Bibliometric Analysis of the Spontaneous Group Discussion Method of Learning Mathematics Using Vosviewer Software

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Abstract: The purpose of this study is to identify themes related to the spontaneous group discussion method so that it can be used as an opportunity for further research on the method of spontaneous group discussion in learning mathematics. This research method uses bibliometric analysis method. Data collection was taken from the Google Scholar database through the PoP (Publish or Perish) application with the keywords spontaneous group discussion mathematical method and processed using VOSviewer software. Most spontaneous group discussion research publications occurred in 2020 and 2021 as many as 31 articles. Analysis of the data in this study using VOSViewer software. The results of this study indicate that Spontaneous group discussions that are still rarely carried out include cases study, creativity and implementation. The spontaneous group discussion method can increase students' knowledge, creativity, and application of learning methods so that the objectives of learning activities can be achieved.

Introduction

Education is an important role, because it is through this education that skilled and qualified human beings will be produced. Education is a process that involves the three aspects of the individual, society, individual national society, and the overall content of material and spiritual reality, and is responsible for determining the nature, destiny, and form of humans and society (Sham et al., 2021). Education refers to the process of changing the attitudes and behavior of individuals or groups of people in order to mature humans through education and training efforts, behavioral processes , and parenting methods (Joseph, 2018).

Learning is a process of interaction between students and educators and is a source of learning for schools. The main purpose of continuing the learning process is to achieve the learning objectives. Learning is not just an experience, but actively and integrated with various forms of action to achieve goals (Nidawati, 2013). Learning has the essence of planning or design as an effort to teach students. Therefore, when studying, students can not only interact with the teacher as a learning resource, but also with all learning resources used to achieve the desired learning goals (Djamaluddin & Wardana, 2019) .

Mathematics is one of the basic sciences taught at all levels of education, plays a very important role and has a major impact on other sciences. This is due to the function and role of mathematics as a tool for logical, analytical and systematic thinking. Mathematics is one of the fields of science that plays an important role in the development of science and technology as a tool for both its application in other disciplines and the development of mathematics itself (Siagian, 2012). Mathematics is one of the subjects in school that is the center of greatest concern for educators, parents and children. According to Wittgenstein,

mathematics is an educational program that can develop critical, systematic, logical and creative thinking (Hasratuddin, 2013).

Improving student learning outcomes can be pursued by teachers in various ways by using learning models or strategies . According to Sudjana (2005), "learning methods are methods used by teachers to build relationships with students in the classroom" (Yusuf Aditya, 2016). Sumardiyono (Supinah, 2010) shows that problem solving is the process of applying previously acquired knowledge to new, unfamiliar situations (Indarwati et al., 2014). Learning is the interaction between individuals and the environment to form a good emotional personality, skills, abilities and attitudes (Nurliani Siregar, 2015). Learning is a teaching and learning process that involves students and teachers, an increase in student learning outcomes can be sought by a teacher in various ways, either by using learning models or strategies, the reality shows that the learning model used by the teacher greatly influences learning outcomes and one of them is through use of spontaneous group discussion method.

Etymologically, Wahyudi explained : Spontaneous group discussion (SGD) consists of the word spontaneous which means spontaneous or without planning, group means group, discussion means discussion (Asriani et al., 2020). According to Huda, the spontaneous group discussion type of collaborative learning method emphasizes five elements in conducting group discussions: active interdependence, individual accountability, interaction development, social skills, and group processing (Yulianti & Santoso, 2017). Spontaneous group discussion is a learning method in the form of group discussions that were not previously planned, but carried out spontaneously and simply.

Further research related to spontaneous group discussion research can be used for reference, evaluation, and development in the future. Bibliometric analysis is a method that worn to analyze the bibliographic data obtained according to a lot of literature such as articles, journals, & other literature (Prasetyo, 2021). Bibliometrics is a mathematical method for calculating and identifying scientific publications in libraries in terms of author citations and their use (Daulay, 2018).

The purpose of this study is to identify themes related to the spontaneous group discussion method so that it can be used as an opportunity for further research on the method of spontaneous group discussion. In addition, it will also look at the trend of research publications related to the spontaneous group discussion method, linkages with other variables or themes and can find themes that are still rarely studied.

Research Method

Research method uses bibliometric analysis method by searching metadata from the journal spontaneous group discussion mathematics provided by Google Scholar. Google Scholar is a tool used by students to search for literature in a scientific work (Rafika et al., 2004). Bibliometric analysis was used to collect literature output from Google Scholar obtained through Publish or Perish using the key term "Spontaneous Group Discussion Mathematical Method". Publish or Perish worn on which journals will be submitted, become a literature review, and to conduct bibliometric research (Auliato et al., 2020).

Based on the search output of Publish or Perish , the researcher got 175 scientific work search outputs from 2015-2021 which then screened into 140 scientific papers. The results of the screening, then exported in RIS format and will be processed using VOSviwer software. VOSviewer software is software used to visualize bibliometric networks (Prasetyo,

2021). According to Leydesdorff & Rafols , VosViewer is a free computer program for visualizing and exploring bibliometric knowledge maps (Tupan et al., 2018).
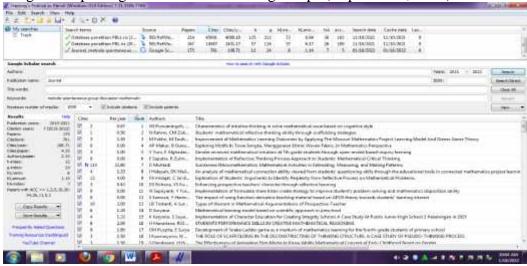

Figure 1. Metadata Search Using Publish or Perish

The results of the metadata search for 175 articles that include spontaneous group discussion of mathematics learning through publish or perish are as shown in Figure 1. As for the research development map, it was analyzed using VOSViewer software. Mapping was carried out to find important points in spontaneous group discussion of mathematics learning in the range of 200115-2021.

Results and Discussion

From the results in table 1, the collection and analysis of data related to spontaneous group discussion in mathematics learning, it was found that the most publications of spontaneous group discussion articles on mathematics learning from 2015-2021 occurred in 2020 and 2021, which were 31 articles with a percentage of 22.1%.

Table 1. Increased Publication of Spontaneous Group Discussion Mathematics

Publication Year	Amount	Percentage
Year 2015	7	5
Year 2016	10	7.1
Year 2017	17	12.1
Year 2018	15	10.8
Year 2019	29	20.8
Year 2020	31	22.1
Year 2021	31	22.1

Based on the search and analysis results obtained 175 article titles, then selected into 140 article titles containing spontaneous group discussion studies in mathematics learning activities. Research on the spontaneous group discussion method in the 2015-2021 period has increased unstable or fluctuating as shown in Figure 2 below.

Figure 2. Development of Spontaneous Group Discussion Publications by Year

Figure 2 shows that from 2015 to 2017 there was a significant increase in article publications. Although in 2018 there was a decline in publications, in 2019 it experienced exclusively development with the number of publications of 29 articles. In 2020 and 2021, there will also be an increase in publications with a total of 31 articles. Thus the arrangement of this research trend shows that the authors of the articles have a higher interest in spontaneous group discussion of mathematics learning.

Figure 3. Themes in Spontaneous Group Discussion

Figure 3 shows the essential themes related to *spontaneous group discussion* . The essential themes that discussed in this article are the results of Coword 's visualization analysis of the keyword mapping Cooccurrens (Tupan, 2016). These essential themes consist of 55 essential themes, then selected into 37 themes related to spontaneous group discussion, namely *small group discussion, application, influence, teaching, Indonesian, relationship, science, difference, effectiveness, role, teaching English, interest , subject, question, case study, mathematical concept, response, creativity, teacher, activity, mathematical problem, analysis, concept, ability, learning process, effect, development, group discussion, implementation, problem, research, school, strategy, skill, study, mathematics, student.*
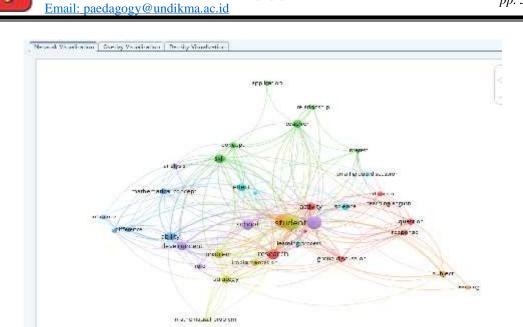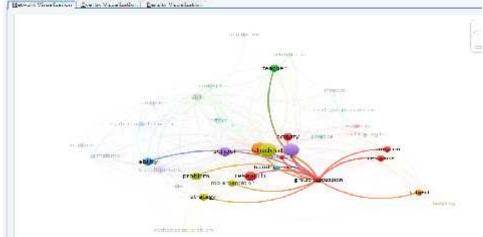
Figure 4. Spontaneous Group Discussion Cluster Using Network Visualization

The results of the visualization using Network Visualization in Figure 4 show 7 clusters consisting of 37 items. Cluster 1 has 8 items with themes that appear, namely *activity, case study, group discussion, Indonesian, question, research, response, and teaching English* . Cluster 2 has 6 items with the themes raised, namely *application, concept, interest, relationship, skill, and teacher* . Then there are 5 items in cluster 3 with the theme of *ability, difference, effectiveness, influence, and mathematical concept.*

Cluster 4 consists of 5 items with the themes *of implementation, mathematical problem, problem, strategy, and student* . The next 5 items in cluster 5 with the themes of *analysis, development, mathematics, role, and school* . Furthermore, 5 items are in cluster 6 with the themes of *creativity, effect, learning process, science, and small group discussion* . Finally, cluster 7 has 3 items, the themes taken are *study, subject, and teaching.*

Spontaneous Group Discussion **Method Network**

VOSViewer visualization in Figure 5 show a network between articles with 16 cross-lines consisting of *teacher, activity, mathematics, student, case study, study, school, ability, problem, learning process, research, implementation, strategy, question, response, and subjects.*
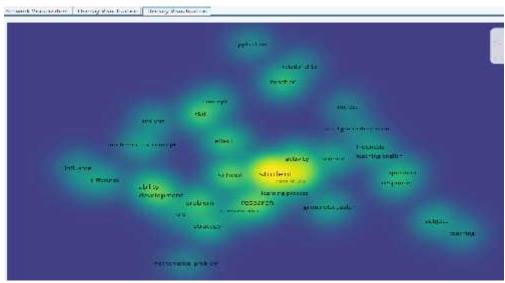
Figure 6. Density of Spontaneous Group Discussion Research Themes

Figure 6 shows the density between the themes in the *spontaneous group discussion research*. The bold yellow color indicates the density of the many research themes in *the spontaneous group discussion*. The lighter the density color, the more is done researching the theme. The themes of *spontaneous group discussion research* that are still little done include *case studies, creativity, and implementation.*

Themes that have prospects for research are *case studies, creativity, and implementation,* in which the color of the topic is dim. *case study* is a series of academic activities carried out in detail about a program, event, or activity at the level of individuals, groups of people, institutions, or organizations by collecting information systematically. detail using various methods to obtain detailed knowledge of the event (Creswell, 2013). Research on *spontaneous group discussion* in mathematics learning has not specifically been studied, but research related to *group discussion* on student attitudes in learning mathematics is needed so that students with *slow learner learning styles* can be accommodated (Mazana et al., 2018). Meanwhile, learning styles also affect mathematical problem solving abilities which can be seen from body gestures and attitudes (Soebagyo et al., 2022). Other research that uses discussion in online learning gives extrinsic motivation results of 85.58%, meaning that discussion in learning can increase student motivation (Lee & Martin, 2017).

Creativity is a competence that will produce new ideas that can be applied when solving a problem and the competence to provide new ideas and apply them to a problem (Jagom, 2015). Stenberg, Kaufman and Pretz (2002) reveal that creativity is a competency that will create new products, in accordance with high quality, which researchers eventually use as an understanding of creativity (Fatmawati, 2018). Creativity in *spontaneous group discussion* is not only creativity in overcoming mathematical problems in discussion, but can have a good influence on students' communication skills (Sulistyowati et al., 2015).

Research on the use of discussions related to the small group work method and the small group method can increase students' creativity in active participation, role playing and learning among students (Yadgarovna & Husenovich, 2020). Thus, in learning mathematics, it shows that the *spontaneous group discussion method* is one method to foster creativity. This proves that *spontaneous group discussion* in problem solving encourages creativity through discussing with friends so that it can make students think and express their thoughts. (Khalid et al., 2020).

According to Usman, implementation is not just an activity, but an activity that is planned to achieve the objectives of the activity (Ardina Prafitasari , 2016). Implementation is the application of a planned activity method in order to achieve an activity goal. Browne and Wildavsky say that implementation is an extension of coordinated activities (Syafriyanto, 2015). The availability and suitability of implementation in the *spontaneous group discussion method* can be used in solving problems determining the level of success of students achieving in problem solving. Learners should be exposed to more effective classroom math demonstrations, discussions, arguments, challenges, meta-cognitive regulation (such as reflection and teaching and direct learning techniques) at all times to develop metacognitive abilities spontaneously and at the highest level in problem solving (Tachie, 2019).

Research on the implementation of *spontaneous group discussions* in mathematics learning has not specifically been studied, but there are studies related to *group discussions spontaneously* to distinguish *spontaneous example-us* e, *evoked example-use* , and *responsive example-use to a provided example* (Zaslavsky, 2019). In addition, there is research on In addition, research on *spontaneous focusing on numerosity* (SFON) shows that SFON is a unique predictor of arithmetic fluency and number line estimation but not for knowledge of rational numbers, math achievement, math motivation, or reading. These results hold even after taking into account age, IQ, working memory, digit naming, and cardinality skills (Nanu et al., 2018).

Conclusion
The conclusion obtained from the results of this study is that the most spontaneous group discussion research publications occurred in 2020 and 2021 as many as 31 articles. Spontaneous group discussion research themes that are still little done include case studies, creativity and implementation. The result of this bibliometric analysis is a spontaneous group discussion research trend. The results of this study indicate the engagement of journal publications that meet the spontaneous group discussion model , so that it can be used as an opportunity for educators to conduct research on the spontaneous group discussion method.

Recommendation
In carrying out learning, it is hoped that educators and other researchers can increase creativity in using the spontaneous group discussion method in teaching and learning activities in the classroom. The preparations that must be carried out by educators and students are linked to the spontaneous group discussion method , namely the availability of learning facilities that are in accordance with the spontaneous group discussion method so that teaching and learning activities are more meaningful.

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