YOUTUBE AS AN EDUCATIONAL TOOL: INSIGHTS FROM A SCIENTIFIC ANALYSIS

O YOUTUBE COMO FERRAMENTA EDUCACIONAL: INSIGHTS DE UMA ANÁLISE CIENTÍFICA

Odorico Guilherme Veloso da Silva
ORCID 0009-0008-9520-8627
Federal University from Jequitinhonha and Mucuri's Valleys, UFVJM
Diamantina, Brazil
odorico.veloso@ufvjm.edu.br

Marcus Vinicius Carvalho Guelpeli
ORCID 0000-0001-5724-1081
Federal University from Jequitinhonha and Mucuri's Valleys, UFVJM
Diamantina, Brazil
marcus.guelpeli@ufvjm.edu.br

Weslley Luiz da Silva Assis
ORCID 0000-0001-6692-4837
Fluminense Federal University, UFF
Volta Redonda, Brazil
weslleyassis@id.uff.br

Valnides Araujo da Costa
ORCID 0000-0002-4814-4981
Minas Gerais State University
Barbacena, Brazil
valnides.costa@uemg.br

Abstract. This article investigates the use of YouTube as an educational tool through bibliometric analysis. Using the PRISMA 2020 guidelines, the research identified and screened 1,660 publications on the topic, extracted from the Scopus and Web of Science databases, covering the period from 2005 to 2024. The analysis was carried out using the RStudio software together with the Bibliometrix library and revealed a significant growth in scientific production related to the intersection between YouTube and education, highlighting keywords such as "learning", "students" and "videos". In addition, collaborations between authors and institutions were identified, as well as the evolution of research themes over time. The results show that YouTube maintains a central and growing position as an educational resource, reflecting the maturation of research in the area, and provides insights for educators and researchers into the potential of YouTube in the educational context, allowing for a better understanding of trends and collaborations in the use of videos as pedagogical tools.

Keywords: YouTube; Multimedia learning; Bibliometric analysis, Educational technologies.

Resumo. Este artigo investiga a utilização do YouTube como ferramenta educacional mediante uma análise bibliométrica. Utilizando as diretrizes PRISMA 2020, a pesquisa identificou e triou 1.660 publicações sobre o tema, extraídas das bases de dados *Scopus* e *Web of Science*, abrangendo o período de 2005 a 2024. A análise foi feita utilizando o software *RStudio* juntamente com a biblioteca *Bibliometrix* e revelou um crescimento significativo na produção científica relacionada à interseção entre *YouTube* e educação, destacando palavras-chave como "*learning*", "*students*" e "*vídeos*". Além disso, foram identificadas colaborações entre autores e instituições, bem como a evolução dos temas de pesquisa ao longo do tempo. Os resultados mostram que o *YouTube* mantém uma posição central e crescente como recurso educacional, refletindo um amadurecimento da pesquisa na área e fornecem *insights* para educadores e pesquisadores sobre o potencial do *YouTube* no contexto educacional, permitindo uma melhor compreensão das tendências e colaborações no uso de vídeos como ferramentas pedagógicas.

Palavras-chave: YouTube; Aprendizagem multimídia; Análise Bibliométrica; Tecnologias Educacionais.

1. INTRODUCTION

The digital age, characterized by ubiquitous technological integration into daily life, has demonstrably transformed labor markets, communication patterns, interpersonal relationships, and, most importantly, educational paradigms (Bates, 2016). This era has witnessed an exponential surge in the demand for technological competencies, necessitating the exploration of novel knowledge acquisition methods. Consequently, online learning has become a cornerstone for both professional and personal development.

Within the diverse landscape of online learning tools, YouTube, a pre-eminent video-sharing platform with a global reach, has emerged as a powerful educational resource. Its expansive library of educational content and tutorials, readily accessible cost-effectively and conveniently, fosters the development of a multifaceted educational ecosystem. Allocca (2018) posits that YouTube's societal impact, particularly on communication dynamics, surpasses that of any other social network, fundamentally altering human behavior and social interactions.

This paper leverages a bibliometric analysis to map scientific output at the nexus of YouTube and education. By employing this methodology, the present study seeks to illuminate the following research questions:

a) What is the temporal trajectory of scientific literature about the utilization of YouTube for educational purposes?
b) Which publication venues have garnered the most prominence within the academic community engaged in YouTube-related educational research?
c) How has the thematic landscape of research on this topic evolved since 2005?

Deciphering the dynamics of scholarly publications in this domain can equip educators and researchers with valuable insights, empowering them to harness the full potential of YouTube as a pedagogical tool. From the results, it is expected to define the state of the art regarding the theme, so that it can be utilized in future studies.

2. THEORETICAL FRAMEWORK

The proliferation of information and communication technologies (ICTs) has undeniably augmented access to information, social interaction, and distance education (Nascimento et al., 2017). Our digital age, characterized by ubiquitous technology (Bates, 2016), leverages the vast trove of data on the World Wide Web to propel educational advancements. However, this abundance of content presents a double-edged sword; while it offers a wealth of material, it can also overwhelm users, hindering efficient information retrieval (Miranda, 2004).

Miranda (2004) aptly highlights that the educational landscape, despite witnessing a surge in educational content creation, often struggles with discoverability, making it a laborious and sometimes futile task to locate relevant materials.

Henry Jenkins (2009), in his seminal work Convergence Culture, prominently features YouTube videos to illustrate his concepts. The latest edition even includes a dedicated section titled “Youtubology” which presents a curated list of relevant videos with their titles and links (Jenkins, 2009). As Thees (2021) suggests, a morphological analysis of the term “Youtubology” reveals its focus on the study of YouTube within various contexts. In the educational domain, Youtubology specifically refers to the strategic integration of YouTube in the teaching and learning process to enrich educational experiences.

While not originally designed as a knowledge repository, YouTube has gradually evolved to fulfill this role (Thees, 2021). This transformative shift can be attributed to several factors, including our growing immersion and dexterity with digital technologies, particularly social media (Bates, 2016). Additionally, our inherent curiosity and inquisitive nature, as highlighted by Allocca (2018), have propelled YouTube towards becoming a viable platform for knowledge acquisition.

Bates (2016) underscores the paramount importance of independent learning skills in the digital age. These skills encompass the ability to not only utilize technology but also critically evaluate information needs and locate pertinent resources. The ubiquity of smart devices and constant connectivity necessitates the development of these new skill sets. Individuals must progress beyond mere users and assume a position of control within the technological landscape. Essential skills in this domain include computational thinking, data analysis, and proficiency in programming languages. Programming has become a transversal skill due to its

applicability across various technology-driven careers. By mastering computational thinking and computer programming, professionals cultivate the ability to think systematically and exert greater control over technological tools.

YouTube, a video-sharing platform, boasts a staggering 1.45 billion monthly visitors and ranks as the second most accessed website in Brazil and globally. With approximately 2.5 billion registered users, it's also the second most-used social network worldwide[1] (Kemp, 2024). Ashraf (2009) observes a generational shift, with students (the "Google-YouTube generation") adeptly using portable devices to access both platforms concurrently, even during class time.

David Ausubel's theory of meaningful learning posits that new knowledge is most effectively assimilated when it can be anchored to existing concepts within the learner's cognitive structure. Bates (2016) further differentiates knowledge into two key components: content and skills, which are interrelated yet distinct entities.

This convergence of YouTube and education, fueled by the integration of digital technologies, opens exciting new frontiers in the learning landscape. As one of the largest video-sharing platforms (Kemp, 2024), YouTube presents a valuable resource for educators and students across diverse fields. This is particularly pertinent for programming skills, which have witnessed exponential growth due to digitalization and the pervasive influence of technology. Platforms like YouTube play a pivotal role in democratizing access to coding education, empowering individuals from various backgrounds to acquire these in-demand skills.

The integration of YouTube into the educational landscape fosters a rich ecosystem of didactic resources. This platform offers a plethora of channels specifically dedicated to educational content, promoting a more engaging and interactive learning experience compared to traditional text-based or classroom instruction. The opportunity for visual learning through videos caters to diverse learning styles and can potentially enhance knowledge retention. Furthermore, YouTube facilitates networking through comment sections and discussion forums, enabling students and educators to engage in dialogue around the presented video content. This inherent flexibility and accessibility empower learners to set their own pace and revisit materials as needed, fostering self-directed learning.

To ground this work theoretically, we draw upon established learning theories that intersect with the domains of education and cyberculture. The works of Ausubel (1963), McLuhan (1987), McLuhan & Powers (1992), Santaella (2013), and Mayer (2020) all provide compelling evidence for the interconnectedness of communication and information technologies (CITs) with educational practices. YouTube exemplifies a contemporary manifestation of online multimedia, and its unique design undoubtedly shapes user engagement and perception of such content.

The Cognitive Theory of Multimedia Learning (CTML), developed by Richard E. Mayer and his colleagues, is informed by over two decades of empirical research conducted at the University of Cambridge. Mayer's (2020) core hypothesis posits that the combination of words and images leads to more effective learning outcomes compared to text alone. However, this theory emphasizes the adherence to specific principles to optimize learning. These principles focus on reducing extraneous cognitive processing (minimizing irrelevant information), managing essential cognitive processing (focusing on key information), and promoting generative cognitive processing (encouraging learners to actively construct meaning) (Mayer, 2020).

[1] Data for the year 2023.

In his seminal work, Understanding Media: The Extensions of Man, McLuhan (1987) famously proposed the notion that "the medium is the message." This suggests that the chosen communication channel inherently shapes the impact of the message itself. McLuhan argues that technological mediums trigger sensory and neurological changes, influencing user actions and perceptions of the information conveyed. Content, therefore, takes on distinct characteristics based on the transmission medium. These mediums, functioning as extensions of human senses, can be viewed as "technical prostheses." Smartphones, for instance, can be understood as extensions of our hands. McLuhan ultimately contends that all technological tools, from books to television and the internet, have a profound influence on human development.

Santaella's (2013) semiotic analysis aligns with Mayer's (2020) CTML theory by highlighting the significance of visual learning. Her concept of "screen readers" suggests that users develop competencies in interpreting visual information alongside traditional textual literacy. This resonates with Mayer's emphasis on the effectiveness of combining words and images in educational materials. Furthermore, Santaella's work complements McLuhan's (1987) notion of "the medium is the message" by proposing that each medium fosters a distinct reader type. The ubiquity of mobile devices and internet access has created a new media landscape where content creators must compete for user engagement in a dynamic environment.

3. DATA AND METHODS

This study employs a bibliometric analysis to investigate the evolving relationship between the YouTube platform and the teaching-learning process. Scopus[2] and Web of Science[3] were chosen as the primary databases due to their comprehensiveness and established reputation in scholarly literature analysis.

Bibliometrics is a quantitative analysis methodology aimed at measuring and evaluating scientific production through indicators such as the number of publications, citations, and collaboration patterns among researchers. Originating from library science and information science studies, it utilizes statistical tools to identify research trends, map co-authorship networks, and determine the impact of articles and journals. Pritchard (1969) asserts that bibliometrics facilitates the understanding of the dynamics of knowledge production and dissemination, offering a broad and structured view of the development of a scientific field. The R package Bibliometrix[4] provides a set of tools for quantitative research in bibliometrics and scientometrics. It is written in the R language, which is an open-source environment and ecosystem. For scientific computing, the main reasons for preferring R over other languages include the availability of substantial and effective statistical algorithms, access to high-quality numerical routines, and integrated data visualization tools (Aria & Cuccurullo, 2017).

The analysis period used starts from 2005, as the YouTube platform was launched in that year. Today, it is the second most visited site and the most widely used video entertainment application globally, with the number of active monthly users at 2.5 billion (Kemp, 2024).

Following the PRISMA 2020 guidelines (Page et al., 2021), a systematic search strategy will be employed to identify relevant literature. Initial search strings in Scopus and Web of Science will target articles published between 2005 and 2024 containing the keywords "YouTube" and "education" or "learning" (details of search strings will be included). Furthermore, filters will be applied to limit the search results to publications within the fields of education, social science, and computer science. The retrieved data will be analyzed using

[2] https://www.scopus.com/
[3] https://www.webofscience.com/
[4] https://www.bibliometrix.org/

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appropriate bibliometric software to uncover publication trends, authorship patterns, and prominent research themes related to YouTube and education.

The PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) were used to select the literature related to using YouTube as an educational tool. The PRISMA guidelines are based on 3 main steps, entitled Identification, Screening, and Final Inclusions, as shown in Figure 1. In the identification phase, the advanced search resource of the selected databases was used. Initially, the search was made by keywords inserted in the search strings, in Scopus: "TITLE-ABS-KEY(youtube AND (education OR learning)) AND PUBYEAR > 2005 AND DOCTYPE(ar)" with a return of 3,339 records, and in Web of Science: "(((TS=(youtube AND (education OR learning))) AND PY=(2005-2024)) AND DT=(Article))" with a return of 2,833 records. Still, in the identification phase, the filter was refined to limit the records to sources with an educational, social science, and computer science scope, using the "Subject area" fields in Scopus and "Research Areas" in the Web of Science.

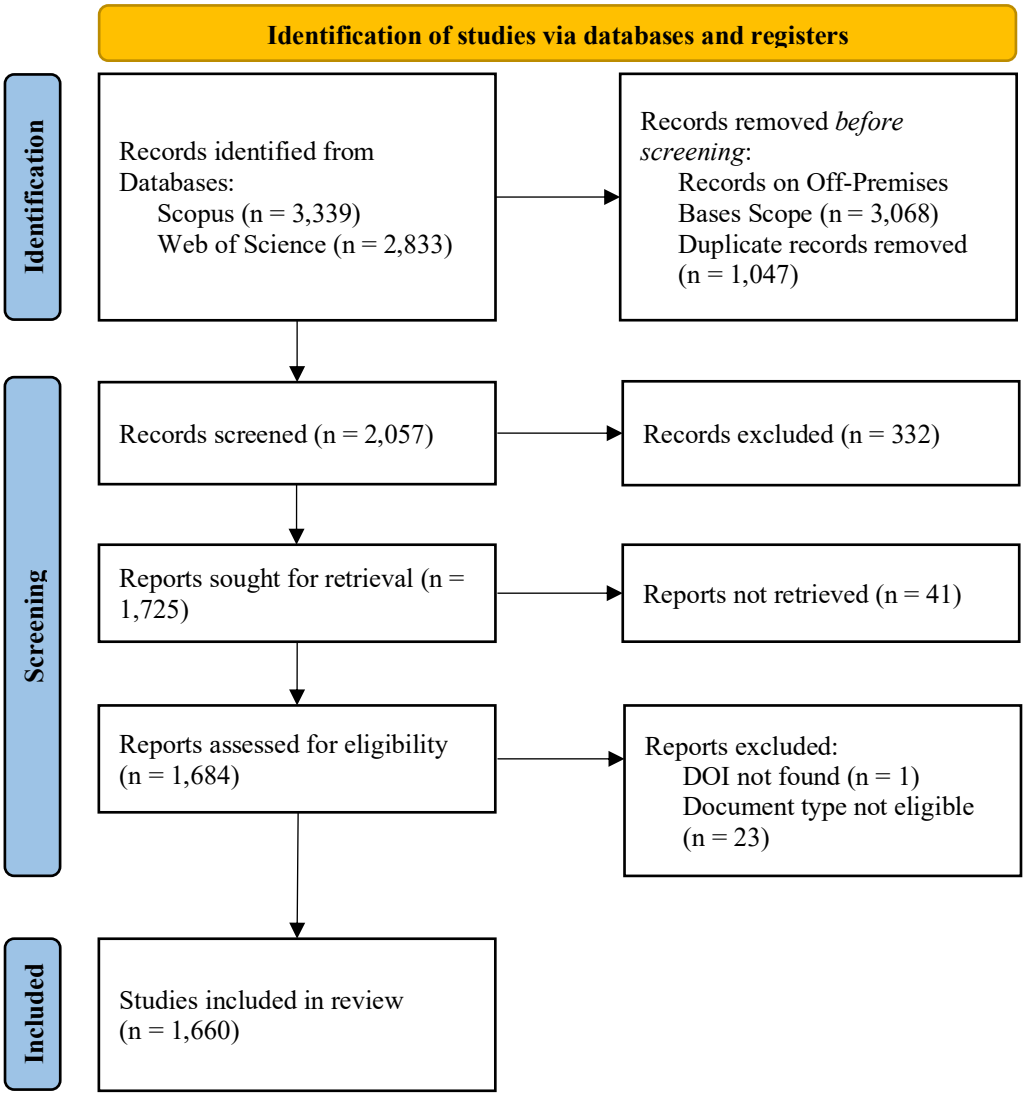

Figure 1. PRISMA 2020 Flow Diagram – Identification of studies through databases.

1.1 Screening Process

The screening process focused on the thematic relevance and key characteristics of the retrieved articles. In the first stage, titles and abstracts were screened to ensure they contained the keywords from the initial search string: "YouTube AND (education OR learning)". This

initial screening eliminated 332 articles. Next, the language of the remaining articles was examined, with only publications in English, Spanish, or Portuguese retained. This step resulted in the exclusion of 44 additional articles. Finally, a review of the remaining publications identified one article lacking a DOI identifier and 23 that were not classified as articles (e.g., book reviews, editorials). Following the application of these inclusion/exclusion criteria, a total of 1,660 publications were deemed relevant for the bibliometric analysis, as illustrated in Figure 1.

1.2 Data Analysis

The RStudio software and the Bibliometrix library were employed to analyze the sample of 1,660 publications. This analysis aimed to extract key indicators relevant to the research objectives. Table 1 provides an overview of the sample analyzed using RStudio software.

Table 1. Sample Analyzed.

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2007:2024
Sources (Journals, Books, etc)	841
Documents	1,660
Annual Growth Rate %	24.5
Document Average Age	4.16
Average citations per doc	17.22
References	6,722
DOCUMENT CONTENTS	
Keywords Plus (ID)	4,424
Author's Keywords (DE)	4,970
AUTHORS	
Authors	4,741
Authors of single-authored docs	242
AUTHORS COLLABORATION	
Single-authored docs	268
Co-Authors per Doc	3.28
International co-authorships %	1.506
DOCUMENT TYPES	
article	1,660

4. RESULTS

4.1. Research Productivity and Geographic Distribution

This bibliometric analysis mapped scientific literature on the use of YouTube as an educational tool. The analysis yielded insights into various aspects of research productivity and geographic distribution.

4.2. Geographic Distribution

The analysis identified scholarly output related to YouTube and education from 84 countries. The United States emerged as the most productive nation, contributing approximately 15% of the publications. China followed closely with 7.5%, while India, Spain,

and the United Kingdom each accounted for roughly 5% of the global output. Brazil ranked tenth, contributing 2.3% of the publications (Figure 2).

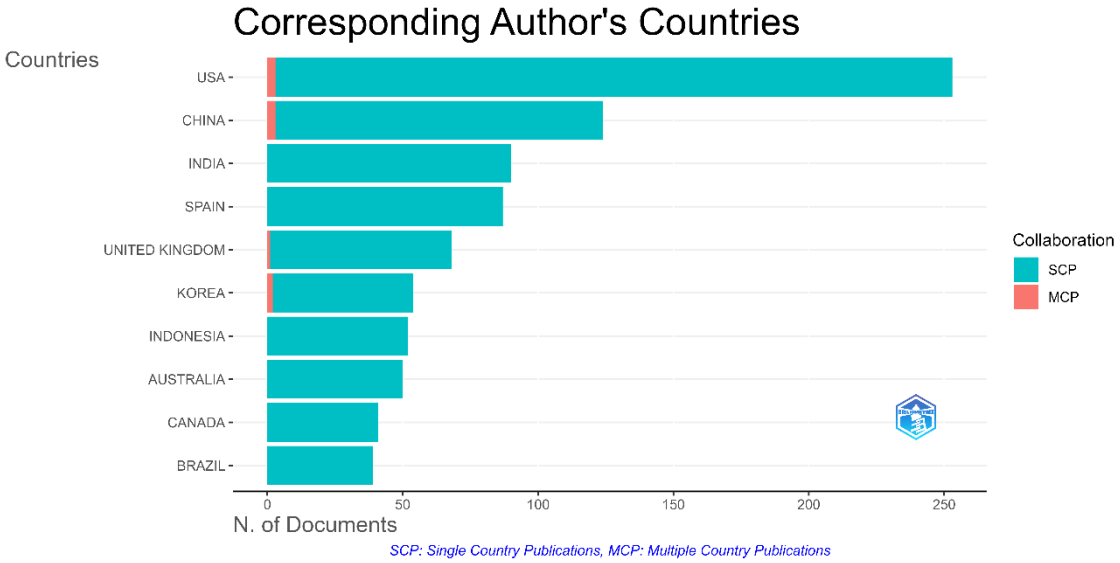

Figure 2. Most relevant countries.

4.3. Publication Trends

The data reveal a steady increase in scientific production on the use of YouTube in education over the past 17 years (2007-2024). There was an absence of publications between 2005 and 2006, coinciding with the launch year of YouTube. This initial period was followed by a significant rise in publications, with the number of studies growing from just 7 in 2007 to over 1,660 in 841 sources by 2024. This exponential growth trajectory underscores the growing recognition of YouTube's potential as an educational tool. Figure 3 visually depicts this trend, with an estimated annual growth rate of approximately 24.5%. A notable acceleration in publication volume is observed from 2018 onwards, coinciding with the launch of the YouTube EDU Channel. The year 2020 also witnessed a surge in publications, potentially linked to the global COVID-19 pandemic and the increased reliance on online learning strategies. It is important to note that data for the full year 2024 is excluded from Figure 3 due to the analysis being conducted in June of that year.

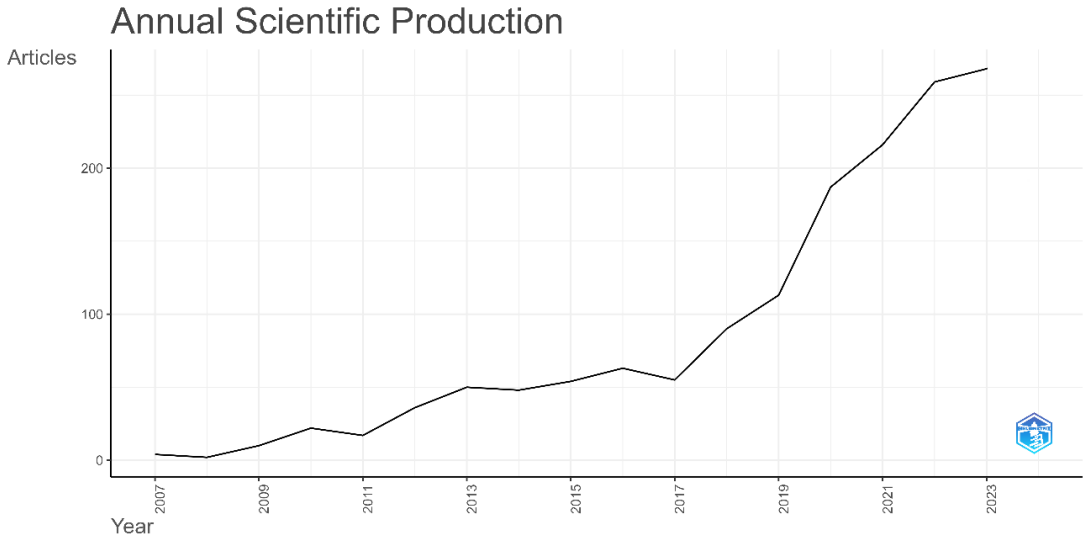

Figure 3. Growth rate of scientific production.

Br. J. Ed., Tech. Soc., v.17, n.4, Oct-Nov, p.1444-1459, 2024
DOI http://dx.doi.org/10.14571/brajets.v17.n4.1444-1459
ISSN 2316-9907

Table 2 presents the productivity index of countries researching the use of YouTube in education. The United States emerges as the leader in this field, with 424 publications and a total of 4,524 citations during the analyzed period. China follows closely with 160 publications and 2,689 citations. Interestingly, Spain boasts a higher number of publications (155 documents) compared to the United Kingdom, China, Australia, South Korea, and Canada. However, these latter countries surpass Spain in terms of total citations received within the timeframe of this study.

Table 2. Country Productivity Index

Classification	Country	Articles	Total Citation
1	USA	424	4.524
2	China	160	2.689
3	Spain	155	774
4	UK	124	2.868
5	India	113	913
6	Brazil	97	223
7	Australia	91	1.088
8	Indonesia	68	169
9	Germany	59	382
10	South Korea	56	1.053

Figure 4 depicts the growth trajectory of scientific production amongst the leading countries analyzed. Visualization reveals a generally upward trend in the number of publications across all countries throughout the analyzed period. However, the rate of growth varies significantly between nations.

The United States and Australia demonstrate a pattern of consistent publication output throughout the timeframe. In contrast, Brazil and South Korea's publication activity only commenced in 2012. Similarly, Indonesia's first publication on the subject appeared in 2019. These observations suggest potential emerging research interests in these latter countries concerning using YouTube for educational purposes.

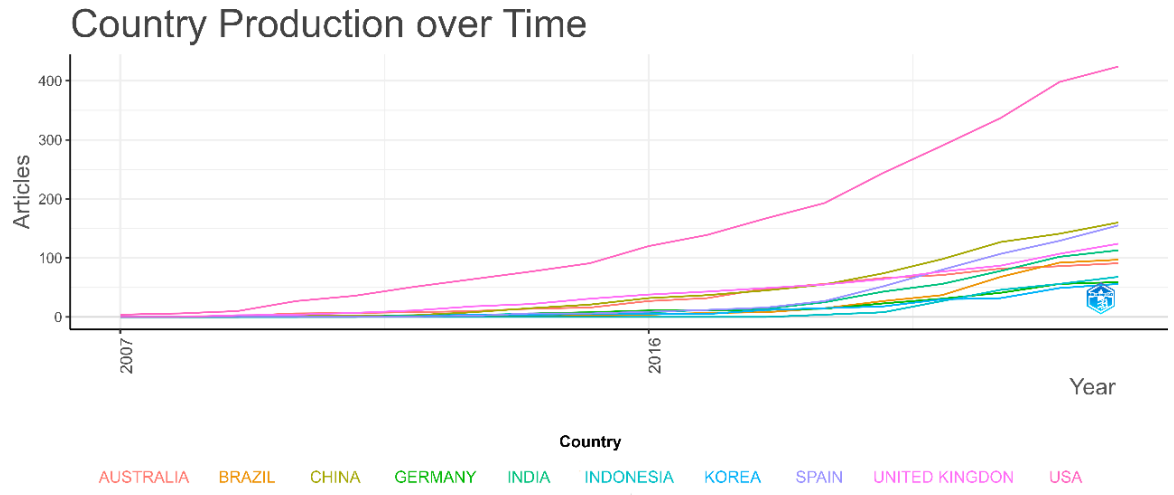

Figure 4. Production by country over time.

4.4. Analysis of Publication Outlets

The analysis identified the dominance of internationally peer-reviewed journals as the primary outlets for research on YouTube and education. This finding suggests that interest in YouTube's educational potential is a widespread global phenomenon. Figure 5 presents the journals that published the highest number of articles within the analyzed timeframe.

IEEE Access, a prominent open-access, multidisciplinary journal, emerges as the leader with 46 publications on the subject. This is followed by the discipline-specific journals Journal of Chemical Education (30 publications) and Multimedia Tools and Applications (25 publications). The presence of both specialized and multidisciplinary journals highlights the cross-cutting nature of research in this field.

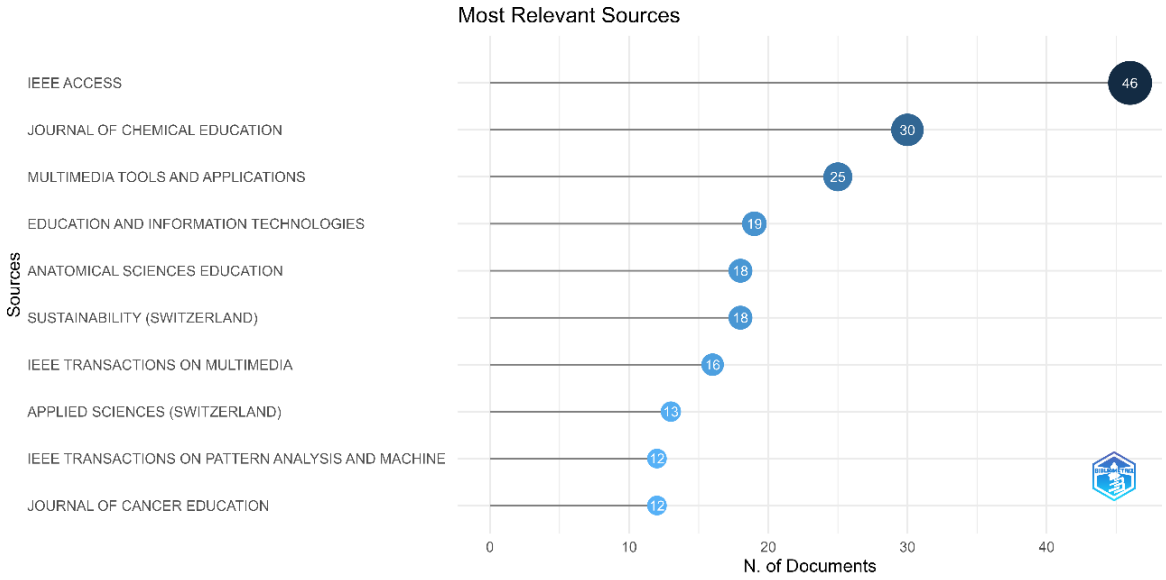

Figure 5. Most relevant sources.

Table 3 details the publication outlets with the highest citation counts, their initial year of publishing on the topic of YouTube and education, and their corresponding h-index values.

IEEE Access retains its leading position, garnering 1460 citations within the analyzed period despite commencing publication on the topic in 2017. This is further corroborated by its h-index of 15, indicating a high degree of scholarly impact for its relatively young body of research on YouTube and education.

The table reveals a trend of established journals publishing on the subject at an earlier date. Examples include IEEE Transactions on Multimedia, Journal of Chemical Education, Anatomical Sciences Education, Computers & Education, and Sustainability (Switzerland). These journals boast h-index values ranging from 14 to 10, suggesting a solid foundation of research in their respective disciplines.

Table 3. Sources Local Impact.

Source	Year	Citation	h-index
IEEE Access	2017	1460	15
IEEE Transactions on multimedia	2010	786	14
Journal of chemical education	2012	572	13
Anatomical sciences education	2012	996	12
Computers and education	2013	1234	11
Sustainability (Switzerland)	2019	218	10

IEEE Transactions on image processing	2013	344	9
IEEE Transactions on pattern analysis and machine intelligence	2012	999	9
Multimedia tools and applications	2013	250	9
Computers in human behavior	2014	420	8

4.5. Highly Cited Articles

Table 4 presents the 10 most cited articles on the use of YouTube in education, published within the Scopus and Web of Science databases between 2005 and the analysis period. These articles collectively account for 14.23% of all citations within the analyzed dataset, highlighting their prominence in the field. This finding is unsurprising given their publication in relevant journals.

A closer look at the table reveals that the article by Thelwall et al. (2012) holds the distinction of having the highest total number of citations (C). In contrast, the article by Ullah et al. (2017) boasts the highest citation count per year (CA). These observations potentially point towards a growing interest in leveraging social media platforms for educational purposes and employing sentiment analysis techniques in research.

Table 4. Most cited articles.

Title	Authors	Year	Source	C	CA
Sentiment strength detection for the social web	Thelwall, Mike and Buckley, Kevan and Paltoglou, Georgios	2012	Journal of the American Society for Information Science and Technology	857	65,92
Action Recognition in Video Sequences using Deep Bi-Directional LSTM with CNN Features	Ullah, Amin and Ahmad, Jamil and Muhammad, Khan and Sajjad, Muhammad and Baik, Sung Wook	2017	IEEE Access	576	72
User acceptance of YouTube for procedural learning: An extension of the Technology Acceptance Model	Lee, Doo Young and Lehto, Mark R.	2013	Computers and Education	396	33
Using online social networking for teaching and learning: Facebook use at the university of cape town	Bosch, Tanja E.	2009	Communicatio	386	24,13
Stereo magnification: Learning view synthesis using multiplane images	Zhou, Tinghui and Tucker, Richard and Flynn, John and Fyffe, Graham and Snavely, Noah	2018	ACM Transactions on Graphics	375	53,57
Algorithmic content moderation: Technical and political challenges in the automation of platform governance	Gorwa, Robert and Binns, Reuben and Katzenbach, Christian	2020	Big Data and Society	348	69,60
Hierarchical Clustering Multi-Task Learning for Joint Human Action Grouping and Recognition	Liu, An-An and Su, Yu-Ting and Nie, Wei-Zhi and Kankanhalli, Mohan	2017	IEEE Transactions on Pattern Analysis and Machine Intelligenc	322	40,25
Facebook and the others. Potentials and obstacles of Social Media for teaching in higher education	Manca, Stefania and Ranieri, Maria	2016	Computers and Education	305	33,89

Online learning readiness among university students in Malaysia amidst Covid-19	Chung, Ellen and Subramaniam, Geetha and Dass, Laura Christ	2020	Asian Journal of University Education	274	54,80
Emotion recognition in conversation: Research challenges, datasets, and recent advances	Poria, Soujanya and Majumder, Navonil and Mihalcea, Rada and Hovy, Eduard	2019	IEEE Access	270	45

4.6. Analysis of Abstract Word Frequency

Figure 6 presents the results of a unigram analysis of the abstracts of the retrieved publications. This analysis unveils the 10 most frequently occurring words. As anticipated, terms directly related to the research topic, such as "learning," "YouTube," "students," "videos," and "social," dominate the word cloud. The high frequency of these terms validates the research focus on exploring YouTube's potential as an educational tool.

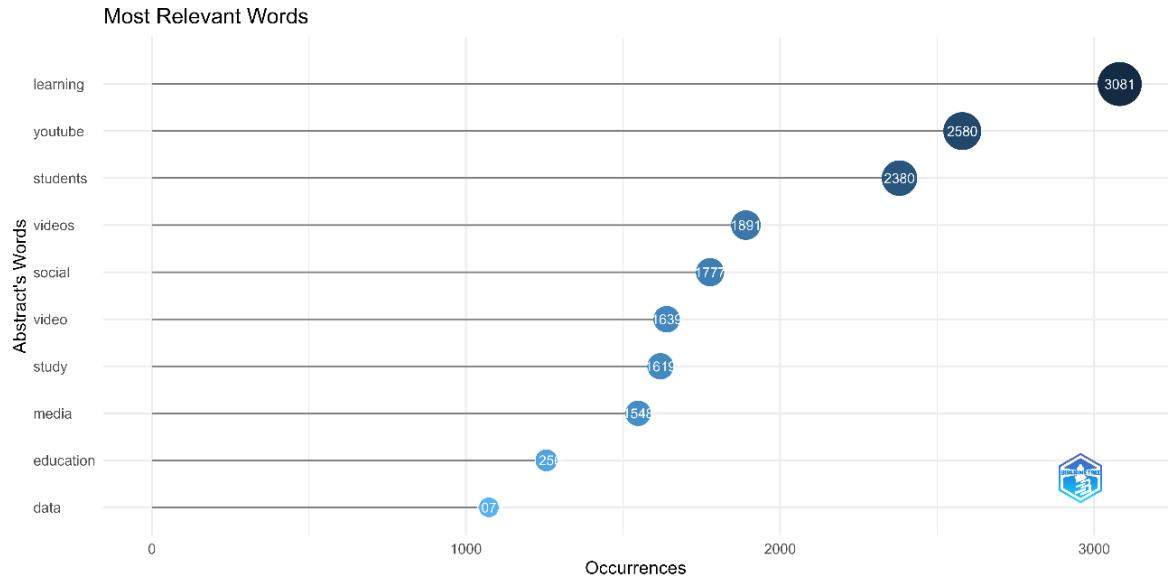

Figure 6. Most frequent words.

4.7. Word Frequency in Abstracts vs. Titles

Figures 7 and 8 offer a comparative perspective on word frequency within the analyzed publications. Figure 7 depicts a word cloud generated based on the most frequent terms appearing in the abstracts. Here, terms directly related to the research focus, such as "YouTube," "learning," and "students," dominate. This aligns with the expectation that abstracts provide a concise overview of the research topic and methodology.

In contrast, Figure 8 presents a word cloud based on the most frequent terms within the titles of the analyzed publications. Interestingly, the emphasis here shifts slightly towards broader terms, with "education" emerging as the most prominent word, followed by "YouTube" and "learning." This observation suggests that titles may prioritize capturing the overall educational context of the research, while abstracts delve deeper into the specific details of using YouTube for learning purposes.

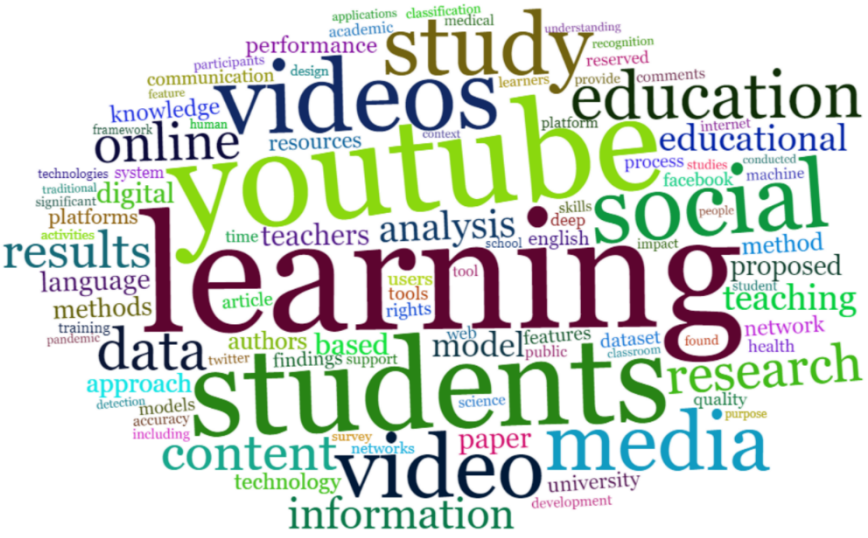

Figure 7. Most frequent words in Abstracts.

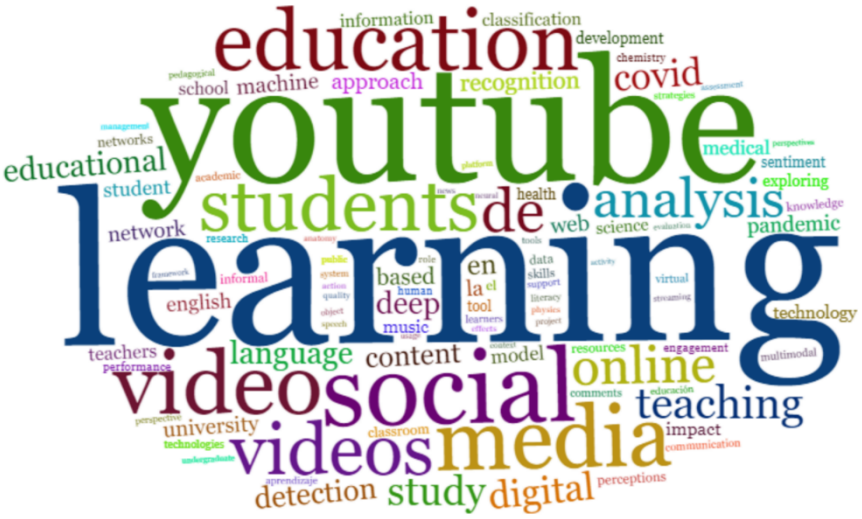

Figure 8. Most frequent words in the Titles.

Figures 9 and 10 delve into the thematic landscape of the analyzed publications, providing insights into the evolution of research on YouTube and education.

Figure 9 illustrates the thematic niches identified in the analysis, with "YouTube" positioned as the central theme. Surrounding this core concept are terms like "learning," "study," "education," and "students," all demonstrating strong relationships with "YouTube." This visualization underscores the enduring presence of YouTube as a central theme throughout the analyzed period, consistently linked to various educational contexts.

4.8. Summary of Thematic Trends

The analysis of publication topics reveals a distinct evolution over time. The initial research efforts primarily focused on establishing the feasibility of YouTube as an educational tool. However, over time, the research landscape has become more diversified, encompassing specific teaching methodologies, educational effectiveness analyses, and case studies within various educational contexts.

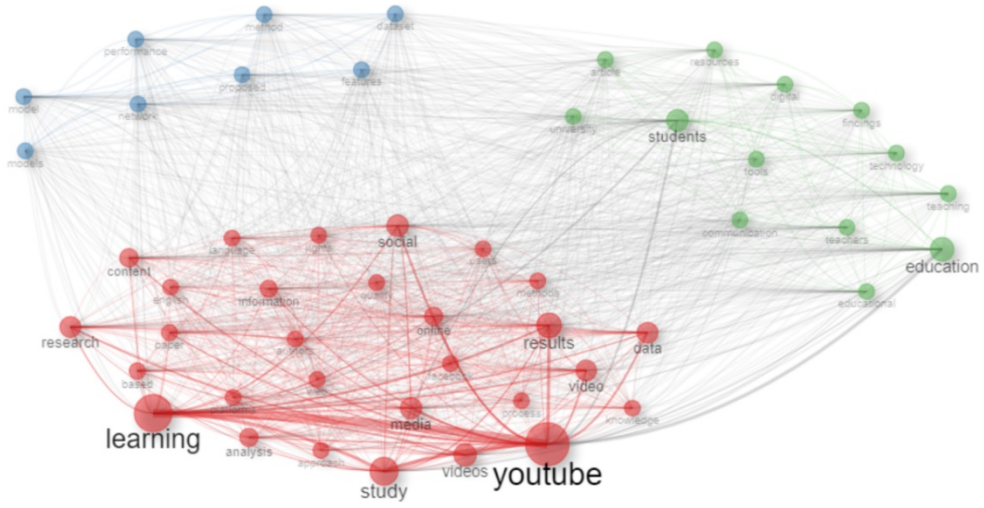

Figure 9. Co-occurrence Network.

Figure 10 sheds light on the evolution of research themes. The emergence of terms like "learning" signifies a broadening of the research focus beyond the initial feasibility studies on YouTube as an educational tool. Meanwhile, the continued presence of established themes like "YouTube," "videos," "education," "students," and "study" suggests a maturation of research in this field. This trend is further corroborated by the increasing number of sophisticated and empirical studies published in recent years, as researchers delve deeper into the use of social media for educational purposes.

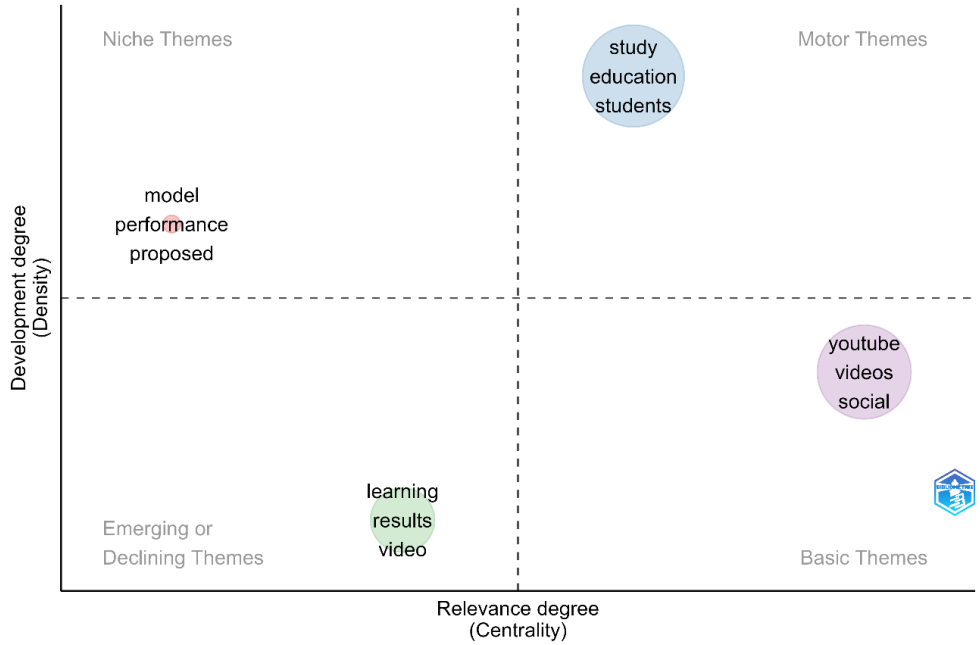

Figure 10. Thematic map.

5. DISCUSSION

This study aimed to map the scientific literature on the use of YouTube as an educational tool from 2005 to 2024. The results reveal a significant increase in research activity, with publication volume exhibiting a steady increase, growing from just 7 studies in 2007 to over 1,660 studies in 2024. This aligns with the rising popularity of YouTube and its integration

into educational settings. Interestingly, the analysis identified North America, Asia, and Europe as the leading regions in both YouTube research and active user base (Kemp, 2024). This finding suggests a potential correlation between robust digital infrastructure and the production of research on the pedagogical applications of YouTube. These results echo prior studies on the educational use of other social media platforms, such as Facebook (Manca & Ranieri, 2016; Lopes et al., 2017; Barrot, 2018) and Twitter (Malik et al., 2019), which also identified these regions as leading research producers. Similarly, studies examining multiple platforms (Manca, 2020; Barrot, 2020) highlight the continuous evolution of the social media and education research landscape. Overall, this study contributes to a growing body of knowledge concerning the ways educators are leveraging YouTube as a tool for enhancing learning experiences.

The growing popularity and user base of the YouTube platform since its launch in 2005 (Burgess & Green, 2009; Allocca, 2018; Kemp, 2024) coincides with the rise in scientific production on its educational applications. Within a year, the video-sharing platform attracted almost 20 million users, and this number has grown exponentially, reaching over 2 billion monthly active users by 2024. This surge in user engagement parallels an increase in scientific research on the pedagogical use of the platform, indicating that educators and academics are actively exploring ways to integrate YouTube's capabilities into their teaching practices to reach wider and more diverse audiences (Ashraf, 2009; Sherer & Shea, 2011; Sawant, 2012; Tamim, 2013). Research efforts are likely to focus on aspects such as the effectiveness of YouTube in learning, instructional design strategies for using YouTube in the classroom, and student engagement with YouTube content.

The analysis revealed that many YouTube-related educational publications are empirical articles published in international peer-reviewed journals. This finding suggests the applicability of YouTube across diverse educational contexts, ranging from elementary school to higher education and even professional settings. While most empirical studies have focused on practical applications and outcomes (Veletsianos et al., 2019), the field is witnessing the emergence of systematic reviews, indicating a growing focus on evidence-based evaluation.

Furthermore, the data show a variation in the use of different types of educational videos over time and an expansion of thematic focuses. The continuous rise in YouTube's popularity, attracting new users and offering new features, coupled with the increasing sophistication of educational technology platforms that promote interactive and adaptable learning methods, likely contribute to the observed diversification in video types and thematic foci of research.

Finally, YouTube's success as an educational tool can be attributed to a unique confluence of factors: a vast user base, a multitude of interactive features that enhance learning experiences, and widespread global adoption. These factors also contribute to the growing prominence of other social networks like Twitter and TikTok in the educational landscape.

6. CONCLUSION

In recent years, scientific production on using YouTube in education has witnessed a significant surge, emphasizing its potential to contribute to the growth of online learning. While core research themes like 'learning,' 'education,' 'students,' 'videos,' and 'study' remain prominent, the field is likely witnessing a diversification of research interests beyond initial feasibility studies.

The United States leads research production, followed by countries like China, India, Spain, and the UK. Despite a lower rate of international co-authorship, the presence of research from various countries underscores the global recognition of YouTube's educational value. This highlights the potential for increased international collaboration to foster knowledge sharing of innovative practices.

The substantial number of publications (1,660) authored by a diverse range of researchers (4,741) signifies a thriving and dedicated research community actively exploring the pedagogical affordances of YouTube.

The results emphasize the potential of incorporating well-chosen educational videos to enrich lessons, fostering deeper engagement among students. Furthermore, encouraging the creation of high-quality educational content on YouTube can contribute to a more comprehensive and accessible global knowledge base for learners everywhere.

To maximize the educational benefits of YouTube, future research should prioritize developing methods for assessing the platform's effectiveness across diverse educational contexts and student demographics. Additionally, exploring how different video types can influence learning outcomes will provide valuable insights for educators seeking to optimize their instructional practices using YouTube.

In summary, this study demonstrates that YouTube has become increasingly relevant around education, presenting a significant potential to transform the learning process. Continuing research in this area is crucial to ensuring YouTube is employed efficiently and innovatively. Expanding international collaborations and utilizing a variety of methodological approaches will be key to improving our understanding and use of YouTube as a powerful educational tool.

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