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Academic Achievement Research in High School: A Bibliometric Analysis

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ABSTRACT

This research aims to determine the important role of academic achievement at the senior high school level. The method used in this study is the bibliometric method assisted by the Scopus database with a quantitative approach. Data were analyzed using VOSviewer software to create co-authorship, keyword and citation maps. The results of the study show that the number of articles published on the topic of academic achievement research has increased from the period 2003 to 2021 with an average publication (1.94 or 2 articles per year). The record was in 2011, which was the highest record among those years. Procedia Social and Behavioral Sciences is the most relevant source and produces many publications related to academic achievement. The country with the largest contribution in the publication of the Academic Achievement study is the United States with 21 published documents. Followed by the Iranian state with 6 documents, Australia with 3 documents, Canada-China-Spain and United Kingdom each with 2 published documents, as well as Brazil-Chile and Ireland with 1 published document. Findings, there are 120 writers who contribute to writing Academic Achievement articles as writers or colleagues of the author in 37 publications. It is known that Kuo Y.L. and Shah, M. is a productive writer with 2 documents each. Although there are no significant differences in the publication document per author, the two researchers are slightly higher than other writers who only publish one document. Future topic trends according to Vosviewer's visualization show that the most appearing topics are related to students, schools, colleges and education.

Introduction

Academic achievement has an important role and is the cause of many benchmarks for measuring student learning success while studying. Academic achievement has educational, social, cultural and psychological dimensions. The potential for weak students is a source of distraction and discomfort in the implementation of the educational process. There are many causes and reasons for the gap in student academic achievement, one of which can be seen from student scores that are below the normal average in a subject. Academic achievement

is very important for education, teachers, students and researchers (Al-Zoubi & Younes, 2015).

The components involved in education in general include input, output and process. Input is in the form of students who have goals in pursuing education by following the process organized by the school. The process taken by students is carried out in the process of learning activities. This learning process involves interaction between students and teachers. students have learning goals in the form of adding and changing knowledge, skills and attitudes towards the material presented. The expected learning outcomes are in accordance with the standards set by the teacher and school, learning outcomes in accordance with expectations can be said to be an academic achievement (Rusmana, 2021). Academic achievement according to explains that the academic achievement that students must achieve as a sign of successful learning is an academic challenge that must be faced by mastering material that is cognitively, socially and emotionally demanding as well as time management (Geary, 2011). Student academic achievement depends on general cognitive abilities, such as working memory, speed processing, and relational reasoning which have been shown to play a key role in achieving educational outcomes (Firdaus et al., 2021).

Academic achievement is the learning process experienced by students and results in changes in knowledge, understanding, application, analysis, synthesis and evaluation. Based on the opinion expressed by Bloom, academic achievement is a process carried out to obtain and achieve the desired goals or in this case, namely academic values, which are followed by students during the learning period at school (Retnowati et al., 2016). Benyamin S. Bloom revealed that academic achievement indicators can be classified into three domains, namely the cognitive, affective, and psychomotor domains (Winkel, 2012).This indicator of learning success or academic achievement for its measurement is known as a rating scale expressed in the form of numbers and letters or from the value of the report card obtained based on the assessment of the classification of the three main aspects, namely knowledge (cognitive), attitude (affective), skills (psychomotor).

This study aims to explore a bibliometric review of research on student academic achievement, especially on the subject of senior high school. In addition, the data to be analyzed is relevant to phenomena that occur in high schools, namely related to academic achievement. Thus, this bibliometric analysis aims to reveal the scientific communication of researchers, active publications and interactions that occur in the context of authors and publications regarding academic achievement in senior high schools.

Academic Achievement

Academic achievement is defined as knowledge acquired or skills developed in school subjects, usually determined by test scores or marks given by teachers, or by both (Phye, 1997). The grand theory of academic achievement in this study is based on Robert M. Gagne's cognitive psychology learning theory, namely Information Processing Theory. In processing this information there is an interaction between internal environmental conditions and individual external conditions. According to Robert M. Gagne, the results of learning can be in the form of intellectual skills that allow a person to interact with the environment through the use of symbols or ideas, and cognitive strategies (Siregar et al., 2010).

Gagne stated that learning is a complex activity and academic learning outcomes are in the form of student capabilities (Dimyati & Mudjiono, 1999). The emergence of this ability is the first form of verbal information, is the capability to express knowledge in the form of language, both spoken and written. Ability to respond specifically to stimuli. The second form intellectual skills, are skills that function to relate to the environment and present

concepts and symbols. These intellectual skills consist of the ability to categorize, analytical-synthetic abilities of facts-concepts, and developing scientific principles. Intellectual skills are the ability to carry out specific cognitive activities. Next is related to cognitive strategy, is the ability to channel and direct one's own cognitive activity. This ability includes the use of concepts and rules in solving problems. The fourth that is motor skills, the ability to carry out a series of physical movements in business and coordination, so that the automatism of physical movements is realized. The latter relates to attitude, is the ability to accept or reject an object based on an assessment of the object. Attitude is the ability to internalize and externalize values. Attitude is the ability to make values the standard of behavior.

Thus, when viewed from Robert M. Gagne's learning theory that there is a process towards academic achievement that will be achieved by students. While the main indicators of learning achievement according to convey that learning achievement is divided into two components as follows (Djamarah & Zain, 2006):

1. Achievement of absorption of learning materials taught, both individually and in groups. Measurement of the achievement of absorption is usually done by determining the Minimum Learning Completeness Criteria.
2. The behavior outlined in the learning objectives has been achieved by students, both individually and in groups.

Benyamin S. Bloom revealed that academic achievement indicators can be classified into three domains, namely the cognitive, affective, and psychomotor domains (Winkel, 2012). The classification is as follows.

1. Cognitive Realm
   The cognitive domain is an aspect of ability related to aspects of knowledge, reasoning, or thought. Bloom divides this cognitive domain into six levels, namely knowledge, understanding, application, analysis, synthesis, and evaluation.
1. Affective Realm
   The affective domain is an ability that prioritizes feelings, emotions, and reactions that are different from reasoning. The affective domain consists of five domains related to emotional responses to tasks, including receiving, responding, valuing, organization, and characterization by value.
2. The Psychomotor Realm
   The psychomotor domain is a domain related to aspects of skills. This realm is related to aspects of physical skills, such as perception, readiness (set), guided movement (guided response), accustomed movement (mechanical response), complex movement (complex response), adjustment of movement patterns (adjustment)., and creativity (creativity).

Based on the presentation of the components and indicators of learning success or academic achievement above, the measurement is known as the rating scale expressed in numerical form, usually carried out by determining the Minimum Learning Completeness Criteria by schools which are obtained based on a classification assessment of three main aspects, namely knowledge (cognitive), attitude (affective), skills (psychomotor).

Method

In this study used the bibliometric method which is a quantitative approach. It aims to measure scientific communication in a discipline with these methods (Pritchard, 1969) It is a method used to reveal the structure of scientific thinking from studies (Ding, 2011). The Scopus database was used for this study, because this database provides consistent and

scientifically valid information (Shibata et al., 2009). The concentration of studies carried out through the bibliometric method is carried out to explore scientific knowledge about academic achievement in senior high schools. Data scanning strategies used in bibliometric studies were examined to form keywords to be used (Gumusluoglu & Ilsev, 2009; Hallinger & Kovačević, 2019). This study explores the development of the subject of academic achievement in high schools based on Scopus indexed journals. Publication data is taken from the Scopus database with certain query keyword content. The search steps are as follows. According to the findings, data sets were reviewed and non-conforming articles were excluded for further analysis. The final data search results found as many as 37 academic publications.

In order to understand the pattern of research flow in academic achievement, the research design that has been prepared must be clearly structured based on the objectives and scope of the research. Bibliometric studies make it possible for researchers to collect all types of publication data related to research objects, and to analyze them, appropriate methodologies are used through the following research questions:

RQ1: How many articles on academic achievement were published in 2003-2021?

RQ2: In which journal are articles about academic achievement most often published?

RQ3: Which country has published the most articles on academic achievement?

RQ4: Who is the most prolific author/co-author?

RQ5: Which affiliates are the most productive?

RQ6: How will the topic of academic achievement be trending in the future?

Data were analyzed using VOSviewer software to create co-authorship, keywords and citation maps. Descriptive statistics and social network analysis were used for data analysis (Zupic & Čater, 2015). First, a co-occurrence analysis was performed to determine the relatedness of the keywords based on the number of studies they published together. That means that the words are closely related. Keywords consist of at least three words provided by the publication author. Second, an overlay visualization is performed to find out the average year of publication. Keywords that appear in the most recent publications are colored yellow. Third, co-citation analysis was conducted to test the linkages of the studies cited together.

Results and Discussion

Publication Profile

The results showed that 37 scientific article publications were found from the Scopus database for the research period (2003-2021). The main sources were 31 article documents, 4 conference paper documents, 1 book chapter document, and 1 document review, so a total of 37 sources were found. These publications are downloaded and then inputted into MSc spreadsheet software. Excel for further analysis. Description of information about the publication is presented in Table 1.

Table 1. Description of Published Data Obtained by Document Type (2003-2021)

Document Types	Records	% of 37
Article	31	83,78
Conference Paper	4	10,82
Book Chapter	1	2,70
Review	1	2,70

Analysis based on the subject area in Scopus, shows that the literature related to Academic achievement is divided into 11 fields of study, which can be seen in full in Figure 1.

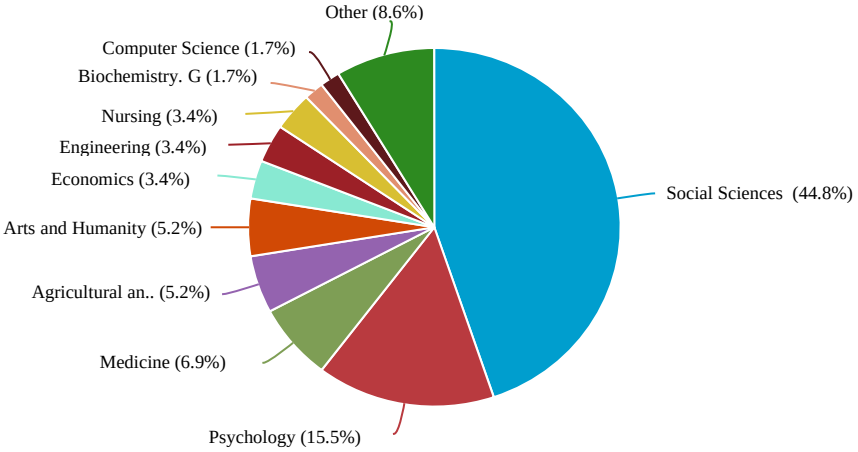

Figure 1. Document by subject area

Publication Outputs by Years

RQ 1: How many articles about Academic achievement were published in 2003-2021?

Table 2. Shows the year of publication during the literature review period. The average journal articles published as a whole for the 2003-2021 period were 1.94 documents. The increase in the number of publications from 2003 to 2021 shows a significant increase. On the other hand, 2011 was the highest number of publications with 6 documents. A similar trend indicates that for the 2021 period (for the first semester) there will be the same or a greater number of publications than the previous term.

Table 2. Publication Output by Year (2003-2021)

Publication by Years	Records	% of 37
2021	2	5,40
2019	3	8,10
2018	2	5,40
2017	4	10,81
2016	2	5,40
2015	4	10,81
2013	2	5,40
2012	3	8,10
2011	6	16,21
2010	1	2,70
2009	3	8,10
2006	2	5,40
2005	1	2,70
2004	1	2,70
2003	1	2,70

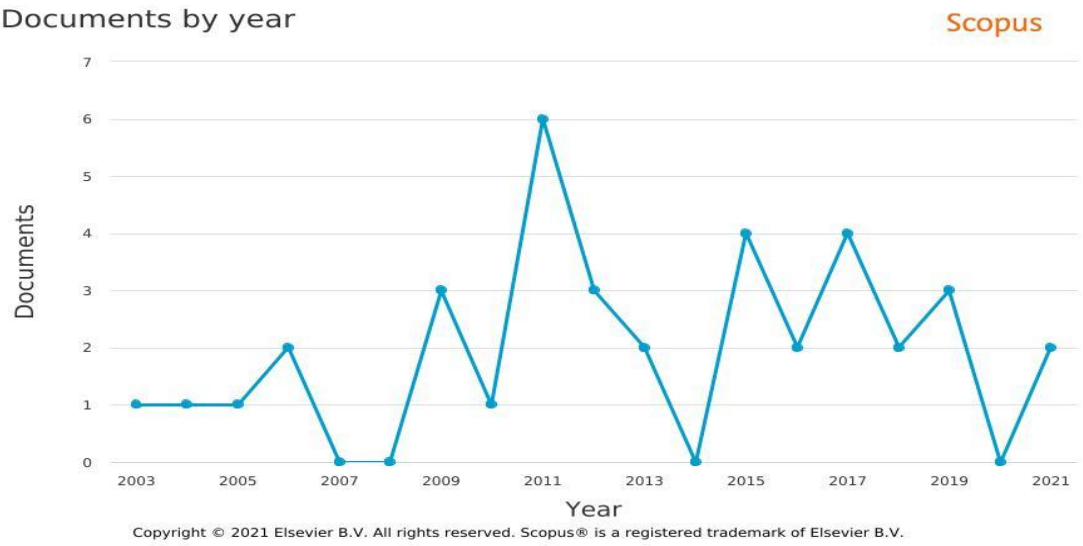

Figure 2. Publication Output by Year (2003-2021)

Journal Frequency Analysis

RQ2: In which journal are articles about academic achievement most often published?

Table 3 shows the frequency of journal publications on academic achievement research based on the top five journals.

Table 3. Publication Frequency Based on Journals (2003-2021)

Source Titles (Scopus)	Records	% of 37
Procedia Social and Behavioral Sciences	3	8,10
Acta Medica Mediterranea	1	2,70
British Journal of Sociology of Education	1	2,70
Collegium Antropologicum	1	2,70
Economics Of Education Review	1	2,70

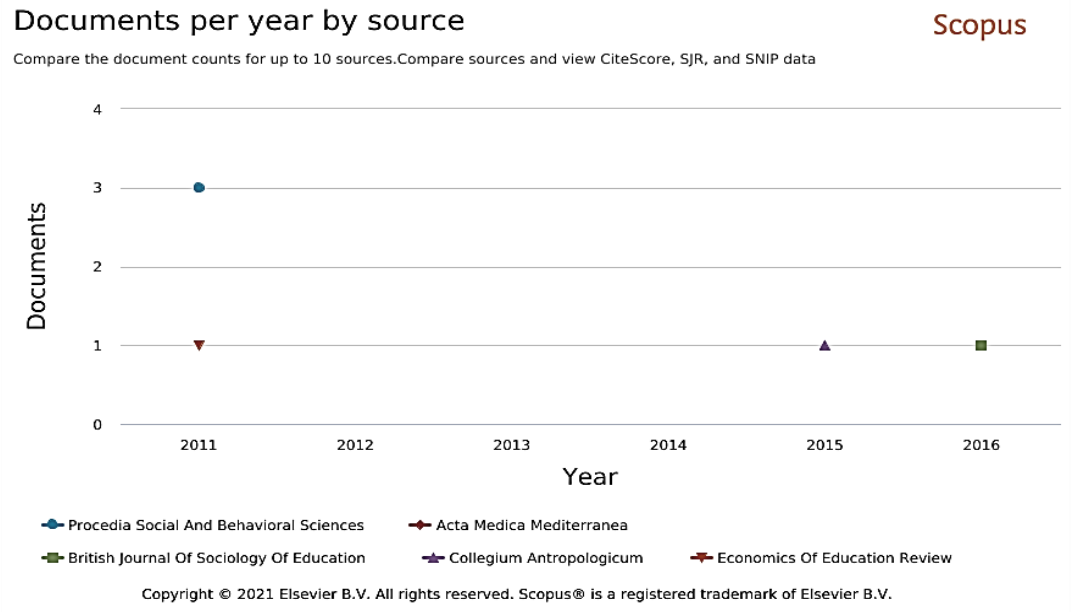

Figure 3. Frequency of publication based on journals (2003-2021)

Based on Table 3. and Figure 3. It is known that the contribution of the first top journal, namely *Procedia Social and Behavioral Sciences*.

The Most Productive Country

RQ3: Which country has published the most articles on academic achievement?

In this section, the author presents the trend of citations related to publications based on countries that publish the most academic achievements. Table 4 and Figure 4 below illustrate the progress of publication productivity, so that we can see progress and decline in publications on this issue in several countries. Table 4 below shows the ten countries with the most publications.

Table 4. Publication Output by Country (2003-2021)

Country	Records	% of 37
United States	21	56,75
Iran	6	16,21
Australia	3	8,10
Canada	2	5,40
China	2	5,40
Spain	2	5,40
United Kingdom	2	5,40
Brazil	1	2,70
Chile	1	2,70
Ireland	1	2,70

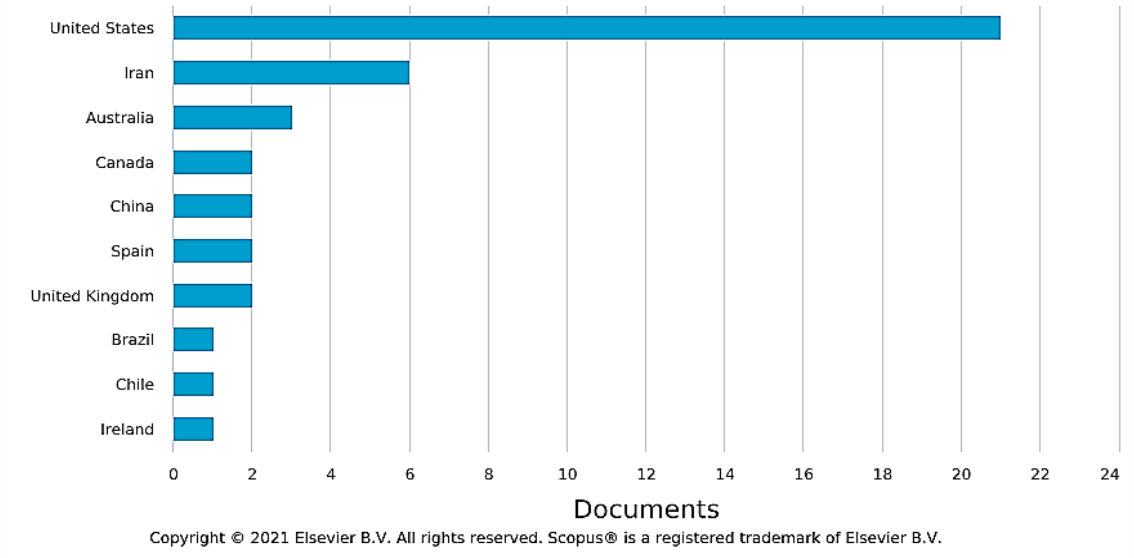

Figure 4. Publications Output by State (2003-2021)

Table 4. and Figure 4. above, showing publication output based on the state in reviewing the Academic Achievement. The country with the largest contribution in the publication of the Academic Achievement study is the United States with 21 published documents. Followed by the Iranian state with 6 documents, Australia with 3 documents, Canada-China-Spain and United Kingdom each with 2 published documents, as well as Brazil-Chile and Ireland with 1 published document.

The Most Productive Author/Co-Authors

RQ4: Who is the most productive joint writer/writer?

Findings, there are 120 writers who contribute to writing Academic Achievement articles as writers or colleagues of the author in 37 publications. The majority of writers or colleagues of the authors are calculated in publications only in one document. Table 5. and Figure 5., the following shows the ten joint writers/authors who most publications.

Table 5. Publication Frequency Based on Author (2003-2021)

Author Name	Records	% of 37
Kuo, Y.L.	2	5,40
Shah, M.	2	5,40
Abasifard, Z.	1	2,70
Abderahim	1	2,70
H.A.	1	2,70
Acosta, F.P.,"	1	2,70
Allen, J.	1	2,70
Amrai, K.,"	1	2,70
Balsa, A.I.	1	2,70
Barnhart, D.L.	1	2,70
Berland, M.	1	2,70

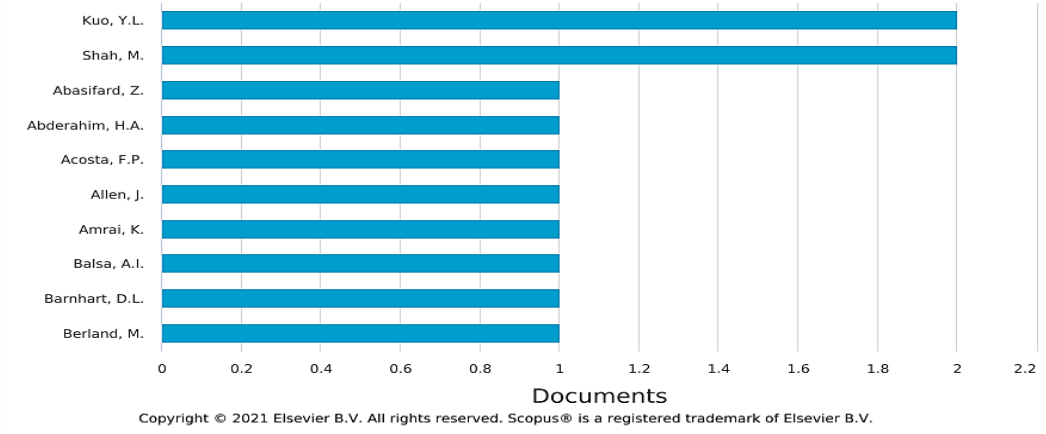

Figure 5. Publication Frequency Based on Author (2003-2021)

Based on the information above, it is known that Kuo Y.L. and Shah, M. is a productive writer with 2 documents each. Although there are no significant differences in the publication document per author, the two researchers are slightly higher than other writers who only publish one document.

The Most Productive Institutions

RQ5: Which institution is the most productive?

Findings, Table 6. and Figure 6. Below, shows that the ten most productive and active affiliates or institutions are presented in the subject of Academic Achievement Most Islamic Azad University and followed by nine other institutions. Islamic Azad University is the institution that most publications related to Academic Achievement.

Table 5. Publication Frequency Based on Institution (2003-2021)

Affiltiation	*Records*	*% of* 37
Islamic Azad University	3	8,10
Johns Hopkins University	2	5,40
University of Toronto	2	5,40
CQUniversity Australia	2	5,40
Michigan State University	2	5,40
Sir Sandford Fleming College"	1	2,70
Center for Reducing Health Disparities	1	2,70
Research Institute	1	2,70
The Trinity Group	1	2,70
Huntsville City Schools	1	2,70
Middle Tennesse State University	1	2,70

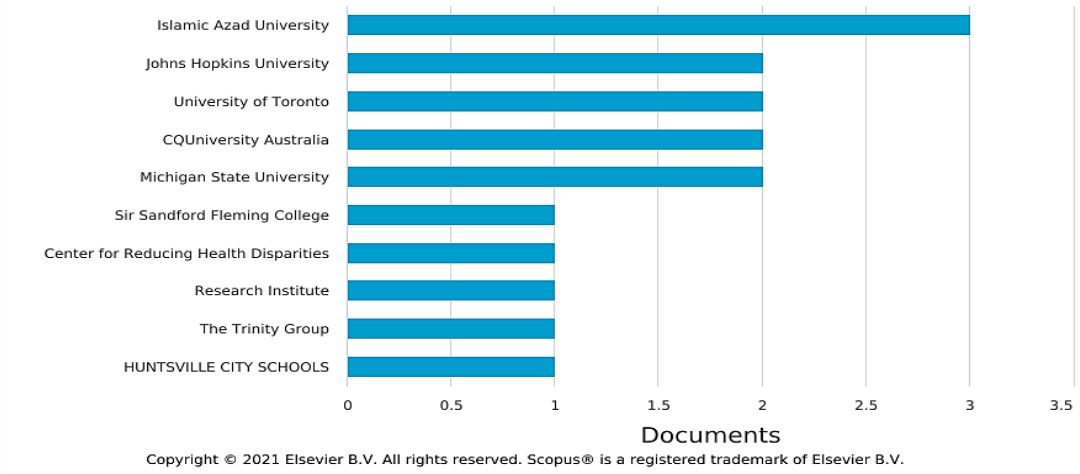

Figure 6. Publication Frequency Based on Institution (2003-2021)

Citation Analysisys

RQ6: What is the trend of Academic Achievement topics in the future?

Search Keyword focus academic achievement in high school obtained the results of 37 documents which later became bibliometric data. Data Processing with VOS Viewer with Stages: Take Bibliometric Data with Extension. Selecting a Map Based on Bibliographic Data, selecting Read Data from Reference Manager Files, Select Data RIS File, Choose Type of Analysis and Counting Method with Maximum Number of Author per document 25 document, choose threshold with a minimum number of documents of an author 2, Choose Number of Author as much as 50.

Figure 7. Visualization based on the keyword author

Based on Figure 7. above, Primavera, I.H., is the writer who collaborates the most with other writers such as Simon, W.E. This can be seen from the linkages between authors from colors in their visualization.

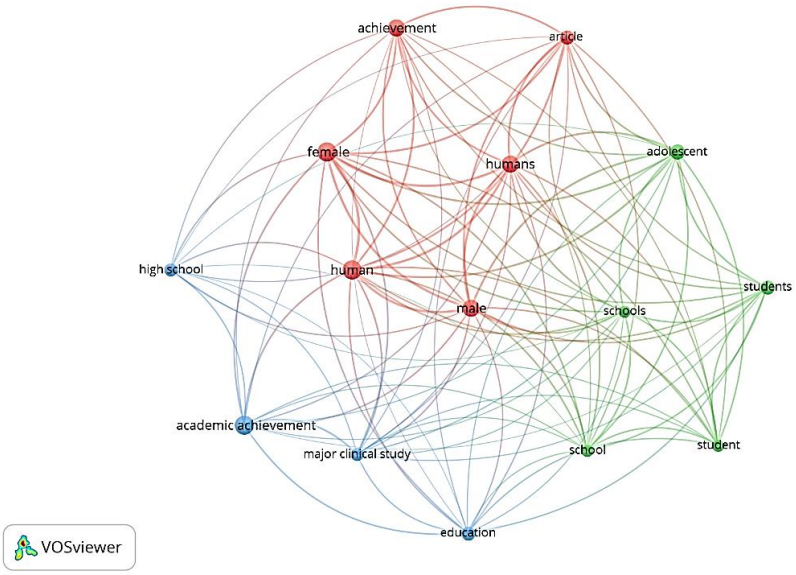

Figure 8. Visualization Based on Keyword Academic Achievement

Based on Figure 7. Above the results of the VOS Viewer analysis with the Academic Achievement keywords, the most examined keyword results are related to the Academic Achievement are Academic Achievement. While those that are still rarely examined are related to Student, School, High School and Education.

Conclusion

Based on the results of the study, showing that the number of articles published in the research topic has increased from the period 2003 to 2021 with an average publication (1.94 or 2 articles per year). Record in 2011, which was the highest record of the year. Similar trends can be seen in 2021 (not yet finished, up to a count of one semester). Procedia Social and Behavioral Sciences is the most relevant source and produces many publications related to Academic Achievement. Kuo Y.L. is the most productive writer by producing 2 publication files. Topics trends in the future in accordance with visualization of VosViewer indicate that the topics that appear the most are related to Student, School, High School and Education.

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