

# **Intention To Study STEM Among Youth: A Bibliometric Analysis**

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## **Abstract**

The demand for STEM education has increased in the twenty-first century's technological era. Researchers' interest has increased in intention to study STEM research field. In order to analyze the development of this research field, this study will do a citation analysis of publications titled "Intention to study STEM among youth" that have been published in educational journals and are available on the Web of Science (WoS) database. We used the Web of Science database to conduct a bibliometric study of 122 papers on the topic 'the intention to study STEM' that were published in scholarly journals. VOSviewer was used in this study to assess and perform a bibliometric analysis. Annual trends, journals, publishers, research fields, publishing sources, organizations, keywords, categories, and researchers were all taken into account in statistical analyses of publications. The analysis revealed that: (1) Developed nations including the United States, Spain, Israel, and Germany accounted for the majority of STEM research intentions. (2) The three top most commonly appearing keywords for intention to study STEM literature were STEM, career choice, and gender. (3) Education and educational research were commonly linked to the intention to study STEM literature. The findings support the inclusion of the intention to study STEM from larger geographical contexts and point to the necessity for more multidisciplinary and cross-disciplinary studies on this topic.

## **Keywords**

Intention to study STEM, Bibliometric Analysis, Review of research, and Career Choice

## **1. Introduction**

STEM stands for science, technology, engineering, and mathematics. These four areas are separate but related. STEM-trained workers boost the economies of many nations by encouraging innovation, enhancing the standard of living, and boosting exports. (Li et al. 2021). The Organization for Economic Cooperation and Development (2012) found that many countries have changed the focus of their educational policies to encourage more students—particularly those from underrepresented groups and bright young people—to chase careers in the STEM fields. The significance of STEM fields has motivated stakeholders, such as researchers, educators, and policymakers, to support students' fascination with and attainment with these fields. Similar efforts have been undertaken to develop laws and initiatives that would promote STEM perseverance in youngsters, especially those who are preparing for college and are close to finishing secondary school (Watt & Eccles 2008). In order to guide such policies and programs, it therefore seems critical to have an understanding of the factors that might be crucial in determining student persistence in STEM. Because different dynamics (such as new techniques, regulations, and programs) are continuously developing and may have varying effects on the STEM future of every country in the world (Sahin et al. 2018). The focus of this work is to assess the development of this research area by doing a bibliometric analysis of works published in educational journals on "Intention to study STEM among youth". Web of Science database will be used for the bibliometric analysis.

Bibliometric analysis on the topic "intention to study STEM among youth" will have several advantages. Starting with, it will help to identify the trend in the development of published articles. Second, it helps in identifying the leading scientists working in the STEM field as well as the most popular places to find scientific articles. For example, It highlights the authors and institutions that have published the most, as well as fresh research interests and potential research success, and identifies which institutions are more invested in this subject, and more (Mazlounian 2012). Finally, bibliometrics can help researchers locate academic researchers and institutions with which to interact, as well

as potential study topics (Martínez et al. 2015). Each publication in Web of Science (WoS) has a thorough review procedure, making it an extensive and trustworthy bibliographical resource (Chain et al.2019).

### **1.1 Objectives**

Analyzing research articles on the topic “Intention to study STEM among youth” that were published in the WoS database between 2010 and 2023 is the aim of this study. This study reveals important facts on which researchers have concentrated their efforts by examining the intention to study STEM articles. It may be used as a reference for future research pathways. The following four research concerns are listed in this study:

RQ1: What was the yearly pattern in the intention to study STEM publications?

RQ2: What were the most well-known institutions, nations, and sources of publications?

RQ3: What was the intention to study STEM research's classification, categories, and keywords?

RQ4: What were the top five papers in terms of citations?

## **2. Methods**

### **Resource**

In order to provide a comprehensive range of pertinent articles, the search was built to recover pertinent articles published until the year 2023. This study examined the intention to study STEM-related papers that were indexed in the WoS database using citation analysis.

The search for publication was conducted using the advanced search option of Web of Science on 19th September 2023 using the keywords TS= (("STEM") AND ("CAREER CHOICE" OR "CAREER MOTIVATION" OR "CAREER ASSESSMENT" OR "CAREER INTENTION") AND ("STUDENTS" OR "ADOLESCENTS" OR "HIGH SCHOOL STUDENTS" OR "YOUTH")). Only English-language publications were included in the search.

### **Exclusion Criteria**

Publications that were not written in English (n = 2) were not included in the bibliometric analysis according to our criteria for excluding publications from this study.

## **3. Data Collection**

A total of 122 publications were chosen from the Web Of Science (WOS) database, including 1 editorial piece, 2 review articles, 1 book chapter, and 118 articles. For further study, these 122 articles were ranked from high to low in terms of the number of citations.

## **4. Results and Discussion**

Figure 1 illustrates that between 2017 and 2022, more than 50% of the publications on intention to study STEM were published, demonstrating the current rise in interest in this field of study. The newly published, highly cited publications on intention to pursue STEM showed an increased trend from 2016 to 2021. The year 2022 had the most citations, with 588 citations across 9 articles, somewhat more than the year 2021's total (Figure 2)

### Publications

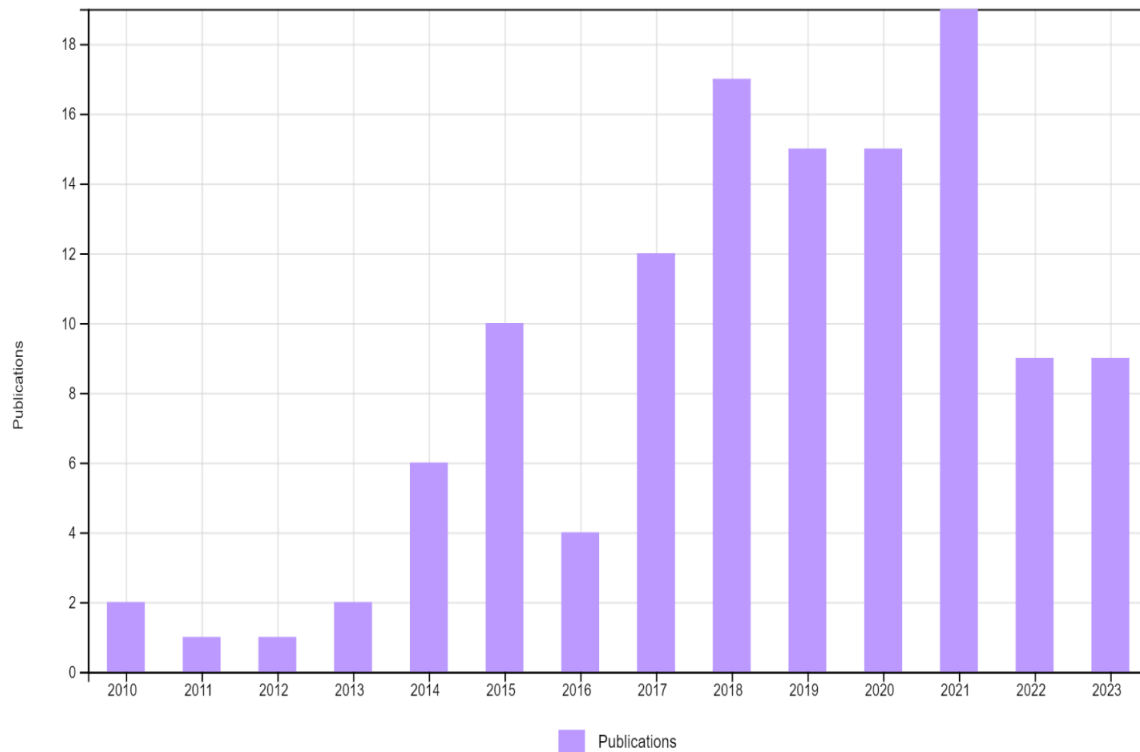


Figure 1. The Yearly Pattern of Publications Regarding Intention to Study STEM from 2010 to 2023

### CITATIONS

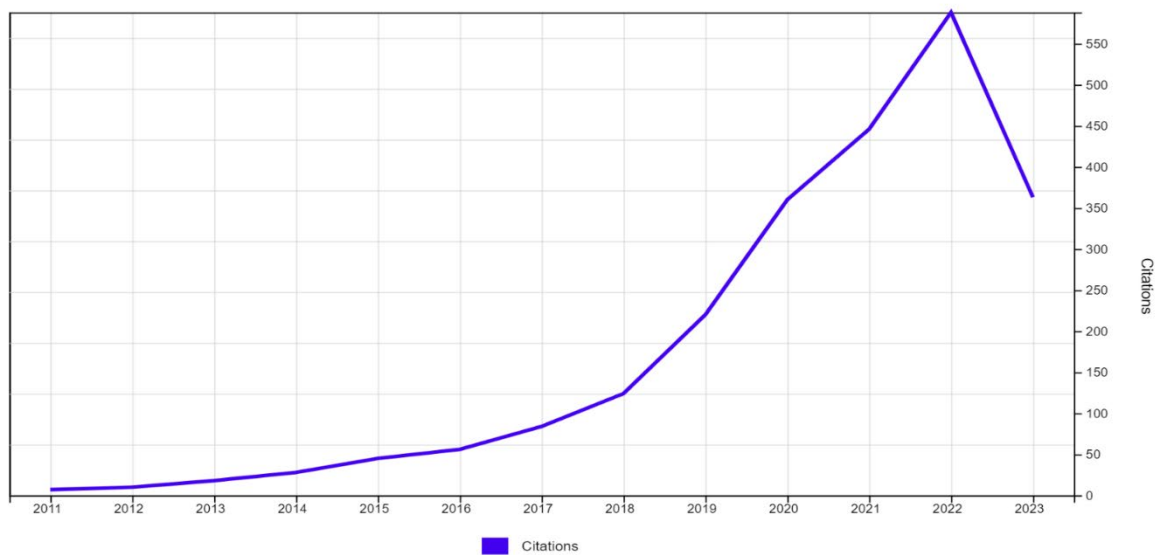


Figure 2. The Yearly Pattern of Citations Regarding Intention to Study STEM from 2011 to 2023.

### **The nations/regions, sources, and institutions that publish the most**

According to Table 1, among the worldwide journals with more than four papers published between 2010 and 2023 are Frontiers in Psychology, the International Journal of Science Education, and Physical Review Physics Education Research. The International Journal of Science Education, which has 7 articles and 143 citations, is the most active journal and a pioneer in publishing research on students' intention to pursue STEM-related fields of study.

Table 1. The Most publication Source

<b>Rank</b>	<b>Source</b>	<b>Documents</b>	<b>Citations</b>
<b>1</b>	<b>International Journal of Science Education</b>	<b>7</b>	<b>143</b>
<b>2</b>	<b>Physical review physics education research</b>	<b>5</b>	<b>154</b>
<b>2</b>	<b>Frontiers in psychology</b>	<b>5</b>	<b>117</b>

Table 2 demonstrates nations with more than seven articles published between 2010 and 2023. Around 60% of research on this topic was conducted in the USA, followed by Spain (10 studies). Regarding the countries of origin of the publications, the majority of research on this topic was done in developed nations including the USA, Spain, Israel, and Germany.

Table 2. The Countries/Regions where the intention to study STEM Research was conducted.

<b>Rank</b>	<b>Countries/Region</b>	<b>Documents</b>	<b>Citations</b>
<b>1</b>	<b>USA</b>	<b>73</b>	<b>1871</b>
<b>2</b>	<b>SPAIN</b>	<b>10</b>	<b>85</b>
<b>3</b>	<b>ISRAEL</b>	<b>8</b>	<b>104</b>
<b>3</b>	<b>GERMANY</b>	<b>8</b>	<b>222</b>

Table 3. The Best Organization for Making Papers with the Intention to Study STEM.

<b>Rank</b>	<b>Organization</b>	<b>Documents</b>	<b>Citations</b>
<b>1</b>	<b>Florida international university</b>	<b>6</b>	<b>150</b>
<b>2</b>	<b>Rice University</b>	<b>5</b>	<b>231</b>
<b>2</b>	<b>Technion Israel Inst Technol</b>	<b>5</b>	<b>56</b>

Table 4. The writers who have made the biggest contributions to the works on STEM study intentions.

<b>Rank</b>	<b>Author</b>	<b>Documents</b>	<b>Citations</b>
<b>1</b>	<b>Gerhard Sonnert</b>	<b>5</b>	<b>121</b>
<b>2</b>	<b>Philip m. Sadler</b>	<b>4</b>	<b>38</b>
<b>3</b>	<b>Zahra Hazari</b>	<b>4</b>	<b>126</b>
<b>3</b>	<b>Remy Dou</b>	<b>4</b>	<b>112</b>
<b>3</b>	<b>Yehudit Judy Dori</b>	<b>4</b>	<b>51</b>

we further examined the organizations with more than four publications published between 2010 and 2023 and discovered that Florida International University, Rice University and Technion Israel Inst technol fall in the group (Table 3).

The result also highlighted that Gerhard Sonnert, Philip m. Sadler, Zahra Hazari, Remy Dou, and Yehudit Judy Dori are the authors with more than three published papers between 2010 and 2023 (Table 4).

### **Categories/Classification and Research Areas**

Table 6 lists the Top 10 research areas utilized in the intention to study STEM, while Table 5 lists the Top 10 categories/classifications. 'Education & Educational Research' (69) has the highest publication between 2010 and 2023.

Table 5. Top 10 Categories/Classification of intention to study STEM Research as per Web of Science.

Rank	Categories	Publications (N)
1	Education Educational Research	69
2	Education Scientific Disciplines	25
3	Psychology Applied	12
4	Psychology Developmental	8
5	Psychology Educational	8
6	Engineering Multidisciplinary	7
7	Psychology Multidisciplinary	7
8	Psychology Social	7
9	Engineering Electrical Electronic	3
10	Social Issues	3

Table 6. Top 10 Research Area of intention to study STEM as per Web of Science.

Rank	Research Areas	Publications (N)
1	Education Educational Research	77
2	Psychology	37
3	Engineering	11
4	Social Issues	3
5	Women S Studies	3
6	Business Economics	2
7	Chemistry	2
8	Computer Science	2
9	General Internal Medicine	2
10	Nursing	2

According to the result, intention to study STEM has been used in the areas of education, psychology, engineering, social science etc. Education & Educational Research area (77articles) has the most publications in intention to study STEM, followed by Psychology area (37 articles).

### **Keyword analysis**

Keyword analysis is a very important part of bibliometric analysis. The final analysis (Figure 3) comprises search terms that the publication's authors provided and those turned up more than four times in the WoS database. The top five terms mentioned in the selected publications are listed below: STEM (39 occurrences), career choice (32 occurrences), gender (23 occurrences), social cognitive career theory (12 occurrences), and self-efficacy (10 occurrences).

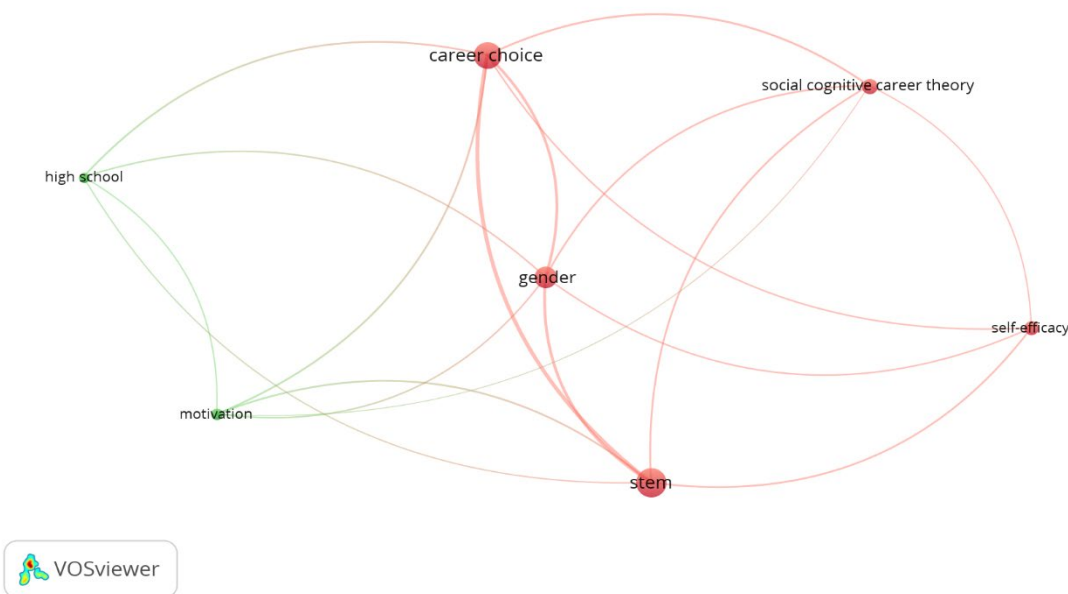


Figure 3. The figure included studies' keywords.

### **The top 5 highest citation publications**

According to Table 7, 90% of the research for the top 5 publications with the highest number of citations on this topic was done in the USA, with the remaining 10% done in Germany. This shows that developed nations pay more attention to the intention to study STEM than underdeveloped nations. The majority of the highly mentioned publications (Rank 1, 2, 3, 4) discussed career choice in STEM. For example (Rice et al. 2013) examined the relationship between social support and attitude and self-efficacy in math and science among students. According to the research, students who experience stronger parental, academic, and social support for math and science have more positive attitudes toward these topics and feel more competent in them. The top 5 highest citation publication journal includes *Developmental Psychology*, *Journal of Youth and Adolescence*, *Social Issues and Policy Review*, *Current Directions in Psychological Science*, and *Computers and Education*. Journal articles make up the majority of the top 5 publications with the highest citations.

Table 7. most cited publications ranking in intention to study STEM

Rank	Article Title	Author	Year	Journal	Document Type	Country of the corresponding author	Citation
1	Math-Related Career Aspirations and Choices Within Eccles et al.'s Expectancy-Value Theory of Achievement-Related Behaviors	Lauer mann, Fani, Tsai, Yi-Miau, Eccles, Jacquelynne S	2017	DEVELOPMENTAL PSYCHOLOGY	Article	Germany	132
2	The Role of Social Support in Students' Perceived Abilities and Attitudes Toward Math and Science	Rice, Lindsay [1]; Barth, Joan M. [2]; Guadagno, Rosanna E. [3]; Smith, Gabrielle P. A. [1]; McCallum, Debra M. [2]	2013	JOURNAL OF YOUTH AND ADOLESCENCE	Article	USA	100
3	New Routes to Recruiting and Retaining Women in STEM: Policy Implications of a Communal Goal Congruity Perspective	Diekman, Amanda B. [1]; Weisgram, Erica S. [2]; Belanger, Aimee L. [1]	2015	SOCIAL ISSUES AND POLICY REVIEW	Article	USA	96
4	Beyond the Threshold Hypothesis: Even Among the Gifted and Top Math/Science Graduate Students, Cognitive Abilities, Vocational Interests, and Lifestyle Preferences Matter for Career Choice, Performance, and Persistence	Robertson, Kimberley Ferriman [1]; Smeets, Stijn [1]; Lubinski, David [1]; Benbow, Camilla P. [1]	2010	CURRENT DIRECTIONS IN PSYCHOLOGICAL SCIENCE	Article	USA	92
5	Learning and motivational impacts of a multimedia science game	Miller, Leslie M. [1]; Chang, Ching-I. [1]; Wang, Shu [2]; Beier, Margaret E. [2]; Klisch, Y (Klisch, Yvonne) [1]	2011	COMPUTERS & EDUCATION	Article	USA	90

## 5. Conclusion

By analyzing the WoS database, this study examined the annual trend in intention to study STEM and used bibliometric techniques to identify some aspects of intention to study STEM literature. This research was conducted using citation and keyword analysis of 122 publications that dealt with STEM study intentions and provided insightful information about the area. As per this study the number of intention to study STEM publications increased rapidly in recent years, because of the advancement of the STEM education and International Journal of Science Education is the most prolific publication source and a leader in publishing research on students' intentions to pursue STEM-related fields of study. As per this study majority of the research on this topic was done in developed nations like USA, Spain, Israel and Germany which shows that there is need for developing nation to investigate this field. Further this study highlighted that Florida international university and Gerhard sonnert are the most productive institution and authors. Most of the publications were published in education and educational research categories/ area and STEM, career choice and gender were the three top most frequently occurring keywords. As per this study Developmental Psychology, Journal of youth and adolescence, Social issues and policy review, Current directions in psychological science and Computers and education are the top 5 highest citations publication journal in intention to study STEM field. The results of this study can assist funding organizations and research governors in determining research policy in the area of intention to study STEM.

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## Biography

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