied to physics education as the calculation of formulas in physics problems. The Minimum Competency Assessment (AKM) is used to develop student's abilities to reason and think logically using the concepts under control related to their surroundings. The red colour cluster has the exact keywords as the top article. The Minimum Competency Assessment (AKM) relates to PISA, national examinations, minimum competencies and surveys, upgrades and teachers.

The top article of the Indonesian Language Minimum Competency Assessment (AKM) deals with eliminating national exams, perception and implementation, while the top article in English deals with student readiness, implementation, PISA, and abilities. The top author in Indonesian language articles discusses science learning associated with independent learning, active learning mathematics uses the Inside-Outside Circle model and analyzes the literacy skills of junior high school students. In contrast, the top author in the English article discusses PISA design in the pandemic era. Many people do not understand the need to carry out a Minimum Competency Assessment and the aspects contained in the Minimum Competency Assessment, and it is necessary to follow up on the Minimum Competency Assessment. There is still little research on minimum competency assessment, so there is a need for further development related to this research.

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