A Bibliometric Analysis of the Accountable Talk Model: Trends, Influential Works, and Key Contributors

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Abstract

The primary objective of this study is to conduct a detailed examination of the accountable talk (AT) model through a bibliometric analysis of 37 publications sourced from the SCOPUS database. The secondary goals include exploring collaborations among authors working on this model, identifying the most influential authors and reference articles, determining the most frequently used keywords, and analyzing recent research trends. The analyses were carried out using a visualization program, with visualizations evaluated based on quantity indicators, quality indicators, and structural indicators. The findings reveal that Lauren B. Resnick is the most influential author, with the article "Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life" (2008) serving as the key reference for this model. Lauren B. Resnick and Einat Heyd-Metzuyanim are recognized as the most collaborative authors in the field. The keyword analysis highlights "dialogic teaching" and "classroom discourse" as the most frequently used terms. Additionally, the research interests of these authors primarily revolve around teacher professional development and the software analysis of talk moves.

Keywords: Accountable Talk, Bibliometric Analysis, Citation Analysis, Co-occurrence Analysis, Co-authorship Analysis, Bibliographic Coupling Analysis

Introduction

When considering learning environments, it's hard to imagine one without dialogue. However, the type of dialogue that takes place varies depending on the structure of the environment. In some teacher-centered environments, teachers take on the role of instructors, delivering information to students and evaluating them through questions. In these settings, students are passive participants, responsible for remembering the knowledge and facts deemed important for them to learn. On the other hand, when students engage in classroom discussions and debates with their teachers, they can approach complex problems collaboratively. This interaction allows students to develop their reasoning and thinking skills by talking, explaining, and discussing. The AT model seeks to encourage such discussions by creating an environment where students learn together while adhering to certain expectations (Resnick et al., 2018). These expectations are rooted in the concept of accountability. As previously noted, not all discussions promote learning. For discussions to be effective for learning, they must meet specific conditions, including accountability to the learning community, accurate knowledge, and rigorous thinking (Michaels et al., 2010).

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According to the AT model, a key feature of an effective discussion environment is its accountability to the learning community. This means that all students are active and valuable contributors to the collective learning process. Every student is encouraged to participate in class discussions, sharing their ideas, listening to others, and helping to advance collective learning by either refining ideas or identifying their weaknesses (Michaels et al., 2010; Resnick et al., 2018).

Another important characteristic of a good discussion environment is accountability for accurate knowledge. This aspect of the model emphasizes that students should present the facts and sources that support their ideas (Michaels et al., 2010; Resnick et al., 2018). For instance, in mathematics classes, students demonstrate accountability for accurate knowledge when they present a property, definition, or theorem to support their solution to a problem. These concepts may have been discussed previously in class or introduced from outside sources (Yalçın, 2024).

The final characteristic of a good discussion environment, according to this model, is accountability for rigorous thinking. This involves making students' ideas and thought processes visible to the rest of the class by justifying, explaining, and elaborating on the ideas presented. It requires students to connect their arguments and evidence in a logical, coherent, and rigorous manner (Michaels et al., 2010).

Recent advancements have been made in developing theories on dialogic teaching and applying these theories in practice (Calcagni & Lago, 2018). Research on learning environments, where students actively construct knowledge through discussions, has been increasing. This study aims to conduct a bibliometric analysis of the AT model, which helps define the structure of such discussion environments, to uncover its emergence process and understand the evolution of studies on this model. Articles and conference papers related to the AT model published in the Scopus database were analyzed using performance analysis and scientific mapping to address the following research questions.

1. Which publications have had the greatest impact on the AT model?

2. Who are the leading authors based on publications related to the AT model?

3. What are the most commonly used keywords in publications on the AT model?

4. What trends have emerged in recent publications on the AT model?

5. Which authors are collaborating on research in the AT model?

Method

This paper utilizes bibliometric analysis to examine publications on the AT model. Bibliometric analysis allows us to trace the history of a research field, understand its evolution, and predict its future trajectory (Cadavid Higuita et al., 2012). It offers quantitative insights into authors, highlights academic progress in the field, and aids in assessing journal quality by providing measurable data (Kumar et al., 2023).

Bibliometric analysis makes visualizations in terms of quality and quantity in the research area under study. According to Durieux and Gevenois (2010), bibliometrics presents quantitative indicators to demonstrate productivity and quality indicators to show evidence of the impact. In addition, structural indicators are used to relate different variables. According to Cobo, Lopez-Herrera, Herrera-Viedma and

Herrera (2011), there are two types of analysis in bibliometrics: performance analysis and science mapping. In performance analysis, the effectiveness of the work of scientific units such as authors, journals and countries is revealed with the help of bibliographic data. Scientific mapping presents the structural and dynamic aspects of research fields.

In bibliometric analysis, information about the field being studied is obtained by utilizing the frequency of keywords. With this method, the common working areas of different disciplines can be revealed (Huai and Chai 2016). In addition, the development of the field can be observed by determining the use of different words together (Wang, 2014).

In this study, a visualization program was used to analyze the data. This program is focused on the visualization of bibliometric maps. The resulting visualizations can be easily interpreted (Van Eck & Waltman, 2010). By using this software co-authorship, co-occurrence, citation, bibliographic coupling, co-citation analyses are performed according to different units such as author, institution, country, source and organization (Mas-Tur et al., 2021). The analysis methods are explained below.

The first method is co-authorship analysis. It is a type of relationship where two or more authors collaborate and publish their research together (Savić et al., 2019). If authors have co-authored at least one publication, they are connected by an edge between the nodes representing the authors. In addition, the thickness of the edges between nodes reveals the strength of the authors' collaboration. The more researchers collaborated together, the thicker the edge between them will be (HabibAgahi et al., 2022).

Second analysis method is co-occurrence analysis. It can be used to reveal the basic concepts of the field being studied. The frequent use of two keywords together in publications indicates a close relationship between these two keywords. In this analysis, the size of the nodes is directly proportional to the number of keywords used. In addition, short and thick edges represent that the concepts are closely related to each other (Nadi-Ravandi & Batooli, 2022).

Another analysis method is citation analysis. Citation analysis is a type of analysis that reveals the structure and development of knowledge in a particular research area (Hou et al., 2018). This analysis is a frequently used method to reveal the influence of authors, journals and publications in the field being studied (Suban, 2023). In a summary, this method determines the number of uses of citations and uses this quantitative information as a measure of influence (Baker, 1990).

One of the analysis methods used is bibliographic coupling. This method is used to link documents, sources, authors, organizations or countries that use the same references of documents (Boyack & Klavans, 2010). In the study conducted by Boyack & Klavans (2010), bibliographic doubling was found to be the most accurate of the citation-based mapping approaches.

The final analysis method is co-citation analysis. When two documents are cited by another document, this is called co-citation of documents (Boyack & Klavans, 2010). When researchers in a field cite a particular set of documents, it means that the documents in that set contain content that has earned the appreciation of researchers in that field. These publications can therefore be considered to contain the key concepts and methods in the field. This analysis hence reveals past contributions to a particular field (Trujillo & Long, 2018). In this analysis, edges connecting nodes indicate a co-citation relationship between these two nodes. That is, both publications have been cited by another document (Trujillo &

Long, 2018). The edges get thicker in proportion to the number of times two documents are cited at the same time increases.

Data Collection Instruments

The Scopus database was preferred for this study. The reasons for this are the quality standards of this database and its large collection of information. Scopus has a total of 1.7 billion citations from 1970 to 2020 (Herrera-Franco et al., 2020). Web of Science and Scopus databases have approximately the same coverage. Moreover, Scopus coverage has increased in the last few years. It is appropriate to conduct an up-to-date study by using Scopus (Harzing & Alakangas, 2016). In addition, in 2020 there were 26,591 active peer-reviewed journals, 1,167 book series, more than 11.7 million conference papers, more than 84 million referenced records after 1969 and moret than 6.5 million records before 1970, with the oldest record dating back to 1788 (Scopus Content Coverage Guide, 2020).

Data Analysis

In this study, articles and conference papers in Scopus database were analyzed. For this purpose, the words "accountable talk" were searched for article title, abstract and keywords in the search tab. Of the 40 articles identified as a result of the search, 3 articles that were not related to the research area were excluded from the analysis. Therefore, 37 publications were analyzed in total.

A visualization program was used for science mapping. Co-authorship networks, co-occurrence networks, citation networks, bibliographic coupling networks and co-citation networks of AT model were analyzed. In order to analyze network visualizations and an overlay visualization were used in the software.

In terms of validity and reliability, the analyses of the visuals in the study were carried out in a detailed and careful manner to avoid potential errors in the assessments. The errors in the obtained data file were filtered out before the visualization was performed. The analyses were thoroughly examined and controlled by two experts in the field. Consensus was reached among the researchers.

Findings

Publication and Citation Structure of Accountable Talk Model

When the ten most-cited documents about AT Model are examined, the first article in the field, "Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life" stands out. Published in 2008, the average annual citation number of the article is 38.43. According to the annual citation average, the article titled "Promoting Rich Discussions in Mathematics Classrooms: Using Personalized, Automated Feedback to Support Reflection and Instructional Change," published in 2022, follows as the next most cited. The third ranked article according to the annual citation average is "Field education as the signature pedagogy of social work education" with a citation rate of 15.92. These articles are the most cited articles that are related to AT model. Other publications in the top ten according to the number of citations can be seen in Table 1.

Table 1

The Most-cited Ten Documents about AT Model

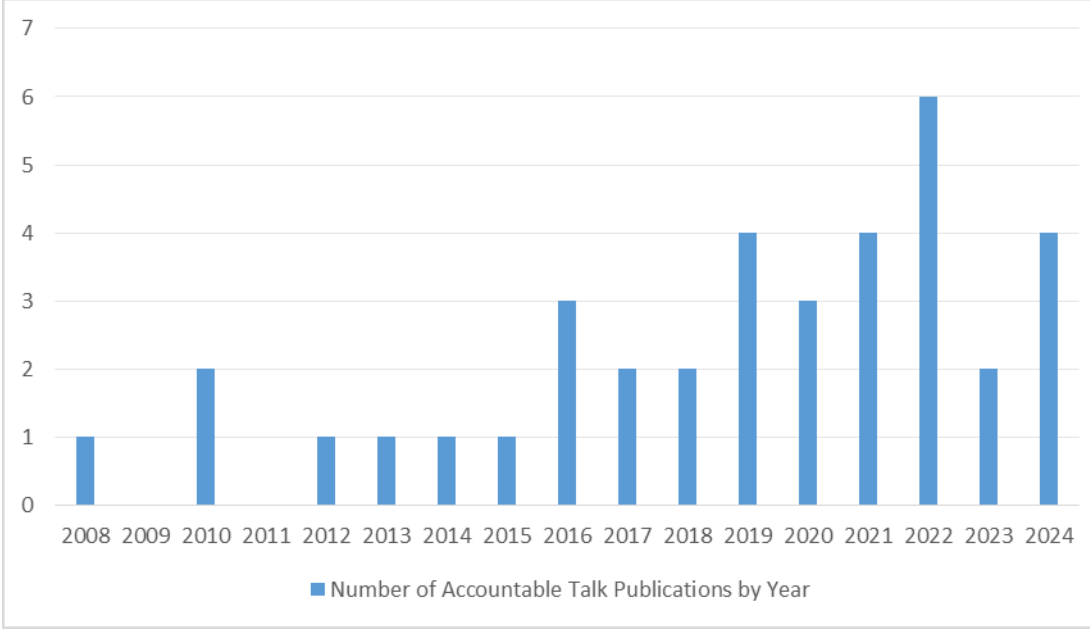
R	Title	Names of Authors	YFP	AGE	TC	TC/AGE
1	Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life	Michaels, S., O'Connor, C., Resnick, L.B.	2008	16	615	38.43
2	Field education as the signature pedagogy of social work education	Wayne, J., Raskin, M., Bogo, M.	2010	14	223	15.92
3	Student agency to participate in dialogic science discussions	Clarke, S.N., Howley, I., Resnick, L., Penstein Rosé, C.	2016	8	96	12.00
4	Speaking but not listening? Accountable talk in an unaccountable context	Alexander, R.	2010	14	52	3.71
5	Promoting rich discussions in mathematics classrooms: Using personalized, automated feedback to support reflection and instructional change	Jacobs, J., Scornavacco, K., Harty, C., Suresh, A., Lai, V., Sumner, T.	2022	2	38	19.00
6	Coordinating scaffolds for collaborative inquiry in a game-based learning environment	Saleh, A., Yuxin, C., Hmelo-Silver, C.E., Glazewski, K. D., Mott, B.W., Lester, J.C.	2020	4	35	8.75
7	The Three Domains for Dialogue: A framework for analysing dialogic approaches to teaching and learning	Calcagni, E., Lago, L.	2018	6	33	5.50
8	Contributions and silence in academic talk: Exploring learner experiences of dialogic interaction	Engin, M.	2017	2024	32	4.57
9	Academic Discussions: An Analysis of Instructional Discourse and an Argument for an Integrative Assessment Framework	Elizabeth, T., Ross Anderson, T.L., Snow, E.H., Selman, R.L	2012	2024	32	2.66
10	Dialogic education for classroom teaching: a critical review	Cui, R., Teo, P.	2021	2024	26	8.66

Notes: Abbreviations: R: rank; YFP: year first publication; AGE = (Current year: 2024) -YFP); TC: total citations; TC/AGE: citations per year

Moreover, Figure 1 shows the distribution of the number of publications on the AT model from the first article in 2008 until December 2024. When the data in the figure is analyzed, while a total of seven publications were published in the first eight years, a total of thirty publications were published in the following nine years. In other words, the number of publications in the last nine years corresponds to 81.08% of the total number of publications. This shows that publications on the AT model are on an increasing trend. The year 2022 was the year with the most articles published in this field. In contrast, no articles were published in 2009 and 2011. Furthermore, there are 6 articles in the top ten list published in 2016 and later.

Figure 1

Number of AT Publications by Year



Analysis of Co-authorship of Authors

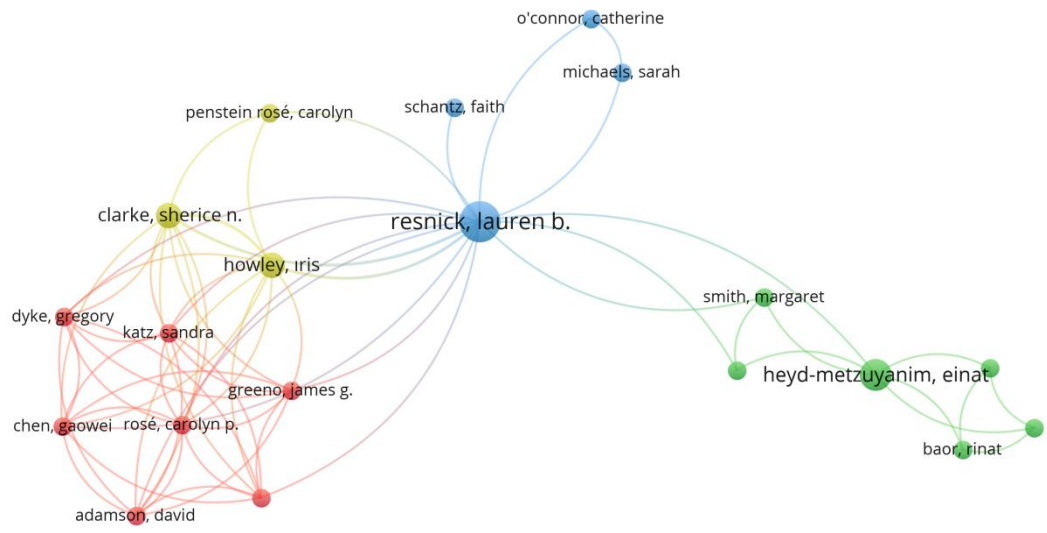
The analysis of author collaboration within the AT model included authors with at least one publication, resulting in a total of 104 authors being part of the study. However, not all of these authors are interconnected within the network. The largest group of connected authors consists of 20 individuals. As shown in Figure 2, four distinct clusters of connected authors were identified. Upon examining the co-authorship network map in Figure 2, and considering the total number of 104 authors, it becomes clear that collaboration among the 20 researchers is relatively low, accounting for approximately 19.23% of the total cooperation.

The red cluster consists of 7 authors, and from Figure 2, it is clear that these authors collaborate closely with one another. This extensive collaboration is mainly due to their shared publication. The second largest cluster is the green one, which includes 6 authors. Einat Heyd-Metzuyanim is at the center of this cluster and works with all the other authors within it. However, her collaboration is limited to this cluster, with the exception of Lauren B. Resnick. Additionally, no author in the green cluster has collaborated with authors from other clusters, except for Lauren B. Resnick. The blue cluster has 4

authors, with Lauren B. Resnick having the most connections in this group. She co-authored with 16 authors in the 20-author dataset and 18 authors in the 104-author dataset. This is highlighted by the large node representing her in the map. As a result, Lauren B. Resnick can be considered a central figure in facilitating collaboration among authors. The smallest cluster is the yellow cluster, consisting of 3 authors. Sherice N. Clark and Iris Howley in this cluster engage in frequent collaboration with authors from the red cluster.

Figure 2

Co-authorship Network Map in AT Model



Analysis of Co-occurrence of Author Keywords

In the analysis of author keyword co-occurrence within the AT model, keywords with at least one publication were considered, resulting in a total of 114 keywords being included in the analysis. The analysis revealed the formation of 17 clusters. Seven of these clusters contain 3 or 4 keywords, while the largest cluster consists of 11 keywords. Additionally, one cluster contains 10 keywords, and two clusters each contain 9 keywords.

In Figure 3, the larger nodes represent the most frequently used keywords, with "accountable talk" being the most prominent. Besides accountable talk, "dialogic teaching" and "classroom discourse" were also among the most commonly used keywords. The thickness of the lines connecting the keywords indicates the frequency with which they are used together; the thicker the line, the more often the keywords appear together. In this context, "accountable talk" and "dialogic teaching" are the most frequently paired keywords. Additionally, other key terms such as "classroom dialogue," "professional development," "dialogic interaction," and "discourse analysis" are also commonly used in conjunction with "accountable talk."

Figure 4 illustrates the evolution of keyword usage over time. The yellow keywords represent those that have been used in recent years, highlighting the direction in which the topic has developed. Two of the

yellow keywords, "question under discussion" and "respectful discourse," are particularly notable. These keywords can be viewed as expanding on the components of the AT model.

Figure 3

Co-occurrence of Author Keywords Map in AT Model

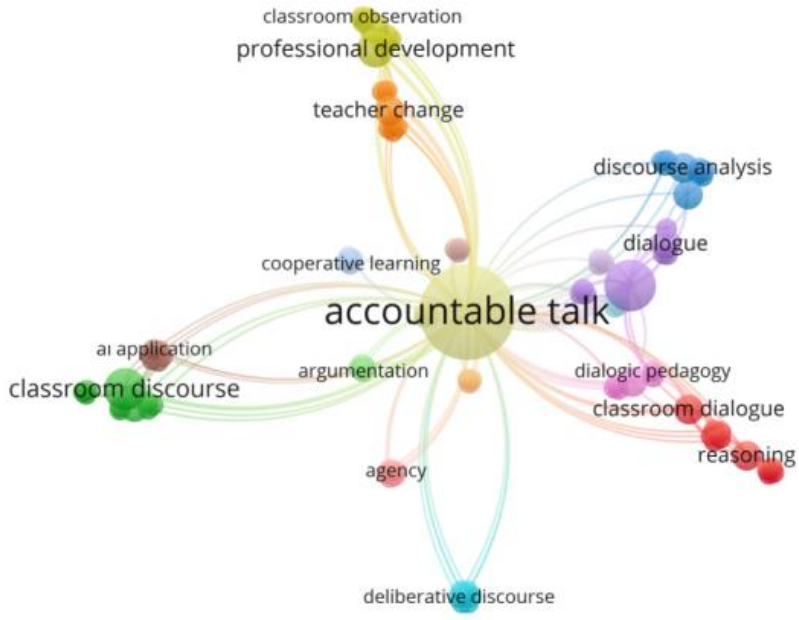
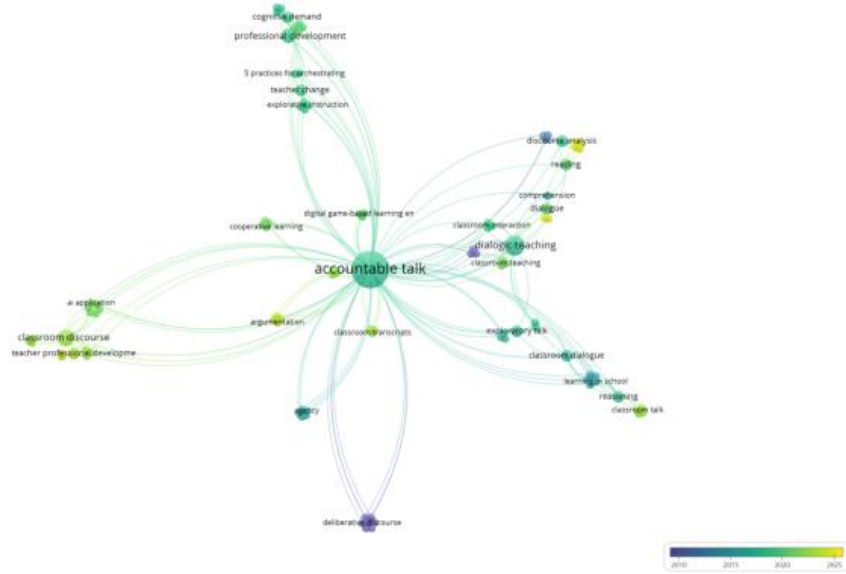


Figure 4

Co-occurrence of Author Keywords Overlay Visualization



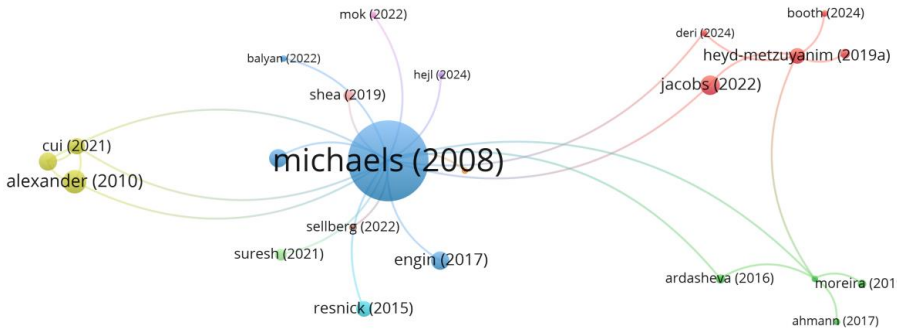
Analysis of Citation of Documents

In the analysis of document citations within the AT model, the minimum citation threshold was set to zero, meaning that all documents were included in the analysis. The results revealed the formation of 11 clusters. Seven of these clusters consist of a single document each, while the largest cluster contains 5 documents. Additionally, there are two clusters that each include 4 documents.

As shown in Figure 5, the article by Michaels (2008) is the most cited document. The size of the node indicates that it has been cited by numerous articles. This publication has 17 citations, while the publication with the next highest citation count, Heyd-Metzuyanim (2019a), has 5 co-citations.

Figure 5

Citation of Documents Map in AT Model

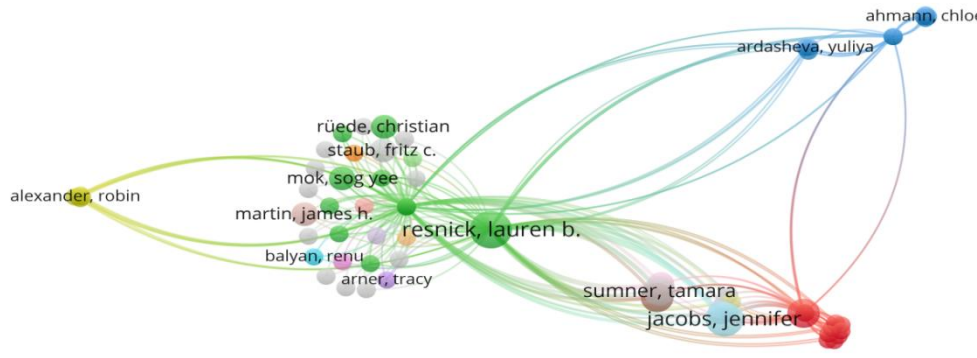


Analysis of Citation of Authors

In the analysis of author citations within the AT model, the minimum number of documents an author had was set to one, meaning that all authors were included in the analysis. The results revealed the formation of 34 clusters. However, 29 of these clusters consist of a single author each. Meanwhile, there are 3 clusters containing 11, 10, and 9 authors, respectively.

Figure 6

Citation of Authors Map in AT Model



When examining the three clusters with the most authors, Lauren B. Resnick emerges as the most influential figure, with 5 documents, 58 links, and a total link strength of 74. In the same cluster, Sarah

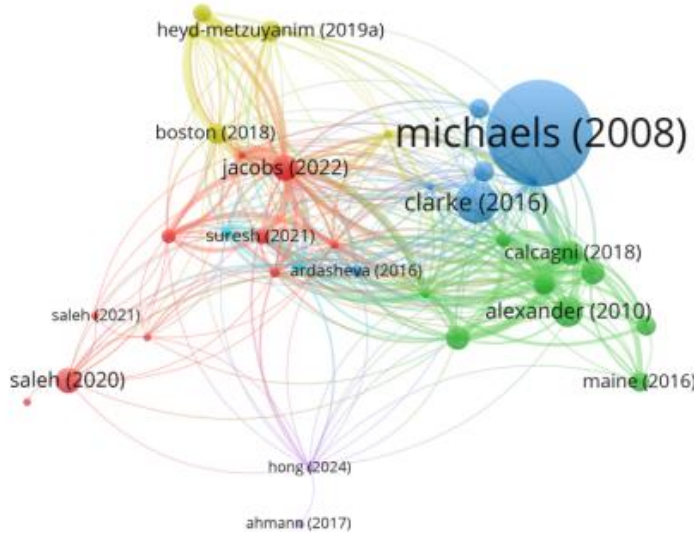
Michaels and Catherine O'Conner also stand out, each with a total link strength of 52. Their high citation numbers are likely due to their co-authorship of the field's foundational article. Eina Heyd-Metzuyanim is the most influential author in her cluster, with 3 documents, 22 links, and a total link strength of 23. In the final cluster, Rosa M. Pons and Vicente Reyes are the most cited authors, each having 1 document, 13 links, and a total link strength of 14.

Analysis of Bibliographic Coupling of Documents

In the analysis of bibliographic coupling of documents within the AT model, the minimum number of documents an author had was set to zero, meaning that all documents were included in the analysis. The results showed the formation of 6 clusters. Among these, 2 clusters contain 2 documents each, and one cluster includes 5 documents, 3 of which are authored by Eina Heyd-Metzuyanim. Additionally, there are 3 clusters with 10, 9, and 7 documents, respectively.

Figure 7

Bibliographic Coupling of Documents Map in AT Model



Upon examining the thickness of the edges, it is evident that there is a strong connection between Boston (2018) and Heyd-Metzuyanim (2019a). Similar close relationships are also observed between Jacobs (2022) and Pons (2021), Jacobs (2022) and Suresh (2022), as well as Jacobs (2022) and Calgagni (2018). In terms of total link strength, Jacobs (2022) stands out as the publication with the highest total link strength, with a value of 105.

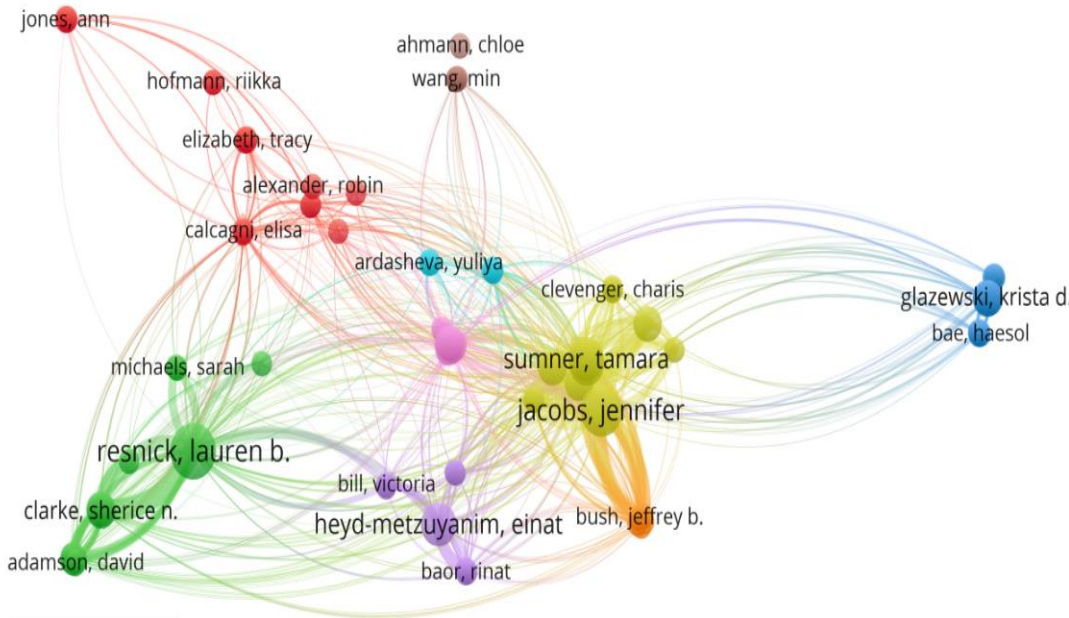
Analysis of Bibliographic Coupling of Authors

In the analysis of bibliographic coupling of authors within the AT model, both the minimum number of documents and the minimum number of citations for an author were set to one, meaning that 87 out of 104 authors were included in the analysis. The results revealed the formation of 9 clusters. However, 5 of these clusters contain fewer than 10 authors. Additionally, there are 3 clusters with 17, 14, and 13 authors, respectively.

As shown in Figure 8, the red cluster is centered around Elisa Calcagni and Leanardo Lago, whose publication focuses on dialogic teaching literature. It is therefore expected that their work is frequently referenced in subsequent publications within this field. The green cluster is led by Lauren B. Resnick, one of the authors of the foundational article in this area. She also has 5 articles featured in this study, which explains the large node size and numerous edges in the bibliographic analysis visualization. The yellow cluster is anchored by Jennifer Jacobs and Tamara Sumner, whose research explored the use of talk moves in discourse practices. They also developed a software tool that offers quantifiable feedback for research-based discourse practices. The purple cluster is centered around Einat Heyd-Metzuyanim, who has 3 publications included in this study, all of which focus on teachers' professional development. Therefore, this cluster is primarily dedicated to the theme of professional development for teachers within the field.

Figure 8

Bibliographic Coupling of Authors Map in AT Model



Analysis of Co-citation of Cited References

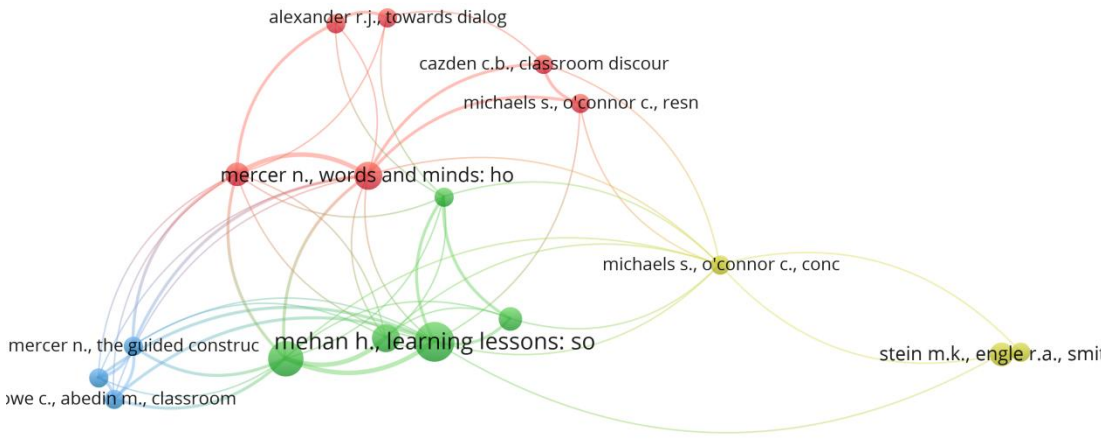
In the analysis of co-citation of cited references within the AT model, the minimum citation threshold for a reference was set to 3. References with fewer than 3 citations showed excessively high co-citation relationships, so a threshold of 3 was considered appropriate for identifying the most influential co-cited publications in the field. As a result, 17 out of 37 publications were included in the analysis. The findings revealed the formation of 4 clusters, with the number of publications in each cluster being 6, 5, 3, and 3, respectively.

The most co-cited publication is Hugh Mehan's (1979) article titled "Learning Lessons: Social Organization in the Classroom." This article is a key work in the field of classroom social organization, published long before the creation of the AT model. Its significance is underscored by its 9,828 citations as of early December 2024. In this analysis, it has a co-citation relationship with 8 other articles, being co-

cited a total of 18 times. Similarly, Neil Mercer's (2000) book "Words and Minds: How We Use Language to Think Together" was published prior to the first works in this field. It is connected to 4 publications in the visualization and has been co-cited 18 times with them. The article by Michaels, S., O'Connor, C., and Resnick, L.B. (2008), titled "Deliberative Discourse Idealized and Realized: Accountable Talk in the Classroom and in Civic Life," has also been co-cited 18 times, alongside 7 other articles. This further reinforces its status as one of the core publications referenced by those publishing in this field.

Figure 9

Co-citation of Cited References Map in AT Model



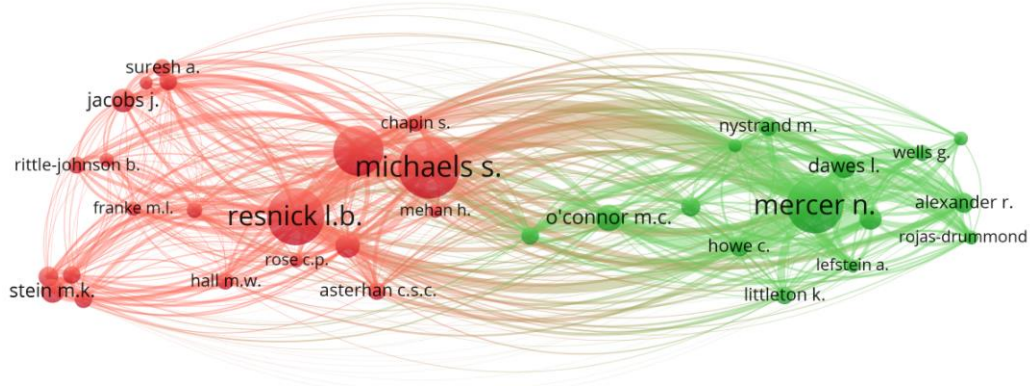
Analysis of Co-citation of Authors

In the analysis of author co-citations within the AT model, the minimum citation threshold for an author was set to 10. With this threshold, the visualization includes 36 authors. The analysis resulted in the formation of 2 clusters. The first cluster contains 21 authors, while the second cluster includes 15 authors.

As seen in the Figure 10, two research networks are formed, represented by red and green clusters. In the red cluster, three key authors stand out. Sarah Michaels is co-cited with 35 other authors in the visualization, with a total link strength of 2,456. Lauren B. Resnick is also connected to all 35 authors, with a total link strength of 1,840. The third significant author in the red cluster is Catherine O'Connor, who is also linked to 35 other authors, with a total link strength of 1,655. This indicates that these three authors have a high number of co-citations, which is expected due to their joint 2008 publication. The most prominent author in the green cluster is Neil Mercer, who is co-cited with 33 of the 36 authors in the visualization. His total link strength is the highest among the 36 authors, at 2,722. Additionally, the thickness of the edges reveals that the connection between Sarah Michaels and Neil Mercer is particularly strong, indicating that these two authors are frequently co-cited in numerous publications.

Figure 10

Co-citation of Cited References Map in AT Model



Discussion

This study conducted a bibliographic analysis to explore the structure of the literature on the AT model. Data obtained from the Scopus database were analyzed using a visualization program. The analysis involved creating and interpreting visualizations related to authors, keywords, and publications. The aim was to explain the significance of the highlighted components by examining their relationships with other elements. Additionally, the study investigated the development and changes in the field in recent years and sought to identify trends for future research.

To address the first research question, Table 1, Figure 5, Figure 7, and Figure 9 were analyzed. As shown in Table 1, the article titled “Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life” is the most influential publication, with 615 citations and an average annual citation count of 38.43. The article's high citation rate is due to its pioneering role as the first article on this topic in the Scopus database. It provides a comprehensive explanation of what accountable talk is and its key dimensions, which is why it has been cited by nearly all subsequent studies in the field. A look at the citation document map shows that its node is notably large, indicating it has been cited extensively. Additionally, this article holds the highest number of co-citations, being cited 18 times in total, in common with 7 other publications. Consequently, this article can be considered the most influential work in the field. The article "Promoting rich discussions in mathematics classrooms: Using personalized, automated feedback to support reflection and instructional change" stands out for its average annual citation count. Although published in 2022, it has already become a significant contribution to the field. The article discusses the development of a program that identifies teachers' talk moves, utilizing advancements in artificial intelligence to bring a new dimension to the field. Examining the citation document map reveals that this article acts as a link between recent and older publications, indicating its central role in the ongoing evolution of the field. Additionally, when looking at the bibliographic coupling of documents map, this publication has the highest total link strength of 105, showing that it shares common references with many other studies in the field.

The citations of authors map highlights the most influential figures in the field. Lauren B. Resnick stands out with five documents, 58 links, and a total link strength of 74, making her a key figure in the area. Sarah Michaels and Catherine O'Conner also emerge as significant contributors, with a total link strength of 52 each. In the bibliographic coupling map, Lauren B. Resnick is represented with the largest node and the highest number of edges, which can be attributed to her five articles and her pioneering work in the field. Similarly, in the co-citation of authors map, Resnick is linked to all the other authors, with a total link strength of 1840, showing her widespread recognition in the field. Additionally, Einat Heyd-Metzuyanim stands out as the most influential author within her cluster, with three documents, 22 links, and a total link strength of 23 in the citations of authors map. In the bibliographic coupling map, she is centrally located within her cluster, reflecting her focus on teacher professional development. Heyd-Metzuyanim's contributions in this area position her as a central figure among authors working in this field.

To address the third research question, the co-occurrence of author keywords map should be analyzed. As expected, "accountable talk" is the most frequently used keyword. However, since this term also refers to the model itself, it is more insightful to focus on the other keywords. Following "accountable talk," the most commonly used keywords are "dialogic teaching" and "classroom discourse." Additionally, "accountable talk" and "dialogic teaching" are the two keywords that appear most frequently together. Other significant keywords related to the AT model include "classroom dialogue", "professional development", "dialogic interaction", and "discourse analysis".

An analysis of Figure 1 in relation to the fourth research question shows a clear rise in publications within this field. Furthermore, the article “Promoting rich discussions in mathematics classrooms: Using personalized, automated feedback to support reflection and instructional change” is emerging as a significant work in the area. The exploration of teacher actions through artificial intelligence or software is becoming a new trend in the field. Additionally, the article titled “The TalkMoves Dataset: K-12 Mathematics Lesson Transcripts Annotated for Teacher and Student Discursive Moves,” with 12 citations in just three years, reinforces this observation. Moreover, the creation of separate clusters in the maps related to teacher professional development suggests that research in this area is likely to grow in the future.

To address the fifth research question, the co-authorship map of authors should be examined. Einat Heyd-Metzuyanim occupies the center of her own cluster, which appears somewhat isolated from the others. This suggests that she and her collaborators have formed a group focused on their specific research topics. Additionally, Lauren B. Resnick is positioned at the center of the overall map and is connected to 16 out of 19 authors, excluding herself. Therefore, researchers interested in this field can reach out to the mentioned individuals for potential collaboration.

In conclusion, the key figures in the AT model include Lauren B. Resnick as the most influential author, and the publication “Deliberative discourse idealized and realized: Accountable talk in the classroom and in civic life” as the most significant work. The most frequently used keywords are dialogic teaching and classroom discourse. Additionally, current studies in the field mainly focus on professional development and the analysis of talk moves using software. Furthermore, Lauren B. Resnick and Einat Heyd-Metzuyanim are recognized as the most collaborative authors in this area.

This article has two main limitations. The first is that only one database was used for the research. Future studies could provide more detailed insights by incorporating additional databases such as WoS and Dimensions. The second limitation is that the study did not include books and book chapters. Including these sources in future research could yield more comprehensive information about the field.

References

Baker, D. R. (1990). Citation analysis: A methodological review. *In Social Work Research and Abstracts* (Vol. 26, No. 3, pp. 3-10). Oxford University Press. https://doi.org/10.1093/swra/26.3.3

Boyack, K. W., & Klavans, R. (2010). Co-citation analysis, bibliographic coupling, and direct citation: Which citation approach represents the research front most accurately?. *Journal of the American Society for Information Science and Technology, 61*(12), 2389-2404. https://doi.org/10.1002/asi.21419

Calcagni, E., & Lago, L. (2018). The three domains for dialogue: A framework for analysing dialogic approaches to teaching and learning. *Learning, Culture and Social Interaction, 18*, 1-12. https://doi.org/10.1016/j.lcsi.2018.03.001

Cadavid Higuita, L., Awad, G., & Franco Cardona, C. J. (2012). A bibliometric analysis of a modeled field for disseminating innovation. *Estudios Gerenciales, 28*(spe), 213-236. https://doi.org/10.18046/j.estger.2012.1486

Cobo, M. J., Lopez-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: a practical application to the fuzzy sets theory field. *Journal of Informetrics*, *5*(1), 146-166. https://doi.org/10.1016/j.joi.2010.10.002

Durieux, V., & Gevenois, P. A. (2010). Bibliometric indicators: quality measurements of scientific publication. *Radiology*, *Radiological Society of North America*, Vol. 255 No. 2, pp. 342-351. https://doi.org/10.1148/radiol.09090626

HabibAgahi, M. R., Kermani, M. A. M. A., & Maghsoudi, M. (2022). On the Co-authorship network analysis in the Process Mining research Community: A social network analysis perspective. *Expert Systems with Applications, 206*, 117853. https://doi.org/10.1016/j.eswa.2022.117853

Harzing, A. W., & Alakangas, S. (2016). Google Scholar, Scopus and the Web of Science: a longitudinal and cross-disciplinary comparison. *Scientometrics, 106*, 787-804. https://doi.org/10.1007/s11192-015-1798-9

Herrera-Franco, G., Montalván-Burbano, N., Carrión-Mero, P., Apolo-Masache, B., & Jaya-Montalvo, M. (2020). Research trends in geotourism: A bibliometric analysis using the scopus database. *Geosciences, 10*(10), 379. https://doi.org/10.3390/geosciences10100379

Hou, J., Yang, X., & Chen, C. (2018). Emerging trends and new developments in information science: A document co-citation analysis (2009–2016). *Scientometrics, 115*, 869-892. https://doi.org/10.1007/s11192-018-2695-9

Huai, C., & Chai, L. (2016). A bibliometric analysis on the performance and underlying dynamic patterns of water security research. *Scientometrics, 108*(3), 1531–1551. https://doi.org/10.1007/s11192-016-2019-x

Kumar, M., George, R. J., & Anisha, P.S. (2023). Bibliometric analysis for medical research. *Indian Journal of Psychological Medicine, 45*(3), 277-282. https://doi.org/10.1177/02537176221103617

Mas-Tur, A., Roig-Tierno, N., Sarin, S., Haon, C., Sego, T., Belkhouja, M., ... & Merigó, J. M. (2021). Co-citation, bibliographic coupling and leading authors, institutions and countries in the 50 years of Technological Forecasting and Social Change. *Technological Forecasting and Social Change, 165*, 120487. https://doi.org/10.1016/j.techfore.2020.120487

Michaels, S., O'Connor, M. C., Hall, M. W., & Resnick, L. B. (2010). Accountable talk® sourcebook. Pittsburg, PA: Institute for Learning University of Pittsburgh. Murphy, PK, Wilkinson, IAG, Soter, AO, Hennessey, MN, & Alexander, JF. https://doi.org/10.1007/s11217-007-9071-1

Nadi-Ravandi, S., & Batooli, Z. (2022). Gamification in education: A scientometric, content and co-occurrence analysis of systematic review and meta-analysis articles. *Education and Information Technologies, 27*(7), 10207-10238. https://doi.org/10.1007/s10639-022-11048-x

Resnick, L. B., Asterhan, C. S., & Clarke, S. N. (2018). Accountable talk: Instructional dialogue that builds the mind. Geneva, Switzerland: The International Academy of Education (IAE) and the International Bureau of Education (IBE) of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Savić, M., Ivanović, M., &Jain, L. C. (2019). Co-authorship Networks: An Introduction. In: *Complex Networks in Software, Knowledge, and Social Systems*. Intelligent Systems Reference Library, vol 148. Springer, Cham. https://doi.org/10.1007/978-3-319-91196-0_5

Scopus Content Coverage Guide; Elsevier: Amsterdam, the Netherlands, 2020.

Suban, S. A. (2023). Bibliometric analysis on wellness tourism–citation and co-citation analysis. *International Hospitality Review, 37*(2), 359-383. https://doi.org/10.1108/ihr-11-2021-0072

Trujillo, C. M., & Long, T. M. (2018). Document co-citation analysis to enhance transdisciplinary research. *Science Advances, 4*(1), e1701130. https://doi.org/10.1126/sciadv.1701130

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523-538. https://doi.org/10.1007/s11192-009-0146-3

Yalçın, V. (2024). *A program design study whitin the framework of accountable talk model in preparation for mathematics Olympiads* [Unpublished doctoral dissertation] Marmara University

Wang, S. B. (2014). Empirical analysis of the research hotspot in the field of port logistics based on complex network. *Computer Systems & Applications, 23*(7), 246–251.