



APPLICATION AND IMPACT OF CONSTRUCTIVISM IN LEARNING: A TERTIARY STUDY

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Abstract

The application of constructivist theories in literature reviews, particularly at the tertiary level, remains largely unexplored. This study aims to identify relevant literature reviews, what are their methodological features, and what are their objectives and subject matter regarding the application and impact of constructivism in learning. The method used in this tertiary study is systematic review. The purpose of the systematic review in this tertiary study research is to provide a careful summary of all available secondary research (literature review) in answering the research questions. In this study, researchers collected journal articles from Google Scholar, Eric, Science Direct, and Scopus online published in the period of 2014 to 2023. Based on the results of the collection and selection of articles by the inclusion and exclusion criteria, 15 articles were obtained. The article consists of 6 types of reviews, from 9 countries published in 15 Scopus and Sinta indexed journals. The results of this review show that the application of constructivism is carried out in learning activities in multi-disciplines. The impact of the application of constructivism is to improve learning outcomes, academic achievement, learning attitudes, and the effectiveness of learning activities.

Keywords: Constructivism, Application, Impact, Tertiary Study

Abstrak

Penerapan teori konstruktivis dalam kajian pustaka, khususnya pada jenjang pendidikan tinggi, masih belum banyak dieksplorasi. Penelitian ini bertujuan untuk mengidentifikasi kajian pustaka yang relevan, apa saja ciri metodologinya, dan apa saja tujuan dan pokok bahasannya terkait penerapan dan dampak konstruktivisme dalam pembelajaran. Metode yang digunakan dalam kajian pendidikan tinggi ini adalah kajian sistematis. Tujuan kajian sistematis dalam penelitian kajian pendidikan tinggi ini adalah untuk

memberikan ringkasan yang cermat dari semua penelitian sekunder (kajian pustaka) yang tersedia dalam menjawab pertanyaan penelitian. Dalam penelitian ini, peneliti mengumpulkan artikel jurnal dari Google Scholar, Eric, Science Direct, dan Scopus daring yang diterbitkan dalam kurun waktu tahun 2014 hingga 2023. Berdasarkan hasil pengumpulan dan pemilihan artikel berdasarkan kriteria inklusi dan eksklusi, diperoleh 15 artikel. Artikel tersebut terdiri dari 6 jenis kajian, dari 9 negara yang diterbitkan dalam 15 jurnal terindeks Scopus dan Sinta. Hasil kajian ini menunjukkan bahwa penerapan konstruktivisme dilakukan dalam kegiatan pembelajaran di multidisiplin ilmu. Dampak penerapan konstruktivisme adalah meningkatkan hasil belajar, prestasi akademik, sikap belajar, dan efektivitas kegiatan belajar.

Kata Kunci: Konstruktivisme, Aplikasi, Dampak, Studi Tersier



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INTRODUCTION

Constructivism is a theory of learning that argues that humans generate knowledge and meaning from their experiences. A significant learning theory that has been applied in many fields, including education, psychology, and the social sciences, it has direct application to education, suggesting that human beings build knowledge and meaning from their experiences. Constructivism emphasizes the active role of students in building their understanding. Students reflect on their experiences, make mental representations, and incorporate new knowledge into their schemes. This is what encourages student learning and understanding to be more profound.^{1,2}

The main concept of this constructivism is that human learning is done through the process of building, learners build new knowledge on top of old knowledge resulting from previous learning. This prior knowledge affects the new knowledge or modification of knowledge that a person will build from the new learning experience. Learning is an active process. Constructivist learning theory provides a powerful framework for understanding how students actively build knowledge and meaning from their experiences.

The constructivist approach plays an important role in the learning process to construct knowledge. Several studies (primary studies) that examine constructivism in learning have produced many literature review studies (secondary studies). This literature review is needed to understand a topic. Constructivism has many interpretations and various forms of application in learning and the impact of each application. However, no review has been carried out at the tertiary level on the results of the review that has been carried out. So it needs to be reviewed comprehensively and in-depth to find out what are the forms of application of constructivism in

¹ Bada and Steve Olusegun, "Constructivism Learning Theory: A Paradigm for Teaching and Learning," *IOSR Journal of Research & Method in Education* 5, no. 6 (2015), <https://doi.org/10.9790/7388-05616670>.

² Beena Giridharan, "Earlier Title: US-China Education Review, Education Review A," 2012.

learning that have been reviewed and their impact on student abilities.³

Tertiary studies, also known as general reviews are a type of literature review that synthesizes the results of several secondary studies (i.e. systematic literature reviews and systematic mapping studies) on a specific topic . This research will analyze and synthesize findings from various literature reviews that have been conducted previously regarding the application of constructivism in learning. This study aims to identify literature reviews relevant to the application and impact of constructivism in learning, its methodological features, objectives, and findings from selected literature reviews.⁴

This tertiary research will provide a comprehensive and in-depth overview of how constructivism has been applied in learning practice and how it has impacted, based on a review of existing literature. The findings of this study are expected to provide valuable insights for educators, researchers, and students involved in the study of tertiary literature.

RESEARCH METHODOLOGY

The method used in this tertiary study is a systematic literature review using the prism method. A systematic literature review is a method carried out to synthesize scientific evidence to answer a specific research question in a clear and replicable way. This method seeks to include all published evidence and assess the quality of the evidence submitted. This tertiary study aims to provide a careful summary of all available secondary research in answer to the research question. The steps taken in this systematic review are as follows:

1. Identify research questions and inclusion criteria for systematic review to be included in the review.
2. Search for relevant systematic reviews in the database.
3. Assess the quality and relevance of systematic reviews using established criteria
4. Extract data from systematic reviews such as study characteristics, interventions or exposures, outcomes, and effect sizes.
5. Synthesize findings from the included systematic review using appropriate narratives.

³ Irshad Hussain, "Use of Constructivist Approach in Higher Education: An Instructors' Observation," *Creative Education* 3, no. 2 (2012), <https://doi.org/10.4236/ce.2012.32028>.

⁴ Alexander Ligthart, Cagatay Catal, and Bedir Tekinerdogan, "Systematic Reviews in Sentiment Analysis: A Tertiary Study," *Artificial Intelligence Review* 54, no. 7 (2021), <https://doi.org/10.1007/s10462-021-09973-3>.

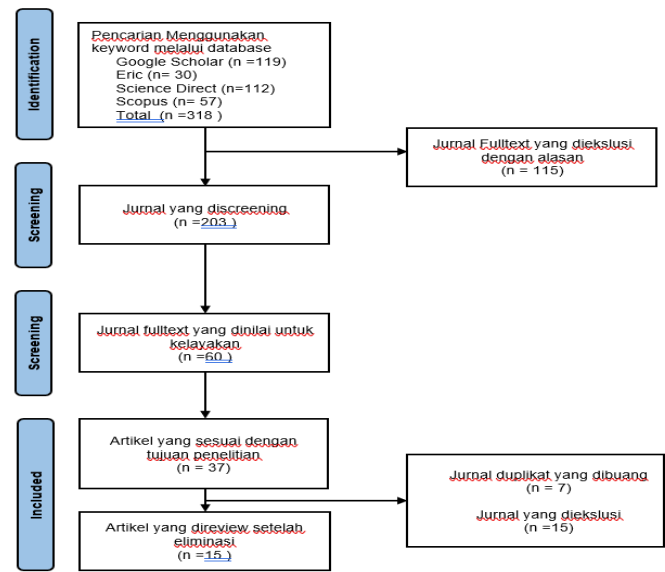


Figure 1. Prism Method

An important component of a literature review is the proper and clear formulation of research questions. This will affect how data is collected, selected, and analyzed data sources. This point is very important especially when there are many relevant sources and a wide field of research. In this study, 3 research questions were compiled (table 2) consisting of What are the relevant literature reviews that discuss constructivism approaches in learning (A1), What are the methodological features of the literature review (A2) and What are the objectives and findings of the literature review (A3). The article search protocol in this study can be seen in Table 2. Where the table describes the steps taken in collecting articles to be reviewed (Steps A-D), while the criteria set in choosing articles that are appropriate (relevant) to the research topic are in Steps E-F. The final search result is located in section G.

Table 1. Search Protocol

A.	Pertanyaan penelitian	A.1	Apa saja tinjauan literatur yang relevan yang membahas tentang pendekatan konstruktivisme dalam pembelajaran				
		A.2	Apa saja fitur metodologis dari tinjauan literatur				
		A.3	Apa saja tujuan dan temuan dari tinjauan literatur <i>Google Scholar, Eric, Science Direct, Scopus</i>				
B	Basis Data						
C	Kriteria Pencarian	C.1	Bahasa	Bahasa Inggris			
		C.2	Bidang Keilmuan	Pendidikan			
		C.3	Jurnal	Sinta 1, Sinta 2 dan scopus			
		C.4	Jenis Artikel	Literatur review			
		C.5	Bidang pencarian	Judul, Abstrak dan kata kunci			
		C.6	Tanggal Publikasi	2014-2023			
		C.7	Tanggal Pencarian	5 November 2023			
D	Istilah Pencarian						
			Kata Kunci	Eric	Google scholar	Science Direct	Scopus
							Total (1)
		D.1	Constructivism in Learning	10	42	75	25
		D.2	Constructivism Approach	9	20	20	31
		D.3	Constructivism	11	57	17	1
			Total (1)	30	119	112	57
			(1) Setelah penghapusan catatan duplikat				
E	Kriteria Inklusi	E.1	Artikel literatur review				
		E.2	Relevan dengan topik				
		E.3	Open akses				
F	Kriteria ekslusi						
		F.1	Prosiding konferensi, Buku				
		F.2	Tertiary Studi, Studi Literatur				
		F.3	Tidak relevan dengan Topik				
		F.4	Tidak open akses				
G	Hasil Pencarian						
		G.1	Dari pencarian kata kunci	318			
		G.2	Setelah tinjauan abstrak	37			
		G.3	Setelah tinjauan artikel	15			

Material Collection

The article search process will be carried out on November 5, 2023. The article searched is an English-language article that is classified as a literature review focused on the field of education. The articles searched consist of sinta 1, sinta 2, and scopus articles. Article search is focused on title, abstract, and keywords. The keywords used in article searches are "*constructivism*", "*constructivism approach*" and "*constructivism in learning*". The data base in this study is *Google Scholar*, *Eric*, *Scopus*, and *Science Direct*. In the *Google Scholar* database, 119 articles were obtained, *Eric's database* obtained as many as 30 articles, *Scopus* as many as 57 articles, and *Science Direct* as many as 112 articles. The total number of articles found was 318 articles and after passing the screening stage of titles, abstracts, and keywords relevant to the research topic, 15 articles were obtained for more in-depth analysis.

Material Selection

Material selection is based on inclusion and exclusion criteria. Inclusion criteria are criteria that are used as a benchmark in choosing articles to be sampled in research. The inclusion criteria in this study are 1) articles classified as review literature related to the application and impact of constructivism in learning. 2) the selected article must be relevant to the topic, and 3) the article is open access. Exclusion criteria are criteria used in issuing articles that are not relevant to the purpose of research. The exclusion criteria in this study are 1) proceedings of conferences and books, 2) tertiary studies and literature studies, 3) irrelevant to the topic, and 4) articles that are not open

access.

The selection of articles carried out consists of two stages, namely abstract review selection and complete manuscript screening selection. Screening is based on predefined inclusion and exclusion criteria. At the initial stage of selection, the total number of article searches was 318 articles and after the selection stage, it was reduced to 15 articles to be analyzed.

Table 2. Tertiary Studies Concerning the Application of Constructivism in Learning

Author	Jurnal	Period e Yang Dicak up	Jumlah Artikel	Jenis Tinjauan	Subjek (Constructiv ism Application (CA))
S Özer Sanal, M Erdem 2023	The European Educational Researcher	2020- 2023	149	SLR	Konstruktivis Pendidikan Khusus
Andreas Maroungkas et all, 2023	Electronics	2017- 2022	136	LR	Pembelajaran Kontruktivis me
Aloys Iyamuremye, et all 2022	Education and Information Technologi es		124	SL	Konstruksi Pengetahuan pada Pembelajaran Kimia berbasis WEB
Vidya Yeravdekar, Ramakrishnan Raman 2022	Original Research	2019- 2022	121	LR	Konstruktivis me Sosial
Nigel Rees, et all 2022	Frontiers In Psychology	2000- 2021	11	MA	Konstruktivis me Kesehatan
Gokhan Bas, Zafer S. Kivilcim 2021	Internationa l Journal Of Technology In Education	2001- 2016	34	MA	Efektivitas Pengajaran Tradisional, Kooperatif, Konstruktivis
Selçuk Arik ,Mehmet Yilmaz 2020	Internationa l Electronic Journal Of Environme ntal Education	2000- 2015	57	MA	Pendekatan Pembelajaran Konstruktivis Dan Pembelajaran
Candra,Heri Retnawati 2020	Internationa l Journal Of Instruction	2013- 2017	25	MA	Konstruktivis me Terhadap Hasil Belajar

Author	Jurnal	Period e Yang Dicak up	Jumlah Artikel	Jenis Tinjauan	Subjek (Constructivism Application (CA))
Abdullah Al-Sakkaf, et all, 2018	Computer Science Education	2011- 2017	58	Article Author	Journal
Periods covered 2018	Number of Articles	Types of Review s	Subject (Constructivism Application (CA))	S Özer Sanal, M Erdem	The European Educational Researcher
2020-2023	149	SLR	Special Education Constructivists	Andreas Marougkas et all, 2023	Electronics
2017-2022 2015	136	LR	Constructivist Learning	Aloys Iyamuremye, et all	Education and Information Technologies
Mehmet Fatih Ayaz, Hanifi Şekerci, 2015	124	SL	Knowledge Construction on Chemistry Learning based on WEB	Vidya Yeravdeka, Ramakrishnan Raman	Original Research
2019-2022 2014	121	LR	Social Constructivism	Nigel Rees, et all	Frontiers In Psychology
2000-2021 2014	11	MA	Health Constructivism	Gokhan Bas, Zafer S. Kivilcim	International Journal Of Technology In Education
2001-2016	34		Traditional, Cooperative , Constructivist Teaching Effectiveness		

Description: SLR (Study Literature Review), LR (Literature Review), SL: (Literature Synthesis), MS (Meta Synthesis), MA (Meta-Analysis), SR (Scoping Review)

Analysis Structure

The structure of the analysis in this study can be seen in Table 4. It consists of eight categories based on research questions. Research question A1 relates to literature review data relevant to the application of constructivism in learning. This question is answered with bibliographic data from selected articles and is included in category 1.

Question A2 related to the methodological features of the literature can be answered by the structure of the analysis in categories I to III. In this category, formal characteristics are chosen to characterize each article related to its methodological approach. Question A3 related to what are the objectives and findings of the literature review using an analytical structure in categories IV to V. In this study, category design is carried out inductively based on repeated reviews of the selected topic.⁵

Table 3. Analysis Structure

I	Description	II	Goal Type	III	Collection of Materials
	Year		SLR (Literature Review Study)		Protocol Driven
	Journal		LR (Literatur Review)		Informal Approach
	Country		SL: (Synthesis of Literature)		
	Period covered		MS (Meta Synthesis)		
	Number of Articles		MA (Meta Analysis)		
			SR (Scoping Review)		
IV	Synthesis of Materials	IN	Objective		
	Descriptive		Application of Constructivism		
	Category		Impact of Applying		
	Content		Constructivism		

RESULTS AND DISCUSSION

This section describes the results of research that has been obtained including the results of descriptive analysis, then continued with category analysis and content analysis.

Descriptive Analysis

This study conducted a review of selected review literature that examines the application of constructivism in learning. Based on the search results, 15 articles were obtained from 15 different journals. The articles reviewed are written by authors from 9 countries, namely Turkey (7 articles), Africa (1 article), India (1 article), Indonesia (1 article), Malaysia (1 article), Canada (1 article), Lebanon (1 article), Greece (1 article) and Wales (1 article). The fact that the articles come from

⁵ Philipp Mayring, "Qualitative Content Analysis," *Forum: Qualitative Social Research* 1, no. 2 (2000).

different countries can provide diverse perspectives on constructivism in learning. Each country has its unique educational context, cultural influences, and pedagogical practices, which can enrich the understanding and application of constructivism.

Turkey is the country that reviews the most articles related to constructivism in learning. This indicates a strong interest or focus on constructivism in learning in Turkey. The findings require new studies to explore why this happens. Whether this is due to education policies, academic interests, or certain educational challenges in the country. The number of articles reviewed for each review article can be seen in the graph in Figure 1 below.

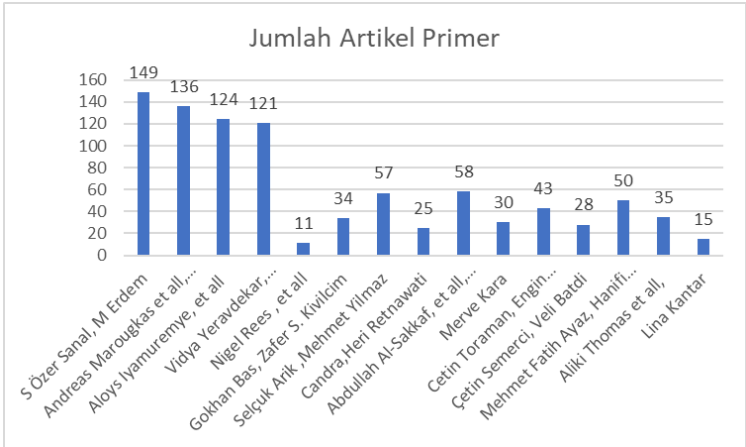


Figure 2. Graph of the Number of Articles Reviewed in Literature Review

The number of primary research reviewed in literature review articles (secondary articles) is increasing from 2022 to 2023. The increasing number of primary studies reviewed in literature review articles indicates an increased interest in this topic. This can be an indication of the expansion of the field of study related to the application of constructivism in learning, with more and more research conducted and published. The number of articles reviewed for all literature review articles obtained was 916 primary articles out of 15 secondary articles. If you look at the ratio of primary articles to secondary articles, on average each literature review article reviews around 61 primary articles (916 primary articles / 15 secondary articles). This ratio gives an idea of the depth of each literature review.

The distribution of articles reviewed is in the range of 2014 to 2023. In 2014 we found 2 literature review articles, then 2 articles in 2015, and 3 articles in 2018. Then 2 articles in 2020, 3 articles in 2021, 1 article in 2022, and 2 articles in 2023. The period covered for each article can be seen in Table 1. However there is 1 article that does not explain the coverage period, this may be because this article is a literature synthesis article. The distribution of this coverage period can be seen in the graph in Figure 2 below.

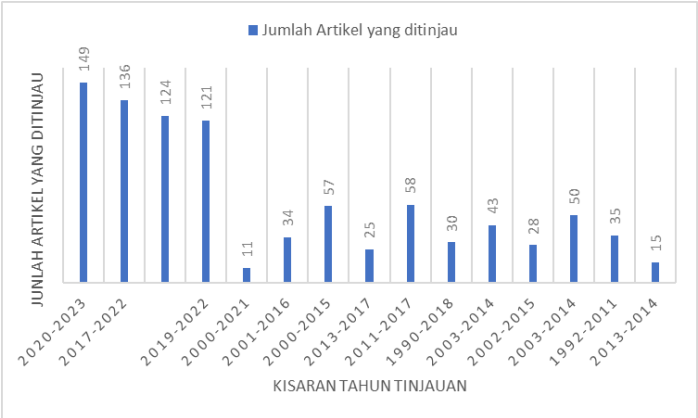


Figure 3. Year of Publication and Coverage Period of Literature Review

Category Analysis

There are 6 types of systematic reviews of articles that are analyzed in depth. Which consists of 2 Literature Review Study articles (13%), 6 Literature Review articles (40%), 1 Literature Synthesis article (6.6%), 1 Meta Synthesis article (6.6%), 4 Meta-Analysis articles (26.6%), 1 Scoping Review article (6.6%). There are a variety of review types used, indicating a comprehensive and diverse approach to analyzing the literature. The most dominant type of review is Literature Review, followed by Meta-Analysis and Literature Review Study. This may reflect the nature of the research field, where a broad understanding of the literature (provided by the Literature Review) and statistical analysis are more focused (provided by Meta-Analysis). The collection of articles in this study was carried out in two ways, namely by being driven by 74% protocol and using 26% informal method which can be seen in Table 4.

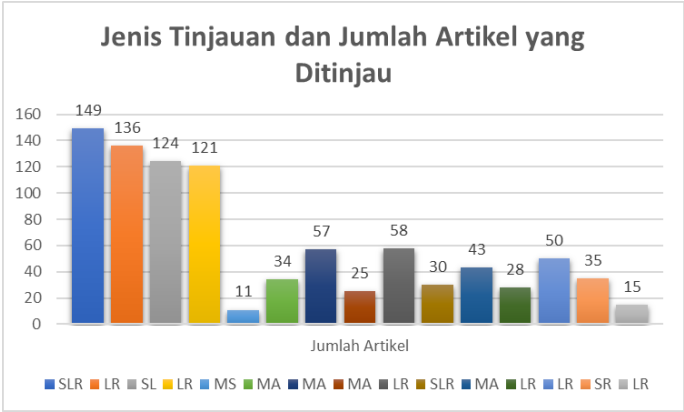


Figure 4. Types of Reviews and Number of Primary Articles Reviewed

Content Analysis

After an inductive approach, through a repeated analysis process related to themes extracted from 15 articles consisting of SLR review types (Review Literature Study), LR (Literature Review), SL: (Literature Synthesis), MS (Meta Synthesis), MA (Meta Analysis), SR (Scoping

Review). After analysis and review, it is grouped into general categories. In this study, using the constancy comparison technique synthesizes the results of these articles. In general, there are 2 topics studied in the selected article, including 1) the application of constructivism in learning and 2). The impact of the application of constructivism in learning. These two categories are grouped based on the data in Table 1. Both topics can be described schematically as in figure 4 below.

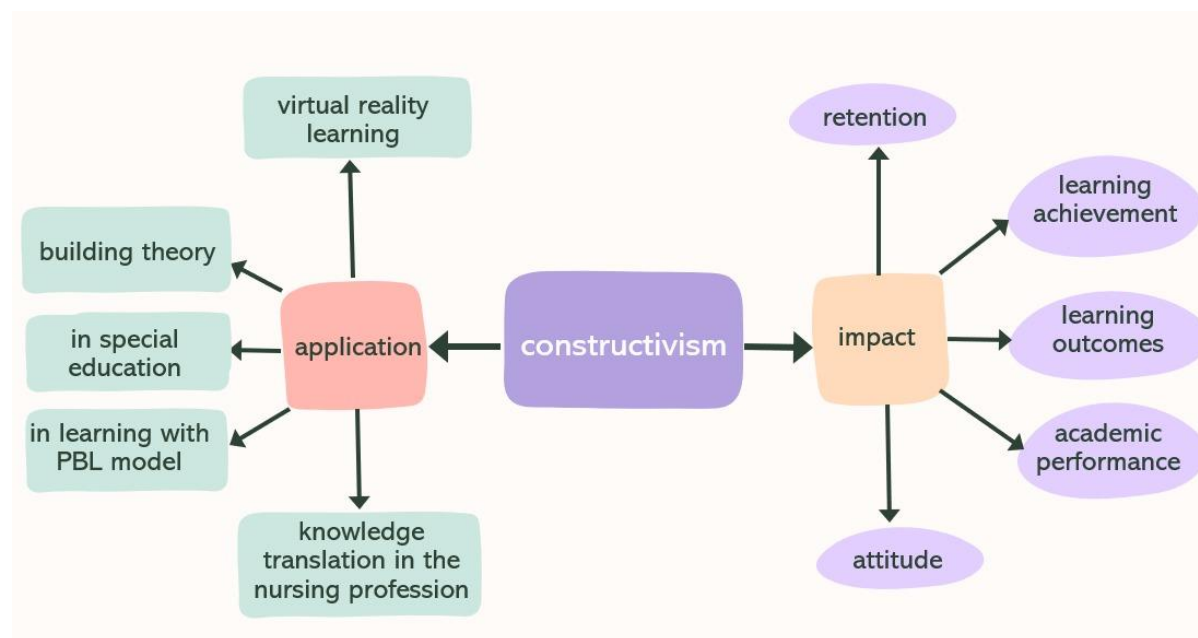


Figure 5. Schema of Topics Reviewed

Application of Constructivism in Learning

This category discusses how to apply constructivism in learning. In the literature review, it was found that constructivism is applied in the learning of mathematics, Chemistry, Nursing, Special Education, and various disciplines.^{6,7,8,9,10,11}

⁶ Gokhan Bas and Zafer S. Kivilcim, "Traditional, Cooperative, Constructivist, and Computer-Assisted Mathematics Teaching: A Meta-Analytic Comparison Regarding Student Success," *International Journal of Technology in Education (IJTE)* 4, no. 3 (2021), <https://doi.org/10.46328/ijte.133>.

⁷ Aloys Iyamuremye et al., "Knowledge Construction in Chemistry through Web-Based Learning Strategy: A Synthesis of Literature," *Education and Information Technologies* 28, no. 5 (2023), <https://doi.org/10.1007/s10639-022-11369-x>.

⁸ Alik Thomas et al., "Applications of Social Constructivist Learning Theories in Knowledge Translation for Healthcare Professionals: A Scoping Review," *Implementation Science* 9, no. 1 (2014), <https://doi.org/10.1186/1748-5908-9-54>.

⁹ Seda Ozer Sanal and Mukaddes Erdem, "Examination of Special Education with Constructivism: A Theoretical and Review Study," *The European Educational Researcher*, 2022, <https://doi.org/10.31757/euer.611>.

¹⁰ Selçuk Arik and Mehmet Yilmaz, "The Effect of Constructivist Learning Approach and Active Learning on Environmental Education: A Meta-Analysis Study," *International Electronic Journal of Environmental Education* 10, no. 2 (2020).

¹¹ Merve Kara, "A Systematic Literature Review: Constructivism in Multidisciplinary Learning Environments," *International Journal of Academic Research in Education* 4, no. 1–2 (2018), <https://doi.org/10.17985/ijare.520666>.

The variety of fields of science that apply this constructivist approach shows its wide relevance. This indicates that the principles of constructivism can be useful regardless of the field of study because constructivism is in the form of building knowledge from learning experiences carried out by students or students. However, it needs to be considered to plan learning activities that can maximize the ability of students to build their knowledge and time effectiveness in their application.

The application of constructivism in the analysis can be in the form of the application of the theory of constructivism to construct a concept, the application of the constructivism approach in a problem-based learning model, the application of constructivism in learning with *virtual reality*,^{12,13,14} and in general, the review explains the application of constructivism carried out in learning activities.

The Impact of Constructivism on Learning

This category discusses how the impact of the application of constructivism in learning is based on what is presented in the literature review. Based on the scheme in the picture, it can be seen that the impact of the application of constructivism in learning from the literature reviewed includes: 1) improving student learning outcomes, 2) increasing student academic achievement, and . 3) Improving students' attitudes towards learning, 4) Streamlining learning activities in various fields of science, Based on the results of the review, it is known that the application of constructivism has a positive impact on success in a learning activity. This is because by

¹² Nigel Rees et al., "Heroism and Paramedic Practice: A Constructivist Metasynthesis of Qualitative Research," *Frontiers in Psychology*, 2022, <https://doi.org/10.3389/fpsyg.2022.1016841>.

¹³ Lina Kantar, "Incorporation of Constructivist Assumptions into Problem-Based Instruction: A Literature Review," *Nurse Education in Practice* 14, no. 3 (2014), <https://doi.org/10.1016/j.nepr.2013.08.010>.

¹⁴ Andreas Maroukas et al., "Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade," *Electronics (Switzerland)* 12, no. 13 (2023), <https://doi.org/10.3390/electronics12132832>.

constructing knowledge, students can get a more meaningful understanding.^{15,16,17,18,19,20,21,22,23}

CONCLUSION

Based on tertiary studies that have been conducted on articles collected and analyzed, it can be concluded that the constructivist approach can be applied to various disciplines and has a positive impact on the learning process, including improving learning outcomes, academic achievement, learning attitudes, and the effectiveness of learning activities.

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¹⁵ Abdullah Al-Sakkaf, Mazni Omar, and Mazida Ahmad, "A Systematic Literature Review of Student Engagement in Software Visualization: A Theoretical Perspective," *Computer Science Education* 29, no. 2–3 (2019), <https://doi.org/10.1080/08993408.2018.1564611>.

¹⁶ Candra and Heri Retnawati, "A Meta-Analysis of Constructivism Learning Implementation towards the Learning Outcomes on Civic Education Lesson," *International Journal of Instruction* 13, no. 2 (2020), <https://doi.org/10.29333/iji.2020.13256a>.

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²¹ Iyamuremye et al., "Knowledge Construction in Chemistry through Web-Based Learning Strategy: A Synthesis of Literature."

²² Bas and Kivilcim, "Traditional, Cooperative, Constructivist, and Computer-Assisted Mathematics Teaching: A Meta-Analytic Comparison Regarding Student Success."

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