

Bibliometric analysis of studies in financial education and sustainability

Análise bibliométrica de estudos em educação financeira e sustentabilidade

Análisis bibliométrico de estudios en educación financiera y sostenibilidad

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Renally Fernandes Couto

ORCID: <https://orcid.org/0000-0002-1643-2102>

Federal University of Campina Grande, Brazil

E-mail: renally.fernandes@estudante.ufcg.edu.br

Kettrin Farias Bem Maracajá

ORCID: <https://orcid.org/0000-0002-8189-109X>

Federal University of Campina Grande, Brazil

E-mail: kettrin.farias@uaac.ufcg.edu.br

Petruska de Araújo Machado

ORCID: <https://orcid.org/0000-0003-1107-8180>

Federal University of Campina Grande, Brazil

E-mail: petruskamachado@gmail.com

Abstract

Given the increasing financialization of human life, people need to be increasingly able to manage money as a resource. Personal finance management transcends economic issues and can be discussed from the sustainability perspective in three pillars. The field of research in financial education and sustainability is remarkably recent, bringing the need to analyze the research trajectory in the area. This research is a bibliometric analysis, supported by the software VOSviewer and CitNetExplorer, and explored the course of studies in financial education and sustainability in terms of productivity by year, authors, periodicals, institutions, notable works, and words key. The main results found were that since 2011 there had been an exponential growth in publications in the area, with the United States being the country that contributed most to the field. The main research titles are related to the didactics of financial education, and the themes are more related to the social and economic spheres of sustainability. Even when composing one of the search filters in the portfolio, sustainability is still an incipient aspect when working in financial education, especially in the environmental sphere. All of this brings the need to understand the relationship between personal finance management and sustainability fully.

Keywords: Financial education; Bibliometric Analysis; Sustainability Perspective.

Resumo

Dada a crescente financeirização da vida humana, as pessoas precisam ser cada vez mais capazes de administrar o dinheiro como um recurso. A gestão das finanças pessoais transcende as questões econômicas e pode ser discutida sob a ótica da sustentabilidade em três pilares. O campo de pesquisa em educação financeira e sustentabilidade é notavelmente recente, trazendo a necessidade de analisar a trajetória da pesquisa na área. Esta pesquisa é uma análise bibliométrica, apoiada pelos softwares VOSviewer e CitNetExplorer, e explorou o percurso de estudos em educação financeira e sustentabilidade em termos de produtividade por ano, autores, periódicos, instituições, trabalhos notáveis e palavras-chave. Os principais resultados encontrados foram que desde 2011 houve um crescimento exponencial de publicações na área, sendo os Estados Unidos o país que mais contribuiu para a área. Os principais títulos de pesquisa estão relacionados à didática da educação financeira, e os temas estão mais relacionados às esferas social e econômica da sustentabilidade. Mesmo ao compor um dos filtros de busca do portfólio, a sustentabilidade ainda é um aspecto incipiente quando se trabalha em educação financeira, principalmente na esfera ambiental. Tudo isso traz a necessidade de compreender plenamente a relação entre gestão de finanças pessoais e sustentabilidade.

Palavras-chave: Educação financeira; Análise Bibliométrica; Perspectiva de Sustentabilidade.

Resumen

Dada la creciente financiarización de la vida humana, las personas deben ser cada vez más capaces de administrar el dinero como recurso. La gestión de las finanzas personales trasciende los temas económicos y puede ser discutida desde la perspectiva de la sustentabilidad en tres pilares. El campo de investigación en educación financiera y sustentabilidad es notablemente reciente, trayendo la necesidad de analizar la trayectoria de la investigación en el área. Esta investigación es un análisis bibliométrico, apoyado por los softwares VOSviewer y CitNetExplorer, y exploró la trayectoria de los estudios en educación financiera y sustentabilidad en términos de productividad por año, autores,

revistas, instituciones, obras destacadas y palabras clave. Los principales resultados encontrados fueron que desde el año 2011 ha habido un crecimiento exponencial de publicaciones en el área, siendo Estados Unidos el país que más aporta al área. Los principales títulos de investigación están relacionados con la didáctica de la educación financiera, y los temas están más relacionados con las esferas social y económica de la sostenibilidad. Incluso al componer uno de los filtros de búsqueda de cartera, la sostenibilidad es todavía un aspecto incipiente cuando se trabaja en educación financiera, especialmente en el ámbito ambiental. Todo esto plantea la necesidad de comprender a fondo la relación entre la gestión de las finanzas personales y la sostenibilidad.

Palabras clave: Educación financiera; Análisis Bibliométrico; Perspectiva de Sostenibilidad.

1. Introduction

Given the financial crisis experienced in 2007, nations seek less aggressive economic arrangements that contemplate the balance between an inclusive economy, shared social well-being, and healthy and sustainable environment (Aleksandrova *et al.*, 2020; Kallis & Norgaard, 2010).

A financially enlightened population can be one of the factors of transition between the world of the traditional economy and the sustainable economy since citizens with a certain degree of proficiency in personal finance can make better decisions when it comes to planning and consuming decisions, investments, credit taking, retirement, protection, and so on (Fox, Bartholomae & Lee, 2005; Hira & Loibl, 2005; Cole, Sampson & Zia, 2011; Bucher-Koenen & Lusardi, 2011).

Countries and institutions partners of the Organization for Economic Cooperation and Development (OECD) have been encouraged to develop strategies to disseminate financial education (Atkinson & Messy, 2011). Studies such as Calderón, Cunha and De Giorgi (2013) found a positive correlation between the acquisition of knowledge about personal finance and the possibility for transforming social realities since most low-income people in developing countries run small businesses. Controversially, the neediest are likely enjoying good financial management benefits, precisely because of the lack of access to information (Phillips, 2001; Haskins, 2001).

Considering that individuals are responsible for making several financial decisions throughout their life, the impacts of these decisions leave the individual sphere and end up affecting the whole society (Mandell & Klein, 2009). Thus, the sustainable development model triple bottom line - TBL - can also support financial education since it can interact simultaneously with the tripod. In addition, educational actions must be cultivated throughout the individual's life, and the ability to deal with personal finances can lose the power of correction and application, whether not practiced (Fernandes, Lynch & Netemeyer, 2014).

However, research in financial education faces some conceptual barriers since it has attracted recent interest, given the significant increase in publications only from the twentieth century. Due to the lack of consensus in the conceptualization of terms, there are gaps about what financial education is (Huston, 2010). There are some studies with controversial results (Johan, Rowlingson & Appleyard, 2020) and semantics which generate confusion in the term (Bruhn *et al.*, 2016). Thus, we try to address the following question: "**How are studies on financial education and sustainability discussed in the literature?**".

Firstly, this research is justified by the recent discussions in financial education and sustainability, which bring needs to expand and validate understandings. Secondly, the conceptual stage of these emerging themes requires further exploration of science. Finally, there is no precedent for productivity analysis associated with cluster techniques in the area, characterizing innovative research.

This article aims to analyze the trajectory of sustainability in financial education studies through hybrid techniques for assessing scientific impact and productivity. In addition, the cluster analysis was carried out to identify research themes. The literature was collected from study of the Web of Science databases. The intention is not to encompass all knowledge about financial education and sustainability. Instead, it intends to provide a comprehension of how these both areas have exchanged

themselves from the scholars' point of view.

2. Background: financial education review

Financial education has already directed public policies in this direction since the 1990s (Grinstein-Weiss, Reinertson & Russell, 2015). Discussions about the role of financial education grown up exponentially due to the credit crisis that started in 2007, when the financial decision environment, both from a macro and micro point of view, became much more complex (Fernandes, Lynch & Netemeyer, 2014; Muñoz, 2019).

The need for financial literacy in the contemporary world is fundamental, given the functions of money in the current political, economic, and social systems (Salter, 2016). Inserted in a system whose money is the primary basis of exchanges and trust, individuals carrying out countless financial transactions throughout their lives, need to be literate to deal with this element in a decision environment that is becoming more and more complex (Boshara, Gannon, Mandell, Phillips & Sass, 2010).

In general, researchers still have controversial approaches concerning the effects of financial education (Leonard, 2008; Adams & Rau, 2011; Collins & O'Rourke, 2010; Hastings, Madrian & Skimmyhorn, 2013; Hira, 2010; Willis, 2011). However, seminal studies such as Bernheim's (1995, 1998) highlights the adverse effects of the lack of financial literacy in people's lives. There has been a consensus in recent research (Loke, 2017; Belehova & Kalachikova, 2018; Tamir & Davidson, 2019; Pangestu & Karnadi, 2020).

According to the literature, understanding the term financial education is not a trivial task. Several terms are intersected or are not well defined. (Huston, 2010; Fernandes, Lynch & Netemeyer, 2014). For some authors, financial education refers to retirement, investment, management, and use of credit (Hira & Loibl, 2005). For others, it can mean budget, savings, purchases, and real estate investments/financing (Fox, Bartholomae & Lee, 2005; Cordeiro, Costa & Silva, 2018) or education for insurance (Lin, Bruhn & William, 2019).

Atkinson and colleagues (2007) relate financial literacy to staying informed and making better consumption choices. Other studies (Yang, Ishtiaq & Anwar, 2018; Orbanova & Velichova, 2013) relate financial education to the odds of success in ventures. On the other side, Lusardi and Mitchell (2011) point out the concept of financial capacity, which is the combination of knowledge, skills, and financial attitudes.

Despite the field receiving prominence after the Recommendation on Principles and Good Practices in Financial Education and Awareness (OECD, 2005), it is possible to realize that several issues were little explored in the literature. One of them concerns the relationship between financial education and sustainability. Yet, when it considers sustainability, it does not refer to the economic sphere but also social and environmental.

There are few studies trying to understand this relationship (Dickmann, *et al.*, 2018; Helm, *et al.*, 2019; Kumar & Prakash, 2019). Education for personal finances has a much greater potential than economic expectations, once its role is developing citizens much more aware of their environment and society. Thus, it is a subject that deserves attention of the scientific community.

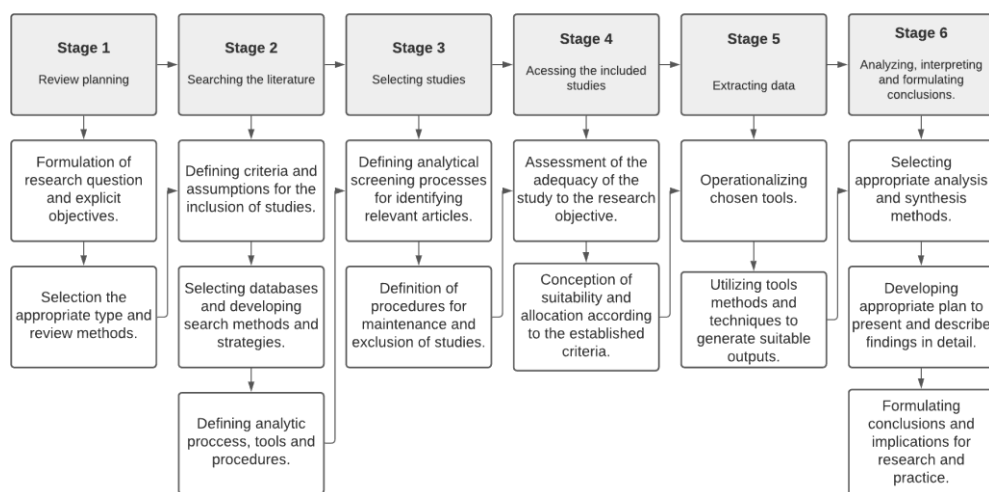
3. Methodology

According to Pare *et al.* (2015), reviewing the literature means visiting the conceptual bases that support the study area in search of clarifications, consensus, divergences, and gaps. Therefore, bibliometric studies are indispensable tools for science to develop, considering that this type of investigation enables visualize how a given field of science is evolving, which authors,

papers, newspapers, and institutions are most prominent. Besides that, it is possible to make inferences about the direction of the following research and reveal gaps that encourage new productions (Sakata, *et al.*, 2013; Koseoglu, 2016).

This work performs a descriptive and bibliometric analysis with evaluative and relational techniques guided by Koseoglu (2016) work. The criteria used to assess productivity include per year, authors, references, institutions, countries and journals, and an analysis of the co-occurrence of words; all these involving cluster solutions obtained through the software CitNetExplorer and VOSviewer (Van Eck & Waltman, 2014). Concomitantly, we sought to balance the sequencing rigor with an interactive approach, in which adjustments and new routes were designed to achieve the objectives.

Figure 1. Instantiations of systematicity guidelines in the review process.



Source: Adapted from Paré *et al.*, (2016).

To obtain consistent results, followed the procedures suggested by Paré *et al.* (2016) for literature reviews approaching systematicity and transparency; the processes represented in stage 1 produced the research question: "How are studies on financial education and sustainability discussed in the literature?". As well as the general objective, which aimed to answer this central question: "Analyze the trajectory of studies about financial education and sustainability". For that, hybrid evaluation techniques of scientific impact and productivity were used, in addition to clustering analysis.

Stage 2 defined search strategies and criteria, and in stage 3, a database was extracted from the main collections of the Web of Science (WoS) on April 19, 2021. The research topics: financial education; (or) financial literacy; (e) sustainability, and only selected publications classified as 'articles' published between 1945 and 2021 in categories of WoS directly related to the triple bottom line (see Table 1).

Table 1. Web of Science categories chosen

Area Studies	Ecology	Environmental Studies	Multidisciplinary Sciences
Business Finance	Economics	Family Studies	Social Issues
Business, Sociology	Education Educational Research	Green Sustainable Science Technology	Social Sciences Interdisciplinary
Demography	Education Scientific Disciplines	Humanities Multidisciplinary	Social Work
Development Studies	Environmental Sciences	Management	Urban Studies

Source: Own elaboration, extracted from Web of Science.

After these refinements, 493 articles were obtained and a pre-analysis was carried out to assess which articles met the research objectives, characterizing the step 4. All abstracts of papers were read and classified according to the following criteria: 1) discussing financial education as the main topic; and 2) relating financial education to one or more pillars of sustainability:

social, economic, and environmental. Finally, 18 articles were excluded, in which four were not found, making reading impossible, and 14 did not correspond to the study's goal, totalizing 475 included studies. All of these criteria reinforce the research's quality and reliability.

Furthermore, stage 5 refers to the choice of analysis tools and methods of extraction; the software selected in this study are graphical tools for clustering solutions, CitNetExplorer applied to the micro-level analysis and VOSviewer applied to macro-level analysis (Van Eck & Waltman 2010; 2014; 2017). The principal resources used in CitNetExplorer are viewing a network of citations, detailing a network of citations, and searching for publications; while in VOSviewer, they are analysis of co-authorship, co-occurrence, and citation.

The extraction process was divided into two phases; first, a productivity analysis was carried out, consisting of the list of the most productive authors, countries, institutions, and the most relevant journals and publications in the portfolio. The second stage a cluster analysis was performed to determine the quotation networks, research mainstream, and the word co-occurrence map. The last stage of the research was developed in the next chapter and presented the research findings, highlighting some conclusions and implications for the study and practice of financial education for sustainability.

4. Results and Discussion

Table 2 shows 297 articles concerning financial education for the social pillar through themes concerning education, social mobility, quality of life, social vulnerability, skill, behavior, and financial literacy. Moreover, 59 articles are related to financial education and the economic pillar. These studies address macroeconomic issues such as the role of financial education in economic development, strategies, and business performance, formulation and conduct of government policies, and their relationship with entrepreneurship. Yet, 110 articles cover both the social and the economic spheres simultaneously.

Table 2. Analysis of the discussion of financial education in the spheres of sustainability.

Sustainability Sphere	(Q) Articles	(%)
Social	297	62,53%
Economic	59	12,42%
Environmental	0	0,00%
Social and Economic	110	23,16%
Social and Environmental	3	0,63%
Economic and Environmental	3	0,63%
Social, Economic, and Environmental	3	0,63%
	475	100,00%

Source: Own elaboration.

There is no evidence relating to financial education to the environmental sphere of sustainability. However, nine papers addressed the environmental and social pillars (3 publications), environmental and economic (3 publications), and economic, environmental, and social (3 publications). It shows that the debate on financial education is focused on the social and economic spheres; in contrast, the environmental pillar is stagnant, requiring more studies and clarifications, which reinforces the need for this study. It is necessary to clarify the productivity analysis. Complete counting configuration was used and not required to ignore documents with more than 25 collaborations. For the authors' analysis, the author's first name was reduced to the initial letter. In addition, the minimum citation values for co-authorship and citation analysis was not established. We dropped recent works that do not meet the research objective. Table 3 summarizes the data of this analysis.

Table 3. Statistics for the data set of financial education and sustainability publications.

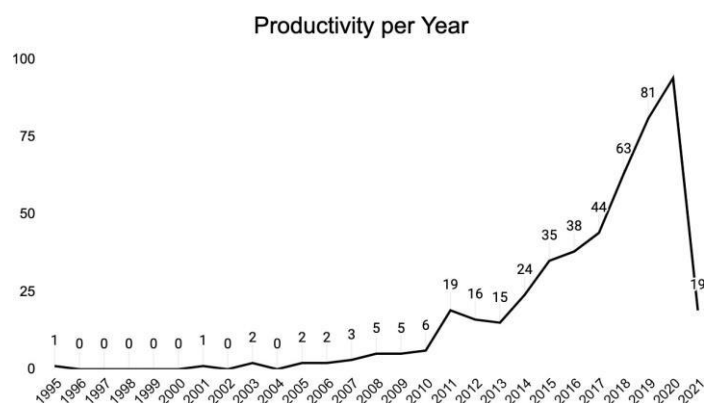
N° of publications	475
N° of author	1,080
N° of organizations	583
N° of countries	69
N° of journals	252
N° of cited references	15,909
N° of citation relations in CitNetExplorer	1,065
N° of citation relations between publications in the data set	1,672

Source: Own elaboration extracted from VOSviewer and CitNetExplorer.

From 475 papers included in the analysis, we observed that 1,080 authors, affiliated in 583 organizations spread across 69 countries, published in 252 different journals. Graphic 1 shows the growth of scientific production in financial education related to sustainability. The seminal study was written by Borokhovich *et al.*, (1995), entitled "Financial management (1972-1994) - a retrospective", the study was a bibliographic review concerning the economic pillar.

Six years after the first paper, Tennyson and Nguyen (2001) published the "Curriculum mandates of the state and student knowledge in personal finance." This study is linked to the social pillar and analyzed students' performance in tests of financial literacy and intention of future savings, comparing schools where the discipline of financial education was mandatory and schools where that discipline was not obligatory. Then, the area experienced almost a decade of low productivity, with an average of fewer than three articles published per year between 2002-2010.

Graphic 1. Productivity per year in financial education and sustainability.



Source: Own elaboration, extracted from Web of Science.

In 2011, there was a substantial increase in publications, making it possible to appoint some inferences to justify this volume. The first is the effects of the credit crisis in 2007, known as the subprime crisis, which collapsed the world economy, leading all nations to formulate national financial education strategies.

The second inference explaining the peak of publications in 2020 is the effects of the economic crisis resulting from Covid-19. It slowed the world economy, bringing unemployment and decreasing income of people, demanding more knowledge and ability to deal with finances, personal resources, and scarcity of financial resources.

Further, we analyzed the co-authored and examined the area's productivity in three units of analysis: authors, institutions, and countries. Table 4 summarizes the ten results for each unit of study. From 1,080 scholars, Xiao collaborates in 12 articles, followed by Collins, Grinstein-Weiss, and Zia, each one collaborating on eight papers. The other authors contribute six or fewer publications.

Table 4. The ten most productive authors, organizations, and countries.

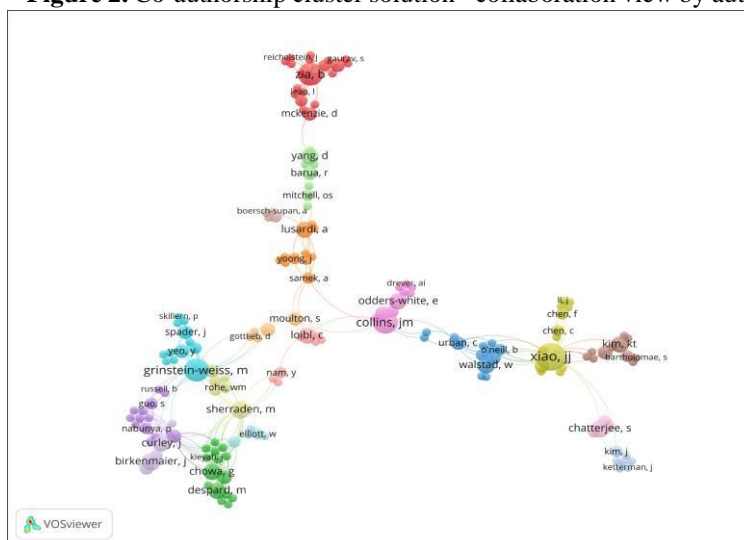
Author	Documents	%	Citations	Organization	Documents	%	Citations	Country	Documents	%	Citations
Xiao	12	2,53	340	Washington University	15	3,16	144	United States of America	220	46,32	4426
Grinstein-Weiss	8	1,68	122	University Wisconsin	14	2,95	307	Brazil	26	5,47	67
Zia	8	1,68	280	University of North Carolina	13	2,74	167	People's Republic of China	21	4,42	188
Collins	8	1,68	181	Ohio State University	12	2,53	185	England	20	4,21	336
Serido	6	1,26	81	University Rhode Island	12	2,53	340	Malaysia	19	4,00	65
Loke	6	1,26	19	World Bank	11	2,32	251	Australia	17	3,58	176
Shim	5	1,05	80	University of Georgia	9	1,89	128	Italy	16	3,37	50
Chatterjee	5	1,05	72	University of Missouri	8	1,68	110	Spain	16	3,37	41
Birkenmaier	5	1,05	33	Universiti Sains Malaysia	7	1,47	19	Germany	14	2,95	297
Zhu	5	1,05	0	National Bureau of Economic Research	7	1,47	31	Netherlands	12	2,53	485

Source: Own elaboration, extracted from VOSviewer.

Analyzing the number of citations by these authors, Xiao is also the most cited author with 340 occurrences and is close to Zia, cited 280 times. Zia has the same number of articles as Collins and Grinstein-Weiss (8 articles), the subsequent most popular authors. On the other hand, Zhu produced five papers but did not obtain citations on the network; one of the causes may be the recent publication of these articles (2019-2020).

Many authors in the field can be positive for developing research, bringing a diversity of debates, and making the soil fertile for developing theories for the future. In this portfolio, of the 1,080 authors, only 170 participate in the most extensive collaboration network, forming 17 clusters, as shown in Figure 2. It is also possible to understand that the prominent authors do not work directly with each other, but their contribution is in the network's nodes.

Figure 2. Co-authorship cluster solution - collaboration view by author.



Source: Own elaboration, extracted from VOSviewer.

Next, the co-authoring analysis on the institutions that most promoted publications in the portfolio of 583 papers, Washington University stood out with 15 articles, followed by the World Bank with 11 papers, and, finally, the University of

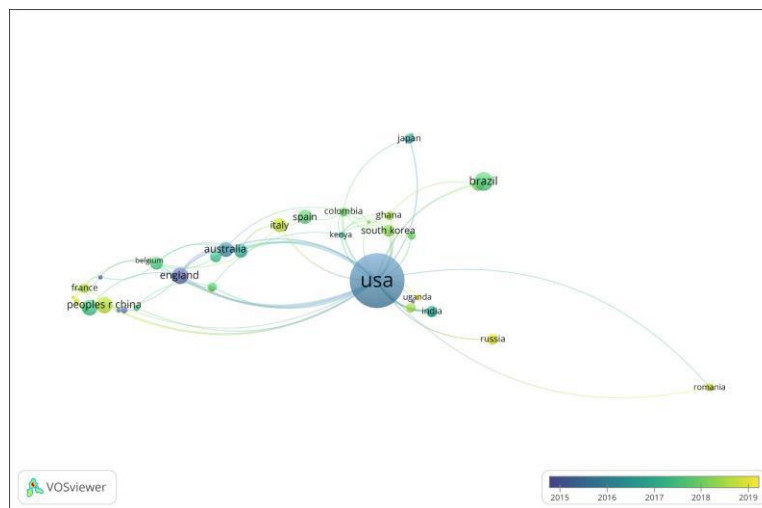
North Carolina with 13 publications. As in the analysis of most productive authors, there were no identified institutions with a concentration of publications; however, of the ten most influential institutions, nine are from the United States.

When analyzing the number of citations of these institutions, the University of Rhode Island with 340 citations is the most referenced in the network, followed by the University of Wisconsin-Madison with 307 citations and the World Bank with 251 occurrences. In this case, Washington University, although it is the institution that most develops work in the area, is not the most cited.

The last unit of analysis of co-authorship is related to the countries with the highest productivity. From 69 that covered the portfolio, the United States appears with 220 papers, which produced almost half of the total publications, corroborating with the previous analysis. Then, Brazil and China appear with 26 and 21 papers, respectively. Thus, the representativeness of the other countries is not as significant as that of the United States, which, in addition to having the most important number of documents, is most cited in papers, with 4,426 citations. At the same time, Brazil is referenced only 67 times, and China is cited 188 times. Other countries, such as England, Germany, and the Netherlands with 20, 14, and 12 papers, have fewer publications but have the highest number of references in the base, with 336, 297, and 485 citations, respectively, behind only the United States.

The productive concentration under siege in the United States can explain many of the characteristics of the research field. Such as the centralization of studies related to sustainability's social and economic pillars and the vacancy of discussion about the environmental pillar. It is also possible to analyze collaboration between countries in publications, as shown in Figure 3. Of the 69, 52 collaborate on the papers; the rest of the publications work in a collaboration bubble.

Figure 3. Co-authorship cluster solution - collaboration view by author.



Source: Own elaboration, extracted from VOSviewer.

The "Overlay Visualization" is used to understand the collaborative relationship between countries and their respective publication densities over the years. The United States is hegemonic in productivity and appears actively collaborating with other countries. Another feature is that United States publications had a slowdown between 2015 and 2017. Other countries such as China, Brazil, Italy, and Russia are more current in the debates, indicating a decentralization of the discussion in the field.

Closing the co-authorship discussion, the analysis of citations is carried out, covering the papers most cited internally in the portfolio and the prominent journals for the area. Of the 475 documents covering this research, 340 were mentioned at least

once in the portfolio. Contrasting to the coauthor analysis in the author's view, except Xiao, the authors who produce the most are not those most cited by the network.

The most referenced paper is "Financial literacy, financial education, and downstream financial behaviors" by Fernandes, Lynch and Netemeyer (2014), with 409 citations on the network (Table 5). That is, 86% of the papers referenced this work. As this is the first meta-analysis in the field, this paper brought some crucial observations for the research and practice of financial education from a didactic and social perspective, becoming one of the milestones of the area.

Next, the work of Huston (2010) "Measuring financial literacy" is the second most cited with 364 mentions in the network and was a criticism of the vague definition of the terms that involve financial education contemplating the social pillar of sustainability. Finally, Anderson *et al.* (2013) paper, "Transformative service research: an agenda for the future" with 346 citations, highlighted financial education services as one of those that can transform society, including the environmental pillar.

In addition, three studies of this portfolio are related to financial education for the three sustainability tripods. The other studies are also highly relevant, as they address financial education in different contexts - Bernheim and Garrett (2003), Cole, Sampson and Zia, 2011 (2011), and Bucher-koenen and Lusardi (2011) - even offer counterpoints on their effectiveness for social mobility and economic balance - Willis (2013).

Table 5. The ten most-cited documents.

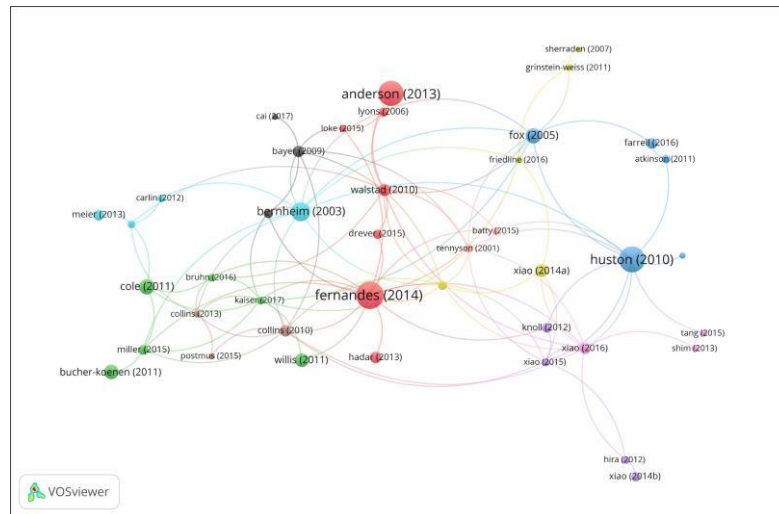
Title	Authors	(Q) Citations
Financial literacy, financial education, and downstream financial behaviors	Fernandes, Lynch & Netemeyer (2014)	409
Measuring financial literacy	Huston (2010)	364
Transformative service research: an agenda for the future	Anderson, Ostrom, Corus, Fisk, Gallan, Giraldo, Mende, Mulder, Rayburn, Rosenbaum, Shirahada & Williams (2013)	346
The effects of financial education in the workplace: evidence from a survey of households	Bernheim & Garrett (2003)	204
Prices or knowledge? What drives demand for financial services in emerging markets?	Cole (2011)	137
Building the case for financial education	Fox & Bartholomae (2005)	135
Financial literacy and retirement planning in Germany	Bucher-koenen & Lusardi (2011)	115
The financial education fallacy	Willis (2011)	104
Consumer financial capability and financial satisfaction	Xiao, Chen & Chen (2014)	98
The effects of financial education on the financial knowledge of high school students	Walstad, Rebeck & MacDonald (2010)	81

Source: Own elaboration, extracted from VOSviewer.

The cluster map based on the internal citations of the portfolio had as inclusion criterion the minimum 5% of occurrences in the network; that is, each paper should have at least 24 citations, which resulted in 54 documents, of which only 42 belonged to the network, generating 7 clusters. From the analysis (Figure 4), it is evident that some of the most cited works end up strongly influencing the network; another relevant feature is that although the highest productivity in the area occurred in 2020, there is no significant work from 2018 and 2019 mentioned in the portfolio.

Concerning the leading journals, the sources that published the most articles in the portfolio. Of 252 journals, the most significant for the financial education and sustainability area was the Journal of Consumer Affairs (38 publications) and the International Journal of Consumer Studies (17 publications). According to this portfolio, the other sources have few significant indexes (Table 6).

Figure 4. Citation cluster solution - vision by most internal cited documents.



Source: Own elaboration, extracted from VOSviewer.

It is worth noting that journals about education and sustainability have published little according to this portfolio. It opens space to infer that financial education has been more related to the act of consuming, and thus, it has been treated much more in conjunction with the economic and social pillars. This perspective justifies further investigating the relationship between financial education and sustainability, especially in the environmental pillar.

Table 6. The ten most productive sources.

Source	(Q) Documents	(%) 475	Citations
Journal of Consumer Affairs	38	8,00%	1,210
International Journal of Consumer Studies	17	3,58%	87
Journal of Family and Economic Issues	11	2,32%	62
Journal of Financial Counseling and Planning	11	2,32%	41
Sustainability	11	2,32%	24
Economic of Education Review	10	2,11%	83
International Journal of Bank Marketing	10	2,11%	59
Children and Youth Services Review	10	2,11%	23
Journal of Extension	8	1,68%	8
Journal of Pension, Economics & Finance	7	1,47%	43

Source: Own elaboration, extracted from VOSviewer.

In co-citation analysis, two aspects were investigated: the works most cited by the articles in the portfolio and the authors, making it possible to understand the roots of the field. For an analysis of the authors who most collaborated in the works cited by the portfolio, a total of 11,055 authors were identified, considered the core placed in Table 7.

Lusardi appears as the main author of the works mentioned in the portfolio (723 occurrences), and Xiao (171 occurrences) is one of the most productive and cited authors in the database. The OECD appears with 164 mentions and is one of the main institutions for promoting financial education globally. Except for Mandell (108 occurrences), the main authors mentioned externally also appear in previous analyses, confirming their relevance for the development of the area. Regarding the works most referenced by the portfolio, out of a total of 15,909, “The Economic Importance of Financial Literacy: Theory and Evidence” by Lusardi and Mitchell (2014) stands out with 103 citations. The articles by Fernandes *et al.* (2014) and Huston (2010) appear again as external references, reinforcing the importance of the works of these authors.

Table 7. The ten most-cited external authors.

Author	Citations	(%) of 11,055
Lusardi, A	723	6,54%
Xiao, J	171	1,55%
OECD	164	1,48%
Bernheim, B	151	1,37%
Mandell, L	108	0,98%
Fernandes, D	101	0,91%
Huston, S	87	0,79%
Collins, J	84	0,76%
Willis, L	80	0,72%
Cole, S	74	0,67%

Source: Own elaboration, extracted from VOSviewer.

However, in percentage terms, as shown in Table 8, the most cited authors are present in less than 1% of the works, punctuating the characteristic of a research field still in an embryonic stage, which needs convergence and conceptual consistency to develop.

Table 8. The ten most-cited external references.

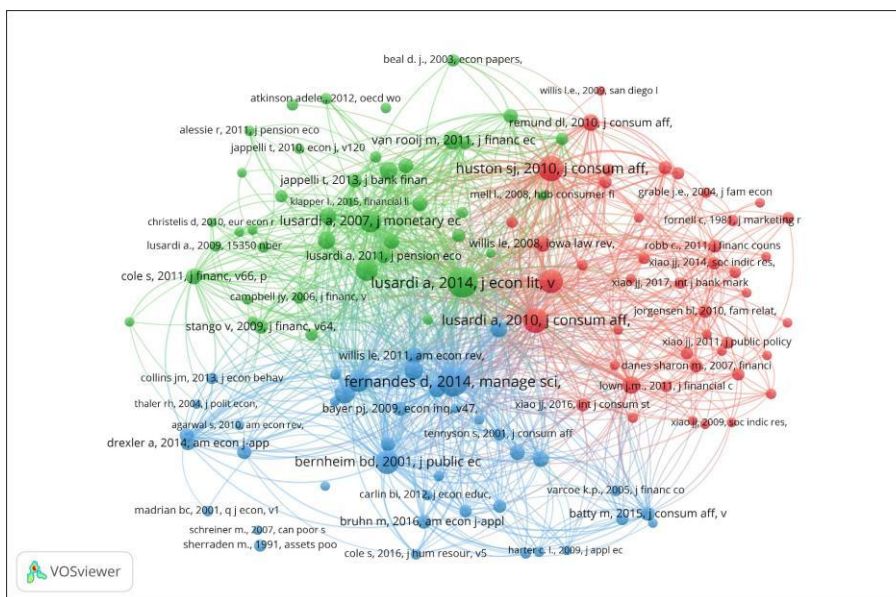
Author	Title	(Q) Citations	(%) of 15,909
Lusardi & Mitchell (2014)	The Economic Importance of Financial Literacy: Theory and Evidence	103	0,65%
Fernandes, Lynch & Netemeyer (2014)	Financial literacy, financial education, and downstream financial behaviors	98	0,62%
Huston (2010)	Measuring financial literacy	69	0,43%
Lusardi, Mitchell & Curto (2010)	Financial Literacy among the Young	65	0,41%
Bernheim, Garrett & Maki (2001)	Education and saving: The long-term effects of high school financial curriculum mandates	62	0,39%
Hilgert & Hogarth (2003)	Household Financial Management: The Connection between Knowledge and Behavior	61	0,38%
Lusardi & Mitchell (2007)	Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education	54	0,34%
Lusardi & Mitchell (2007)	Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth	52	0,33%
Hastings, Madrian & Skimmyhorn (2013)	Financial Literacy, Financial Education, and Economic Outcomes	50	0,31%
Bernheim & Garrett (2003)	The effects of financial education in the workplace: evidence from a survey of households	45	0,28%

Source: Own elaboration, extracted from VOSviewer.

When adopting the criterion of a minimum of 2 citations per work, the number of papers cited drops to 2.004, confirming the seminality of some papers. For the cluster chart of the most cited external references, shown in Figure 6, the minimum criterion of 10 citations was adopted, and only 126 works met this requirement. In this analysis, it was possible to identify the formation of three clusters representing the main lines of research. It explains that although it is a recent field, some seminal works stand out and bring cohesion to the discussions in the area.

After this productivity analysis, of the nine articles related to the environmental pillar of sustainability and the three that work in total, only Anderson et al. (2013) appear as the third most cited work internally in the portfolio. It corroborates with the proposition that the environmental pillar is still little related to financial education. To comprehend the most relevant themes studied in the area, a co-occurrence analysis of keywords was carried out based on the textual data. After this, a historiographic cluster analysis brought the main works that work on these themes.

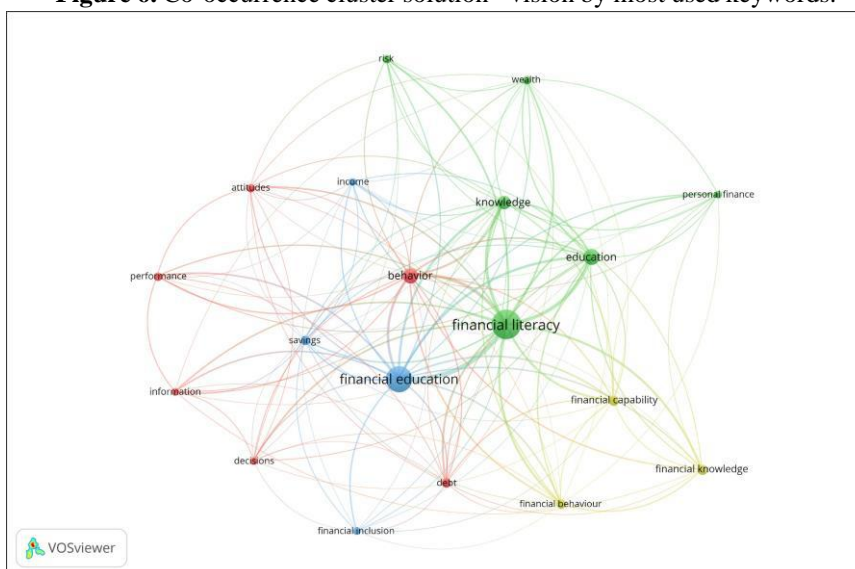
Figure 5. Co-citation cluster solution - vision by most external cited documents.



Source: Own elaboration, extracted from VOSviewer.

In all, 1,670 keywords and 3,609 occurrences were identified in the database. This study used the criterion of at least 15 occurrences, resulting in 22 main words. Among the most cited terms are 'financial literacy with 235 occurrences,' financial education ' (178 occurrences), and 'education' (72 occurrences). Figure 6 presents four clusters formed by 19 items that indicate the main aspects of the research (Figure 6).

Figure 6. Co-occurrence cluster solution - vision by most used keywords.



Note: The following words were excluded from the map: gender-difference, impact, and workplace. Source: Own elaboration, extracted from VOSviewer

According to Table 9, the red cluster addresses the importance of access to information, linked to behaviors and attitudes towards decisions, especially those related to indebtedness. On the other hand, the green cluster addresses the didactics of financial education from a formal perspective from the perspective of investments and the accumulation of financial resources. In turn, the blue cluster is much more related to the financial inclusion of people without access to the habit of saving and caring for income management. And finally, the yellow cluster addresses the importance of knowledge and skills to develop

financial capacity in general. This cluster is also the one that most exchanges with themes from other areas, bringing a more philosophical perspective. So, the research focused on clusters 2 (green) and 3 (blue). It was also found that the word sustainability is not even among the most cited, although it is one of the search filters that generated this database.

Table 9. Summary of clustering solution - most used keywords.

Cluster 1 (red) - 6 items	Term	Occurrence	Relevance
Financial Education related to the behavioral lines.	Attitudes	19	0,53%
	Behavior	64	1,77%
	Debt	24	0,67%
	Decisions	16	0,44%
	Information	18	0,50%
	Performance	22	0,61%
Cluster 2 (green) - 6 items	Term	Occurrence	Relevance
Financial Education related to didactic content and formal knowledge	Education	72	2,00%
	Financial literacy	235	6,51%
	Knowledge	53	1,47%
	Personal finance	18	0,50%
	Risk	20	0,55%
	Wealth	20	0,55%
Cluster 3 (blue) - 4 items	Term	Occurrence	Relevance
Financial Education related to practices, planning and savings and investment	Financial education	178	4,93%
	Financial inclusion	15	0,42%
	Income	15	0,42%
	Savings	25	0,69%
Cluster 4 (yellow) - 3 items	Term	Occurrence	Relevance
Financial Education related to a multidisciplinary and philosophical perspective	Financial behavior	26	0,72%
	Financial capability	28	0,78%
	Financial knowledge	28	0,78%

Source: Own elaboration, extracted from VOSviewer.

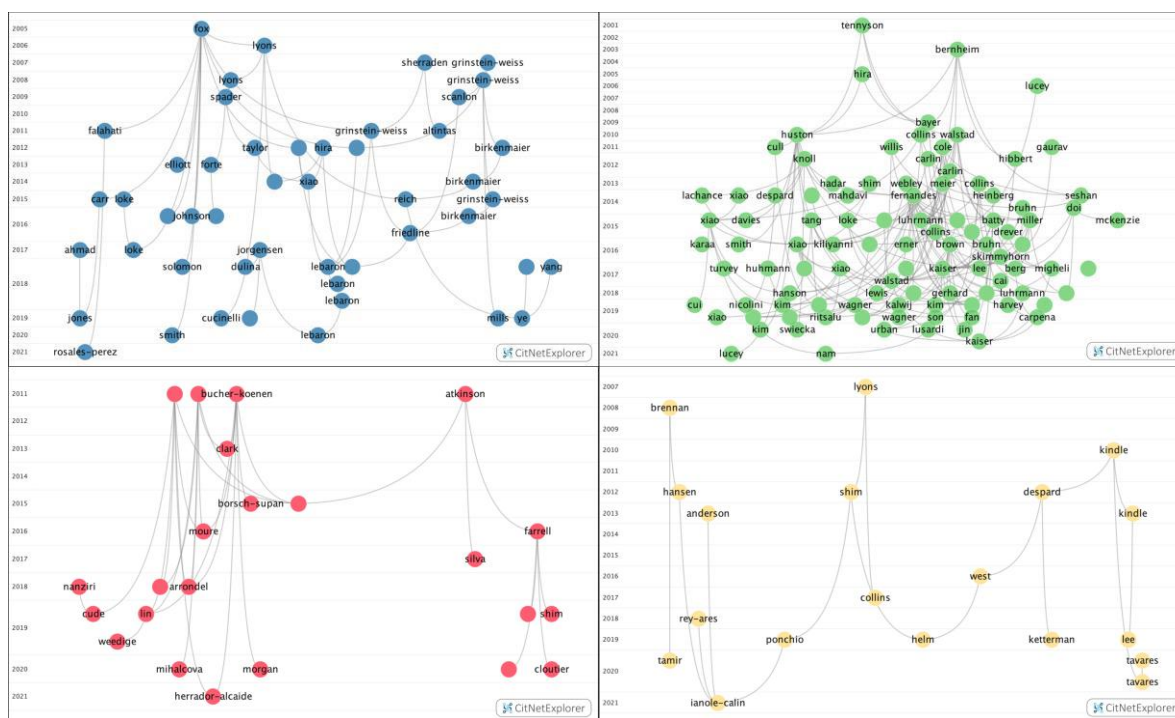
These lines of research are confirmed in the CitNetExplorer clustering solutions using the core publications (Figure 7). The red cluster covers the behavioral line, is the most recent in the field and has a time frame between 2011-2021, discusses the cultural and behavioral differences that influence the literacy and management of personal finances; much of the research explores the relationship between specific countries or groups and financial education.

The green cluster represents the most traditional papers in the area. It investigates financial education's didactics. For example, what makes up financial education and its role, what content they should cover, among other issues. It has a time frame between 2001-2021, which confirms that, although it is the oldest line of research, there are still many open questions, such as the lack of consensus in the conceptualization of terms and difficulty in developing solid concepts and theories. And the blue cluster is the second most traditional in the field, with a time frame between 2005-2021, and deals with the transition between theory and practice of financial education, based on themes such as financial planning, savings, investment, and credit, pointing to a concern with the economic aspects in social life.

Finally, the yellow cluster, although not the most recent, with a time frame between 2007-2021, is the one with less research and covers multidisciplinary themes. Relates the field of financial education philosophically with other areas; it was the only cluster to cover research related to the environmental pillar of sustainability. It is still possible to identify that the papers

dealing with the environmental pillar do not directly link them. And yet assume weak citation links with other articles, as is the case with Helm *et al.* (2019) that covers the social and environmental pillar and Anderson *et al.* (2013), that manage to relate the three pillars.

Figure 7. Core publications clusters.



Source: Own elaboration, extracted from CitNetExplorer.

In general, the number of publications involving financial education and sustainability has been gradually increasing each year, with an average of ≈ 25 publications per year between 2011-2016, rising to ≈ 60 between 2017-2021, growing more than 100%. The largest concentration of productions comes from institutions in the United States that hold $\approx 46\%$ of the total authorship of the portfolio. Other countries have a very timid parcel in the field; still, Brazil and China occupy the second and third places in the ranking.

It was confirmed that there are no traditional institutions of study in the area, although the Washington University leads the ranking of publications by institution, with only 15 papers. From the authors perspective, Xiao affiliated with the University of Rhode Island is who most collaborates with the field (12 articles), followed by Grinstein-Weiss, affiliated with Washington University, Zia affiliated with the World Bank, and Collins affiliated with the University of Wisconsin, each collaborating on eight documents. The prominent journals in the area are the Journal of Consumer Affairs with 38 papers and the International Journal of Consumer Studies with 17.

The main internal works in the portfolio are those by Fernandes *et al.* (2014), Huston (2010), and Anderson *et al.* (2013). According to the papers used in the articles, Lusardi and Mitchell (2014) appears as the main work. Most of the documents in this study address questions related to didactics, consumption of financial products, indebtedness, well-being, entrepreneurship, retirement, savings, and economics. Even though sustainability is one of the words that originated this database, only nine works address the environmental pillar. Of these, only three manage to work in financial education in harmony with the triple bottom line.

In the field stand out four general research lines, divided into clusters, confirmed in the analysis of the occurrence of words. Thus, the results of this study point to a still very shallow discussion between financial education and sustainability in

the literature, especially about the environmental pillar. All of this leaves many questions open about the role of financial education in developing a society with fewer inequalities, a less aggressive economy, and a healthier environment.

5. Final Considerations

This research sought to capture an overview of discussions in the financial education and sustainability literature, verifying the distribution of papers according to the year, country, author, institution, and journal; all of this to identify the concentration of research in productivity and impact. In addition, a co-occurrence analysis of words was carried out, and the most popular lines of research in the field were identified. Some analyses were reinforced with cluster solutions for greater detail.

We conclude that studies in financial education and sustainability have gained popularity worldwide since 2011, but the research tradition has focused on the United States. Brazil and China occupy the second and third places, a timid position, but relevant for decentralizing the theme in countries of economic sovereignty and bringing debates to emerging countries.

Financial education needs more internal consensus to show its development potential in other fields of study. This lack of cohesion for the fundamentals of the area perpetuates research that is very contained in its field. And as it was possible to see in the clustering analysis, the principal authors do not work together directly, and few authors dare to come out of the discussion bubble to relate financial education to other topics.

Then, the researchers must spend much effort in the study of financial education and sustainability, especially about the environmental pillar. Limiting the debate on personal finance management to the economic or social pillar only contributes to perpetuating structures predatory of life and well-being.

The purpose of financial education is not just to empower people to manage money as a resource; that would be equivalent to putting warriors on the front lines of a battle with pocket knives while the opponent has a cannon. The role of financial education focused on sustainability goes further, making up one of the pillars of the formation of citizens and their social and environmental awareness.

The future of studies in financial education and sustainability, far beyond scientific development, also points to developing intelligent solutions to social problems, functioning as a tool to combat inequalities, support healthier economies, and develop a safe and sustainable environment; and this article can be considered as a starting point. Given the limitations inherent to the nature of the bibliometric and scientometric article, it is necessary to deepen conceptual investigations, to propose innovations that can be tested theoretically and empirically, thus contributing to scientific progress. For future research, it is suggested that financial education and sustainability frameworks be proposed and experimentally tested, in order to ascertain the magnitude of the impacts of these two factors on people's behavior and lives.

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