Systematic Literature Reviews as a Tool in Engineering Education

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Abstract— read up on the pertinent research articles by doing a literature review. When first starting out in the scientific research field, it might be difficult to know which large databases are necessary for your work and how to effectively search and filter materials. We suggest a tweak to Kitchenham and Bacca's method that would help the researcher shift the focus from "my" problem to "the" current issue. Their approach breaks down the whole process into three separate phases: preparation, execution, and evaluation. During the pre-analysis phase, a "mentefacto conceptual" and three or five research questions are generated using the research issue technique. When developing a search thesaurus and inclusion/exclusion criteria, a creative "mentefacto conceptual" could be really useful. A simple systematic inquiry is the best approach to start research. In order to accomplish your research goals, it is important to follow three steps: locate appropriate literature; review relevant works; and verify that your results address your research questions. Creating thorough and precise inclusion and exclusion criteria was a part of building the search strategy. In a perfect world, the researcher would have access to a comprehensive library of fundamental publications, each with detailed descriptions. The study case provides a concise and easy-to-understand explanation of the process, and the findings support the hypothesis.Approach to Methodology The engineering education literature reviewed in detail

INTRODUCTION

The development of research questions and the establishment of parameters for subsequent studies depend on comprehensive literature reviews [1]. Researching for a PhD requires a methodical approach, especially in the first year. Reading about the study's methodology (population, sample, statistics), findings, and authors' suggestions will help you understand the field's past work better. Additionally, it might be helpful to research the databases and journals that the top writers in your area utilise when marketing their work. If you follow these steps, the data you have about the published results will be current and permanent. Scientific publications and other venues where researchers collaborate to exchange study results, methodologies, databases, networks, etc. are less well-known in areas that may benefit from more research. Finding the right thesaurus terms and knowing how to filter the results may be challenging for researchers, whether they are moving into uncharted terrain or merely trying to further their present field of study. In [2], a taxonomy is shown as a table with several sections and topics to help comprehend the breadth of the subject. They propose a taxonomy with a horizontal tree with two sets of entries (rows and columns), a multitude of keywords, and so on by combining four primary categories and splitting it into two diagrams. It is unfortunate that the search strategy gets unclear with such a vast diversity. With its unique characteristics and visually beautiful appearance, De Zubira's [4] "mentefacto conceptual"—originally meant to aid with reading comprehension—would be ideal for the aforementioned uses. Searching Scopus for the single variable "main topic; and, as discriminators, the date of publication." publishing, and then every reader carefully analyses the gathered articles, the authors do basic filtering in [5].

The study does not qualify as a systematic review due to the biassed search words and the lack of criteria to include or reject studies, even if the researcher is satisfied with the results. Any one of the many paths that describe the whole systematic procedure of developing a state-of-the-art might be used to get around the aforementioned restrictions and empirical methods.

The author's contributions to engineering literature reviews [7], the work of Kitchenham et al. [6], and the changes by Bacca et al. [8] have provided researchers with a framework to follow in recent years. This framework also includes the work of hundreds of other scholars. Planning, performing, and evaluating are the three steps they use. A group from Keele University known as Kitchenham established guidelines for comprehensive literature reviews in software engineering [9]. Adhering to its generalizability, they modify earlier work[6,7] to suit the needs of the field. The researcher's extensive expertise and understanding in the chosen scientific field is essential for the effective use of these approaches. The findings acquired utilising the technique described by Kitchenham et al. [6, 7, 9] are built upon research topics, subjects, inclusion/exclusion criteria, and associated analysis. Because this approach integrates conceptual thinking into a systematic search strategy, it offers all of the benefits listed above and more, including the potential for significant impact. As an upgrade from the Kitchenham protocol, we suggest this approach for first systematic reviews. Building a library of high-impact journals is a great way for a novice researcher to publish their work, connect with other experts in the field, and keep up with the latest developments in their area of study. This document contains the following elements: the mentefacto framework, a thesaurus, database search scripts, research questions, inclusion/exclusion criteria, literature reviews, features for analysing the research question, journals containing relevant content, systematic review results, and brief conclusions. in addition to a brief summary of the method's use in a real-world context given towards the conclusion of the article. The method streamlines the process of doing systematic reviews, and this case study shows how it may be used. METHOD All aspects of the review, from planning to execution to reporting, adhered to the three-stage methodology for a literature review as described by Kitchenham [6, 7, 9] and Bacca [8]. An novel step that develops from an initial strategy for the research topic overall is the addition of a conceptual mind or a graphical model to the research process (De Zubira, [4]). The next step is to apply the suggested approach to this theoretical investigation. Use this resource as a guide to streamline your search and organise results according to your inclusion/exclusion criteria. Following these adjustments, the systematic review process consists of the following procedures: Setting Things UpRecognising the need of reassessment (1.1)

The Existing Body of Knowledge About the Issue (1.1.1).

Questions for Study (1.1.2)

1.1.3 "Mentefacto Conceptual"

1.1.4 Systematic Reviews That Are Similar

Creating a Review Protocol 1.2.

Criteria for inclusion and exclusion are defined in Section 1.2.1.

Data Extraction Form Preparation 1.2.2 Journal Selection 1.2.3

Reviewing the Process

2.1. Finding relevant research 2.2. Choosing main studies

Evaluation of Research Quality 2.3

Extraction and tracking of data 2.5 Synthesis and tracking of data

3. Summarizing the findings

As seen in Figure 1 (titled "'THE' Current State of the problem"), the researcher's understanding of the issue broadens beyond their original "personal/individual" viewpoint by the conclusion of the investigation. When evaluating existing literature, it is just as crucial to have subject-and area-specific knowledge as it is to be able to conceptualise the mentefacto and generate research questions. This information will allow us to run the initial systematic search, S(), in our quest to locate applicable systematic reviews. Why not do a comprehensive If there is a lack of prior research, a systematic review will be carried out to answer the research questions.The Systematic Search Procedure, or S(), provides some context for the second macroprocess. The next stage is to use a database-specific script to get search words from the mentefacto scientific and conceptual thesauri. The next step is to find the study using an other approach. Finally, as shown in Figure 2, the search results are added to a list as a variable.

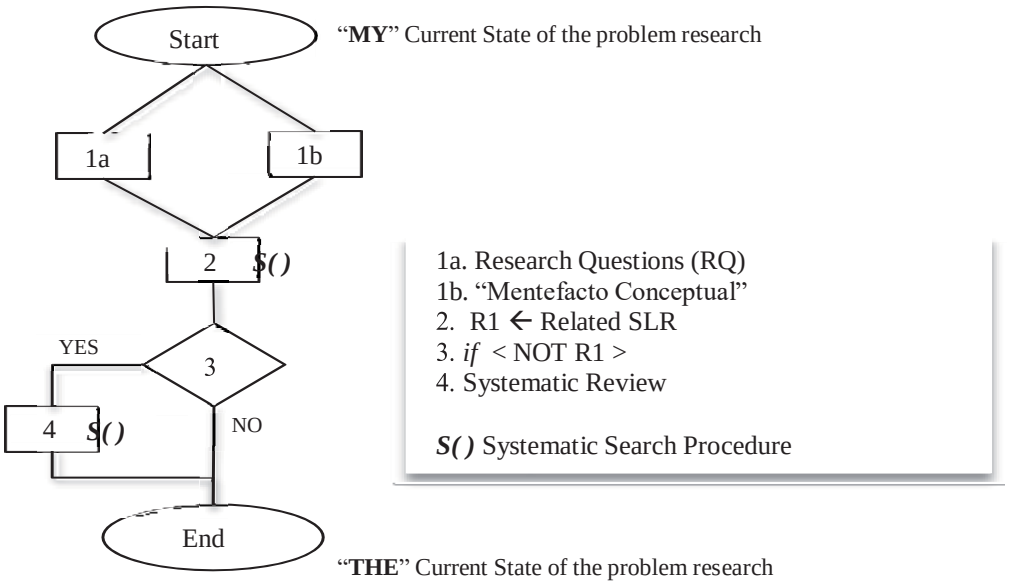
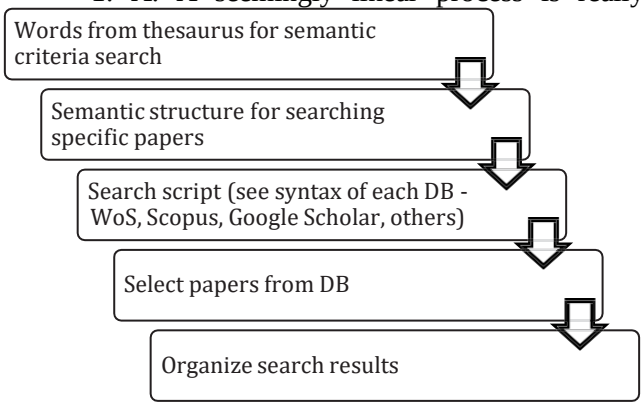


Fig. 1Generalized Methodology Procedure

1. A. A seemingly linear process is really



iterative and continues eternally until all the goals of each stage and sub-stage are met. Using the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA) [1] for both the "Development of a review protocol" stage and the report's final presentation was critical. Researchers may find PRISMA, which has a specialised flowchart and a 27-item assessment checklist, useful for putting together reports of systematic reviews [10]. One cycle is required at the very least.

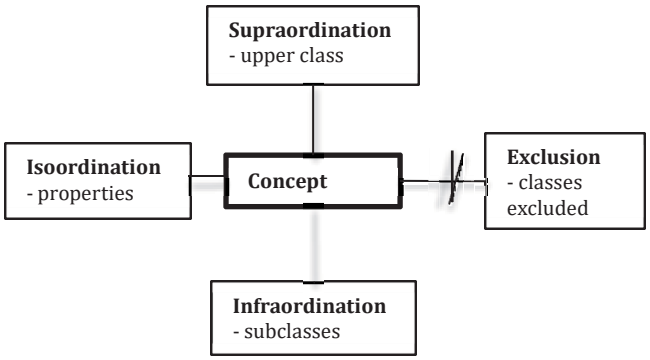
on each research participant according to the suggested method. First things first: make sure all the data is thoroughly evaluated. The first step in doing any kind of scientific research is to identify relevant prior literature on the topic of interest. According to Anger-Egg, one should consider the psychological and social components using sociological ideology rather than becoming bogged down in the theoretical details [11]. Applying the

methods outlined by Hernández [12] is one way to tackle a research problem in this area.Ultimately, study aids are the aim.

1. 2. queries for study.
2. Third, the study's justification: why and for what. from the research.
3. Study feasibility, number four.
4. Access to materials is the fourth category.
5. Limitations of the Research 4.2.
6. 8. The research's relevance and impact.
7. Disparities in understanding the issue
8. What we know today, section 9.1.
9. 9.2 Fresh viewpoints on the subject matter.

• Some of these thirteen things are provided by the systematic review, but the first one is essential for moving forward. In order to adequately describe the issue, the researcher must have an in-depth understanding of it, as stated by Ackoff [13]. Assuming you pose the question appropriately, the likelihood of receiving a satisfactory answer should increase. How the researcher approaches the problem methodically and explicitly determines the next steps. More Investigation Necessary A part of the issue description is the research questions, according to Hernández [12]. This study's foundational questions will draw on the researcher's own interests as well as the current literature on the topic. Researchers should be forthright about their reasoning behind research questions and state them clearly at the start of a study as they govern the research strategy and anticipated results (Hienemann, 2014). The technique uses the research questions as a starting point to get to the essence of what needs to be examined and how. The labels should make it easy for you to distinguish them from the first set of study questions. The narrative proper of the question follows the letter RQ and continues with the numbers in the labelling syntax. The first question needs an explanation, so please provide one.
Can you tell me the answer to the second question, RQ2?
10. Can you tell me how to answer the last question?

11. You may be able to narrow down your initial set of research questions if you find systematic reviews that address some of them. If only partial responses are supplied, the categories used for analysis may be adjusted, but the question can be preserved. If you want to cover a lot of territory and acquire difficult answers, Kitchenham says you should have three or five research questions.
12. The conceptual mentefacto was created by De Zubiria [4] to assist with reading and learning. The mentefacto conceptual is a representational tool used in conceptual teaching. It is a "graphical sketch" because the author uses representation to show a complicated notion that already exists. What comes next is dependent on how you answer these four questions. To what category does it belong? How are you different from other things that look like you? Can you be classified into several types? In light of these questions, four related frameworks of thought developed:15.It is seen in Figure 3 that the first quartet is missing, followed by superordinate, infraordinated, and isoordinated. Superordinados highlight the overall structure, infraordinate all of its constituent classes and subtypes, and delete its closest relatives; isoordinados highlight specific aspects; infraordinates all else.



Section 3: The "Mentefacto conceptual" [4] Images

To help you choose the right keywords, you may see an ideogram (Isoordination) on the left side of the screen. Because any investigation into a subset of the concept would likewise fall under its purview, we take the subclasses (Infraordination) into account while selecting keywords. Criteria for inclusion and exclusion are assessed using data on super ordination and exclusion.
Table I: Database Search Protocols 4) Additional Cochrane Reviews

Prior to commencing the compilation of a bibliography for the mentefacto graph model, a fundamental systematic search for relevant literature reviews must be conducted. We may then check to see whether they answer our research questions after we find any.The modelo conceptual comes up with thoughts when the search phrases are entered into the semantic framework of the literature search. The scientific domain thesaurus is then consulted in order to generate terms that indicate antonymy and synonymy based on these notions. Table I details the search strategy that will be used to construct each database-specific script. If the researcher's subjective requirements are met, three types of articles are identified: authentic, referent, and response. This section demonstrates the soundness of our research proposal by demonstrating how the literature reviews we have chosen enable us to answer the research questions posed by our topic. On the flip side, we will collectively address the unanswered research questions by grouping related bibliographic topics. Learn the history of the rules. You must determine from the beginning what does not constitute an inclusion. This and subsequent parts of the evaluation are constrained since few systematic reviews have dealt with the study's objectives and techniques of analysis. Examining possible study participants using general, specific, and mixed criteria is the next step in the process described by Bacca et al. [8]. Following theoretical studies, international standards, and research methods, we build adjustable variables for each component, and we make sure that the included groups are considered as well.Combination of keywords m and m

The following filters work in tandem: (year > (current year -5 years))

Review, Topic 1 OR Synonymous Topic 2; Topic 3 OR Synonymous Topic 4; Topic 5 OR Synonymous Topic 6; Topic 7 OR Conversely Keyword 8

For every part, we construct adjustable variables based on theoretical studies, global standards, and research methods.• (keyword_m* OR synonym_m)

The following filters work in tandem: (year > (current year -5 years))
Review, Topic 1 OR Synonymous Topic 2; Topic 3 OR Synonymous Topic 4; Topic 5 OR Synonymous Topic 6; Topic 7 OR Conversely Keyword 8

difference between n_2 and n_m
Consider the following options: keyword_1, synonym_1, keyword_2, synonym_n, synonymous_n_1, synonym_n_2, OR review, study
1) Making a form to collect information
2) In order to properly categorize the data that has been acquired, the researcher must first establish the necessary systems. Areas for storing tools and showing results need to be defined and set up, includingmutually exclusive
Thirdly, the main filters are the year, abstract, keywords, and title of the article.(5 years less than this one)
the combination of (keyword_1 OR interchangeable_term_1)
5)) as electronic databases and citation managers.
6) Mendeley or another bibliography management program may help you arrange and classify academic literature search results.
7). The eye
Cloud storage is a good option for collaborative projects and last-minute preparations, and papers and other documents that come up during the search are also necessary. Magazines Selected

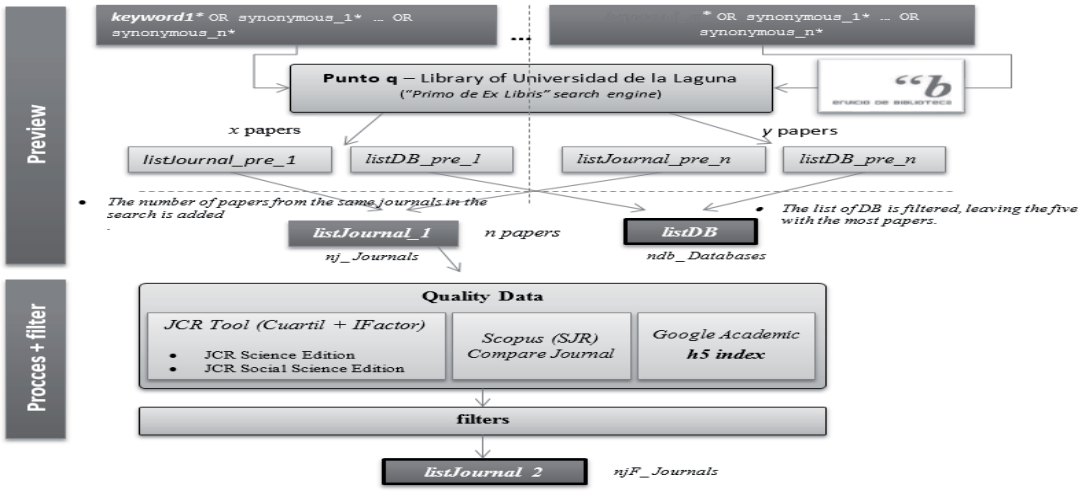


Fig. 4. *Flow chart for selecting relevant journals*

A. Yes, sir. A process flow diagram has been drawn up to help with the choice of suitable journals. Universidad de La Laguna's library conducted the first curation using "Primo de Ex Libris" in tandem with the platform's "Punto q" search engine.Depending on the search volume, the platform automatically creates lists for journals and databases using listsJournal_pre_1 and listsJournal_pre_n, and listsDB_pre_1 and listsDB_pre_n, respectively. Similar to previous research, this study draws from a broad variety of fields to arrive at its conclusions. At the moment, we're concentrating on sorting the journals by their influence. Our go-to method for this kind of work is the systematic search, which involves organising your keywords and search phrases according to a semantic sentence2 that links several academic disciplines with terms from a scientific thesaurus. To narrow our search to just the websites and articles that are relevant to our study, we may utilise this filter.Journal Citation Reports (Impact Factor, Quartile in Category, and Category), Science Citation Reports (h-index), and the Web of Science (WoS) are all visible in the first journal list (listJournal_1). Known as listJournal_2, it is the second sorting filter output. Here are some selection criteria that you might use:A quarter of the research publications value sortingOrd.assuming that JCR is valid.Assigned to SJR.h-index of type fiveThe other three criteria are

numerical proportions of papers collected from journals, thus we set this variable at 25% to ensure consistency.

B. • The list must be purged of any and all periodicals that aren't directly related to the field of study. A few examples:

C. o The JCR takes into account the following areas: Science of Computing, Computer Science: Interactive Applications

D. - Information Science and Related Fields; Pedagogy, Psychological Studies, and Related Areas; Special Education; and Rehabilitation.

E. o "Education Technology," "Education," "Human Computer Interaction," and "Engineering & Computer Science (general)" are all categories in the h5 index.

F. As a last criterion, the "Aims and Scope" portion of each journal's online home must be reviewed.

G. • Discard any periodicals that aren't included in the JCR or SJR indexes.

H. Following the earlier-provided Ord formula, just the top twelve journals on the list need be retained.

I. • The journals must be separated into two piles—JCR Science Edition and JCR Social Science Edition—according to their categorization in JCR 2016.

Review Methodology (M): Execution After the method has been decided upon, the review process may start, as stated by Kitchenham [7]. The inclusion/exclusion criteria and journal list from Step 1 are necessary for this one to function. (journal lists). Figure 2 lays out some of the steps to take in this case. Procedure S for Systematic Search, which were used both during planning and in Related SLR. Using the new method's adjustments, this stage consists of five sub-stages as outlined in Kitchenham's [7] proposal. Since the review is an iterative and incremental substage, the researcher is free to repeat the procedure as many times as they see fit in order to get at the answers to their research questions.

Identification of research

J. P. Compared to the prior stage, this initial sub-stage improves upon the strategy. As part of this process, you will plan your strategy, detect any publishing bias, get papers, manage your bibliographies, and record your search. To do this, one can use the S() Systematic Search Procedure's first three stages: Semantic search engine terminology choices; A search method that takes semantic structure into accountUsers are able to access data sources via the use of semantic terms in structured query languages (SQL). And lastly, a script for document searches. Now is the time to conduct an exhaustive search of the selected databases; this should be done in Use Google Scholar, Scopus, or World Scientific to narrow your journal search. One approach that has been proposed for continuous journal searches and results sorting according to the structure of research questions' variables is "Knowledge Discovery in Databases" (KDD) [15]. Logical gates like AND, OR, NOT, SAME, and others provide effective filtering, while structured search concepts enable semantically organised searches. Take a look at how we can use AND to combine our search criteria, OR to get a list of synonyms from our previously built thesaurus, and NO to exclude irrelevant results.Mendeley3, Zotero4, Endnote5, or any other bibliography management programme academics can conceive of may help them organise the results they get from academic database searches. Bibliographic software greatly simplifies the process of managing the possibly excessive number of citations that may result from a literature study.

Mr. K.Remembering that the researcher's prejudices might often affect the quality of the results is significant when considering publication bias [7]. Remember that

credible academics, such as those who edit or review for high-impact journals in the top quartiles of the JCR and SJR indexes, are the foundation of creative, high-quality research; Google Scholar searches may assist decrease bias to some degree, but it's still important to use caution.What Comes Next: Selecting Primary Resources The whole articles will be available when the bibliographies are finished. In order for the research team to access the administration and decide which articles to use collectively, they need individual logins to the bibliography management system. Finding the primary papers that address the research question is an important criterion for study selection [7]. One distinguishing feature of systematic reviews compared to more traditional reviews is the adoption of rigorous selection criteria to reduce the likelihood of bias. During the protocol design phase, these criteria are defined and written out to guide the remainder of the process. Before deciding which texts to use and which to leave out, make sure you read each one thoroughly. It is essential that all documents be properly annotated, saved digitally, and kept in a single location. Excellent syntax

for cataloging digital files is as follows:

1) Research into gestural environments, such as RQ2_01_SSE3_2013_Torres_Usability, where:

2) Question No. 2 in the Study

3) First chosen paper; referred to here as "01."

4) Journal ID from the Social Sciences E3 List.

J. 5) Don't forget to add the citations to your bibliography program and save them to your computer. As seen in the previous example, provide the required information into the application's Notes section after assigning tags (RQ1, SSE1, SLR). To further facilitate statistical analysis, the selected document must also be tabulated in the electronic record sheet.

1) 2) Evaluating the Standard of Studies

2) This section elaborates on the one that came before it. Evaluating the "quality" of the source articles is often seen as crucial, in addition to the normal inclusion/exclusion criteria [7]. The inclusion and exclusion criteria provide further proof of these traits; these criterion include quality metrics like the study's relevance, the reliability of the cited references, the expertise of the writers, and the prestige of the publication that released the research. Instead of considering study design while choosing and reviewing trials, as mentioned in [7], the Cochrane Collaboration and the Australian National Health and Medical study Council argue that it should be considered when analysing evidence. You may easily determine an article's significance using search engines and databases like as Scopus, WoS, Elsevier's ScienceDirect, and GoogleScholar, among many others. Sites such as Scimago (SJR) and Journal Citation Reports (h5) provide access to the bibliometric data of all journals indexed in Google Scholar's database. Considerations such as the h index, dating trend, and impact factor of the journal play a role in determining its quality and ranking. Having completed a thorough examination and cataloguing of journals as part of the methodology's approach, the criteria of this stage are fulfilled to a great degree.

Data extraction forms should contain review names, dates of data extraction, titles, authors, journals, publication descriptions, and any other observations that researchers would want to include in order to ensure the accuracy of primary study data [7]. A group of researchers should be able to complete this substage if they employ the bibliographic management software that is already available (described in section B1). Their occurrence, interaction, and recognition procedures might be made more effective and efficient with data registration. Publications that are relevant to the research

problem and the literature review should be annotated in the notes section. After that, you need to indicate that these papers are part of the review in the keywords section. To begin a literature review, you must first identify the sources that are applicable to your study.Data Merging and Ongoing Monitoring Lastly, the quality of the systematic review is evaluated. Depending on the aim, descriptive (non-quantitative) or meta-analytical synthesis can be the way to go [7]. We have a meta-analysis in the second one. Furthermore, Kitchenham outlines the essential elements for both qualitative and quantitative research. A review is what this report is. It is critical to make the results public so that other researchers may evaluate and comment on them. The results of systematic reviews are often expected when it comes to arranging research findings across several areas and time periods. This section is included in all PhD theses and may be published in an academic journal or presented at a conference.

The following details should be included in the report of the systematic review, according to Kitchenhand [7]:

1. Title.
2. Authorship.
3. Context, Objectives, Methods, Results, and Conclusions, often known as an Executive Summary or Structural Abstract.
4. Background.
There has to be a detailed description of each review question.
6: Review Techniques: Information Gathering, Search Strategies, Selecting Studies, Evaluating Quality, Extracting Data, and Synthesizing Results.
7 Studies that met the inclusion criteria and those that did not, as well as a list of the latter with an explanation of why they were not included.
Conclusions and findings are presented in Section 8.
9. An analysis of the key results, including their implications and limitations.
Ten. Final Thoughts and Suggestions.
11. Acknowledgements.
12) Improper bias or interest.
Thirteen: Bibliography/Appendices.

The Case Study: XVI.

An overview of the functions performed by each stage and substage is provided for the objectives of both confirming the method and giving the researchers some background information. The PhD thesis from 2017 also includes a good evaluation of the method [16, 17]. The new parts are introduced to the Kitchenham approach by offering a quick summary of the revision process. Inclusive classrooms, where gestural-computer interaction is beneficial for children, have been selected as a functional domain to illustrate the technique.Step One: Get Ready 1) Analyzing the Present Problem Situation Considered a research subject in computer science, human-computer interaction (HCI) is a branch of natural interaction (NI). As the number of individuals with impairments who need specialized hardware and sensors to use computers continues to rise, human-computer interaction (HCI) studies are becoming more important in the IT industry. To make things even more natural and intuitive for the user, IN may be used to enter not only voice instructions but also hand, finger, arm, and body motions as well as indirect bio-physiological data collected by wearable sensors into a computer [18]. Gestural interfaces, on the other hand, allow users to operate a computer by moving their hands, fingers, trunk, neck, and face [19]. Because digital teaching tactics derived from gestural interaction settings have been shown to significantly improve learning for persons with cognitive difficulties, it is crucial to be aware of and organize the findings from research in this field [17], [20].

2) Investigative Queries

- From the exposition of the problem, and as a requirement for future research the following research questions have been proposed:

- • RQ1: In what ways have strategies for gestural engagement in educational settings been implemented?
- How have the pedagogical materials for gestural communication been developed?
- Which technologies for gestural engagement have been implemented in schools?
- One) Conceptual Mentefacto

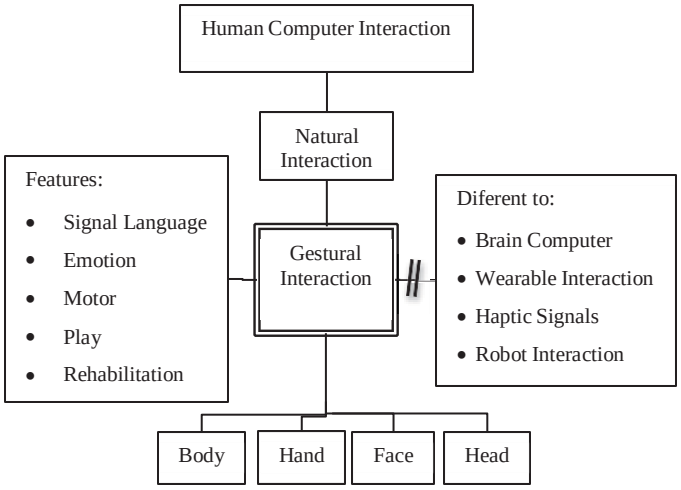


Fig. 5. *Mentefacto Conceptual – Gestural Interaction*
Gestural
L1 Computer Interaction

CONCLUTIONS

This article offers a novel approach to the topic by covering all aspects of conducting, designing, and reporting on a systematic review. De Zubrá's mentefacto—an ideogram for a conceptual mind map—and Bacca's revised version of Kitchenham's original methodology lend credence to this method. Particular attention is paid to mentefacto modifications.Improving my knowledge

A. Performing the analysis

Each item in JournalList_2 was searched using Elsevier's ScienceDirect platform's Expert Search capabilities using the following script. We further divided our areas of interest into five categories based on the results of the original search so that we could locate the most relevant scientific papers. You may use the indexing approach with the WoS system. abstract, serving as the foundation for the search terms, their antonyms in the scientific thesaurus, the semantic framework for retrieving academic papers, and the search script tailored to the database.

A case study illustrates each step. We have delayed installing the search script in the databases since our emphasis is on utilising the mentefacto conceptual framework.

REFERENCES

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to 2016," was published in Computer Education, vol. 116, pp. 28-48. B. Kitchenham's "Procedures for Conducting Systematic Reviews," [6] states that there should be seven. "Conjoint Technical Report," finished in 2003 at Keele, United Kingdom.

In 2009, B. Kitchenham, O. Pearl Brereton, D. Budgen, M. Turner, J. Bailey, and S. Linkman published an article titled "Systematic literature reviews in software engineering - A systematic literature review" in the Journal of Software and Information Technology published by the IEEE Computer Society. You might access the article from pages 7–15. Article 8 of the 2014 Journal of Educational Technology, "Augmented Reality Trends in Education: A Systematic Review of Research and Applications," states that... As stated on page 91 of S. Keele's 2007 article "Guidelines for performing Systematic Literature Reviews in Software Engineering," 11. The paper "Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement," written by D. Moher and published in August 2009 in the Annals of Internal Medicine (vol. 151, no. 4, p. 264), serves as the basis for this research. If you are interested in learning how to do social research, you should get a copy of Learn to Investigate, Volume 1 by E. Ander-Legg Egg [12]. The Editorial Brujas in Córdoba, Argentina, released it in 2011. the work of R. Hernández, F. Fernández, and P. Baptista's Methodology of Research, Sixth Edition [13] is mentioned as [14] in many places. The 2014 edition was published in Mexico by MacGraw-Hill/Interamericana. "Management Misinformation Systems," by R. L. Ackoff, published in Manage. Sci., 1967, pages B-147. Since its 2003 publication by Editoria Paidotribo and K. Heinemann, "An Introduction to Sport Science Empirical Research" has been available to the public since 2016. Pages 444–451 of the DESIDOC Journal of LIS, published in December 2018, include this paper. A. K. Dhiman published a paper titled "Knowledge Discovery in Databases and Libraries" in 2011. referenced as (P. V. Torres-Carrión's) "Approach to Human-Computer Interaction with Emotion Analysis for Individuals with Down Syndrome" on page (17). The book was released in 2016 by Universidad de la Laguna. Application to Learning Processes Involving Gestural Interactions. Details taken from a 2017 paper by P. Torres-Carrión, "Evaluación de Estrategias de Aprendizaje con HCI Kinect en alumnos con Sndrome de Down," published by the Spanish National University of Distance Education...

"Fundamentos of Human-Computer Interaction" was written by P. V. Torres-Carrión.

[20]. A technical session called "Seville" was held in Spain in 2018 at the University of Loja.

Human-Computer Interaction Beyond the GUI, written by P. Kortum and published by Elsevier/Morgan Kaufmann in 2008, discusses the development of user interfaces that take in data other than what is often associated with sight, sound, taste, and touch. [21]. An paper titled "including gamification techniques in the design of Tango: H Platform" [22] was published in 2013 in the journal J. Teknol. (Sciences Eng.) by C. S. González-González, P. Toledo-Delgado, M. Padrón, E. Santos, and M. Cairos.

"Taking a signal: A review of gesture-based computing research in education" was an essay written by N. S. Chen and F. R. Sheu. It was published in the 2014 issue of the journal Comput. Educ., number 78, pages 268-277. In their review titled "Interactive Technologies for Autistic Children: A Review," S. Boucenna and colleagues uncovered [24]. On May 5, 2014, pages 722-74 of volume 6, issue 5 of Cognit. Compute were published. [25] The This is the "Widening Participation in Technology

Design: A Review of the Involvement of Children with Special Educational Needs and Disabilities," a 2015 study published in the International Journal of Child-Computer Interaction, takes a multi-faceted approach to understand this issue. The authors, I. Benton and H. Johnson, employ various methods to gather information.