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# AUDIOVISUAL CONTENT OF YOUTUBE VIDEOS ON THE RESEARCH PROBLEM STATEMENT.

## A Didactic Analysis of their Relevance

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**KEYWORDS**

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*Relevance*
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**ABSTRACT**

*The use of YouTube videos as an alternative medium for informal learning has become increasingly prevalent among undergraduate and graduate students. The research, which employed a mixed methodology, sought to conduct a didactic analysis of the relevance of audiovisual content in YouTube videos in relation to the approach taken to the research problem. Descriptive and discourse analysis were used to this end, with the result that the audiovisual content of these videos was found to be of insufficient relevance in terms of structure (use of visual and conceptual elements, graphic organisers and animations), thematic content (prior knowledge, quotes and references, feedback), communication and methodology. This is because the content does not respond technically to the curricular planning of learning.*

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## 1. Introduction

Espinoza Freire (2018) emphasises that identifying the research problem represents the most crucial and challenging stage of the scientific method, and therefore, as espoused by Russell Ackoff, "a well-formulated problem is half the solution". It is evident that, in order to gain insight into the methodology to be employed in their research, particularly when formulating their thesis plan, higher education students frequently turn to a variety of resources, including videos on social networks, particularly YouTube, to facilitate informal learning (Colás-Bravo and Quintero-Rodríguez, 2022). This approach is designed to enhance their understanding of the subject matter and to equip them with the requisite knowledge to embark upon their studies. However, it is noteworthy that videos pertaining to the field of education represent a mere 3% of the total number of videos consulted. Video metadata accounts for 3.43% of the total, while hand-coded data represents 5.21%. In contrast, publications related to "gaming" represent 29.34% of the global total (McGrady et al., (2023).

Social networks are currently a popular phenomenon among various segments of the population. López-de-Ayala et al. (2020) specify the communicative, research, information or distraction purposes of social networks. Similarly, Gupta & Bashir (2018) highlight the role of social networks in socialisation, information, entertainment and education. Indeed, studies have demonstrated that social networks can be effectively utilised to create learning environments that transcend geographical and temporal boundaries (Fonseca-Peso et al., 2020). This enables the utilisation of digital information at any given moment, integrating data from diverse sources (Ramires-Lima et al., 2020). Furthermore, it facilitates educational innovation through interrelationships (Greenhow & Chapman, 2020). The utilisation of social networks facilitates the creation of virtual learning environments, the application of assimilated knowledge and the access to vast quantities of information, of which YouTube represents an innovative didactic option (Martínez-Domingo et al., 2021).

In their 2021 study, Andrade-Vargas et al. posit that: The authors further posit that the advent of the Internet and social networks has rendered content creation a considerably more accessible undertaking (p. 88). Maldonado et al. (2023) additionally assert that in the current era of technological advancement, the utilisation of social networks for the dissemination of audiovisual content has become a near-ubiquitous practice (p. 2). They additionally highlight YouTube as a dominant force in the creation of audiovisual content. Similarly, Andrade-Vargas et al. (2021) posit that this social network is predicated on the creation of content. The user is not merely a consumer of content; rather, they also engage in the production of content, thereby assuming the role of a prosumer. This transforms the social network into a conduit for both consumption and production. The term "audiovisual content" is used to describe a series of images and audio, which can be broadcast and transmitted to an audience for viewing and listening. Videos are comprised of both audio and visual elements, which collectively constitute their audiovisual content.

As one of the most widely used social networks, YouTube provides a platform for the dissemination of videos that can be utilised by teachers and students in the didactic process across various educational levels and subject areas. The platform offers a unique opportunity to engage learners through the use of multimedia, which can enhance learning by stimulating multiple sensory experiences. Betancur-Chicué & Muñoz-Repiso (2023) emphasise that the cognitive theory of multimedia learning has prompted studies into the importance of applying it to the design of videos in accordance with the characteristics of the student for whom the training is intended. Mayer (2020) highlights that integrating diverse forms of representation, including text, image and sound, can enhance learning, comprehension and retention of information, provided that multiple complementary forms are presented. This theory is founded upon the premise that the brain processes information more effectively when multiple sensory modalities, such as video, are engaged simultaneously.

Videos are a common feature of higher education, and as such, they must possess certain characteristics in order to optimise the didactic action. In light of their findings, Velarde-Molina

et al. (2023) advise that videos should comprise a number of key elements, including a clearly defined learning objective, interactive questions, the highlighting of pivotal information, the elimination of superfluous details, the use of straightforward language and a fluent presentation of the subject matter. Vera Balderas and Moreno Tapia (2021) identify YouTube as an alternative learning website, indicating that videos should be employed as a didactic resource in formal education, but only those that guarantee quality content. Colás-Bravo and Quintero-Rodríguez (2022) conducted a study to ascertain the perceptions of the characteristics of YouTube as a platform for informal learning. Their findings revealed that respondents placed greater emphasis on the instrumental aspects of YouTube, particularly in terms of rapid learning and the flexibility to adapt learning to desired times and spaces. Additionally, they highlighted the pedagogical aspects of YouTube, including its use as a mobile learning (*m-learning*) platform, the personalisation of learning through instructor choice, and the exploration of diverse learning formats. In response to the necessity of supplementing the curriculum with additional content, students often turn to video resources on platforms such as YouTube or other social networks.

Videos on scientific research topics, such as the research problem statement, are often consulted by students in order to gain insight into the process of approaching the research in question. Ramírez (1999) emphasises that the problem statement should describe the phenomenon to be studied or the object of research, define the spatial and temporal scope, and describe the units of analysis. In his 2000 work, Kerlinger poses the following question: "What constitutes an effective problem statement?", he responds, limiting himself to noting that there is no "correct" way of stating it. He goes on to establish criteria for the statement: "The problem must express a relationship between two or more variables, it must be clearly and unambiguously formulated as a question, and it implies the possibility of empirical proof." In other words, the statement is the equivalent of research questions. Hernández Sampieri et al. (2014) state that "posing the problem is nothing more than refining and structuring the research idea more formally" (p. 36), which is an idea originally proposed by Selltiz et al. (1976). This idea is also presented by Sabariego and Bisquerra (2004), who note that "this process of refining and formally structuring the initial research idea in order to better understand some issue is called problem identification or problem statement" (p.94) and by Lara (2013), who indicates that "the problem statement is nothing more than formally refining and structuring the research idea" (p. 116). However, the cited authors do not elucidate what is meant by "refining and structuring the research idea more formally." This suggests a divergence of opinion regarding the problem statement, which may impede the clarity of understanding for the novice researcher and could potentially lead to confusion regarding the structure or format. The components of the problem statement, as identified by Hernández Sampieri et al. (2014), Hernández Salieri & Mendoza, 2018 and Lara (2013), include objectives, questions and justification. However, this approach does not address the issue of specifying the focus of the object of study, as highlighted by Matos and Vera (2017). Bernal (2010) posits that the approach comprises a description or statement of the problem (illustrating the situation and object of study) and the formulation of questions.

Opinions on the problem statement are diverse. However, it can be defined as follows: it is a description of a problematic situation, where the research topic is delimited and contextualised, focusing on the object of study; it is an initial review of the state of the question; it is the formulation of questions and objectives; and it is the justification and viability of the study, which should be presented in relation to the research approach and paradigm. In quantitative studies, the approach is characterised by precision, delimitation, specificity and limited flexibility. In contrast, qualitative studies adopt a broad, open and flexible approach. An appropriate approach should limit the scope of the study and clarify the research process. This is achieved by defining the subject matter, the participants involved, and the information to be collected (Sabariego & Bisquerra, 2004). Additionally, it is essential to present information on variables for quantitative research and categories for qualitative research. These factors should be taken into account when designing videos on the subject, with the aim of ensuring that the thematic content is relevant. In this regard, UNESCO (1998) underscores the significance of relevance as a crucial aspect of educational quality, underscoring the necessity for education to be meaningful and tailored to the

individual needs of each student. In the case of resources such as videos, it is essential to consider the criteria for evaluating the relevance of audiovisual content. These include aspects such as structure, thematic content, communication, and methodology.

Videos are a pedagogical tool that can enhance motivation in university students (Rodríguez and Platas García, 2022). Therefore, they require a clear and coherent structural design that facilitates the organisation and logical sequence of the information, thus facilitating comprehension and retention. Mayer et al. (2020) emphasise that the structure of the video should facilitate a manageable and coherent segmentation of the information, thereby enabling students to assimilate knowledge effectively. It is essential to ensure that the structure of the video is visually and functionally didactically appealing. Liu and Elms (2019) posit that the aesthetic qualities of figures and animations in a video can enhance interest, facilitate comprehension, and enable flexible learning at the student's own pace. This represents a notable departure from conventional teaching materials, as evidenced by the observations of Kurniawan et al. (2022). A well-designed visual presentation in a video can significantly influence the effectiveness and appeal of the learning experience. In order to achieve understanding of the problem statement, it should be related to prior knowledge in a logical sequence (Ausubel, 1978). Furthermore, as Persson et al. (2019) have highlighted, it is important to achieve synchronisation of visual and verbal elements in order to facilitate effective learning, which implies comprehension. The size of the texts could affect comprehension, as Lange and Costley (2020) have noted. Furthermore, the use of colours, images and animations to present learning topics can assist the visual learner in "imagining abstract material" (Hidayah, 2023, p. 58).

The quality of the thematic content of videos is a significant determinant of their efficacy in the learning process and in engaging students' interest. Luby & Southern (2022) posit that clarity and conciseness in the communication of academic topics is essential to optimise student understanding, interest and engagement. Mayer (2021) presents the "personalisation principle," which posits that learners are more motivated to understand what they are hearing when they feel that their tutors are listening to them. It is pertinent to design succinct videos, as Pattier (2022) asserts that YouTube users are seeking tangible solutions to their queries. Furthermore, the appropriate utilisation of scientific terminology to elucidate the subject matter is crucial, as Kulgemeyer & Wittwer (2023) highlight the potentially detrimental impact on student learning of videos that perpetuate misconceptions. Conversely, contextualised examples facilitate the acquisition and transfer of knowledge. López Gómez et al. (2018) report that in their review of scientific papers, they identified shortcomings concerning the theoretical foundation inherent in the connection between linguistics and research methodology.

It is essential that effective communication with videos ensures the information displayed is understood and assimilated. Mayer (2020) posits that, in accordance with the "multimedia principle," optimal learning is attained when visual and textual elements are harmoniously integrated into a coherent representation, thereby facilitating more effective information processing and enabling the conveyance of abstract concepts in a concrete manner. The sequence of topics presented in the video should be clear and logical, facilitating the progressive acquisition of new knowledge based on previous learning. In terms of methodology, the objective is to facilitate active and meaningful learning (Delgado Corbeña et al., 2023). The deployment of visual and auditory effects in the video is crucial for capturing and sustaining attention throughout the viewing experience. Consequently, the strategic incorporation of motion graphics and animations with sound effects to reinforce the presented information can enhance the learning experience. In terms of methodology and structure, Makhlouf & Iñigo (2022) emphasise the importance of ensuring that the image is consistent in terms of its textual, visual and auditory content. This is to ensure that the product has a unified meaning and is clear and precise for a specific reader or viewer (p. 18). The incorporation of interactivity with videos serves to maintain interest and facilitate comprehension and assimilation of information. In order to achieve this objective, it is recommended that videos be complemented with additional materials, such as study guides and supplementary readings, which can assist in deepening and assimilating the knowledge gained. Such supplementary materials may also facilitate the development of autonomy in learning and

understanding at an individual pace. In accordance with the cognitive theory of multimedia learning, Mayer (2021) posits that videos facilitate the selection of key words from the text and their organisation, associating them with previous knowledge (Ausubel, 1978).

In the field of video research, it would be optimal for the use of videos to be carefully planned and evaluated to ensure their effectiveness in the teaching and learning process (Monroy Andrade, 2024, p. 126). However, the issue of video content on platforms such as YouTube raises the question of whether the audiovisual material included in these videos is didactically relevant to the research problem statement. In order to respond to this question, the objective was defined as follows: to analyse the relevance of the audiovisual content of YouTube videos for learning about the research problem statement.

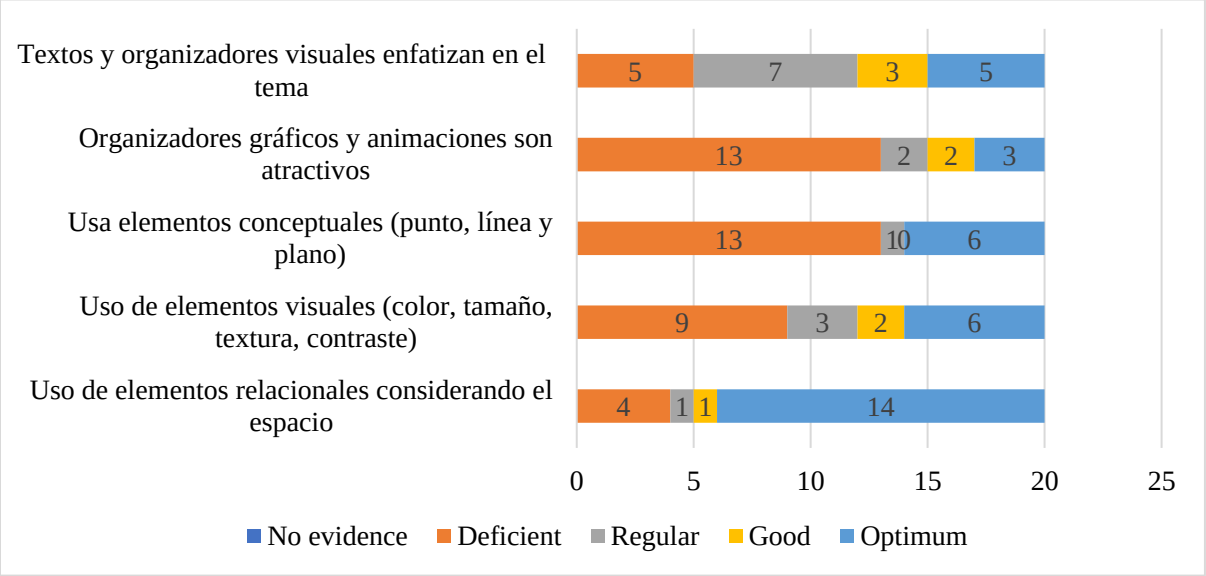
## 2. Methodology

The study was conducted in accordance with the mixed approach and concurrent design methodology (Medina Romero et al., 2023). The theoretical arguments presented underpin the design of the video, which in turn informed the design of the ad hoc data collection sheet. This sheet was used to proceed with the analysis of variables and categories with indicators, subcategories, and relationships. Twenty videos were viewed, a number obtained after achieving saturation (Martínez-Salgado, 2012; Ortega Bastidas, 2020). The sample of videos was selected in accordance with the following inclusion criteria: narration with sound and in Spanish, published between 2018 and 2024, and with a duration of 4 to 16 minutes. No exclusion was based on the place of origin, age, educational level, or gender of the YouTuber. The quantitative data was analysed using descriptive statistics, while the qualitative data, obtained by transcribing the oral narrative discourse of the video into written texts, was analysed using discourse analysis.

## 3. Results and Discussion

The findings of the descriptive analysis and the discourse analysis of the sample videos in relation to the research problem statement are presented in the following figures. A discussion of the results is also provided.

**Figure 1**. Structure of YouTube videos on the problem statement.

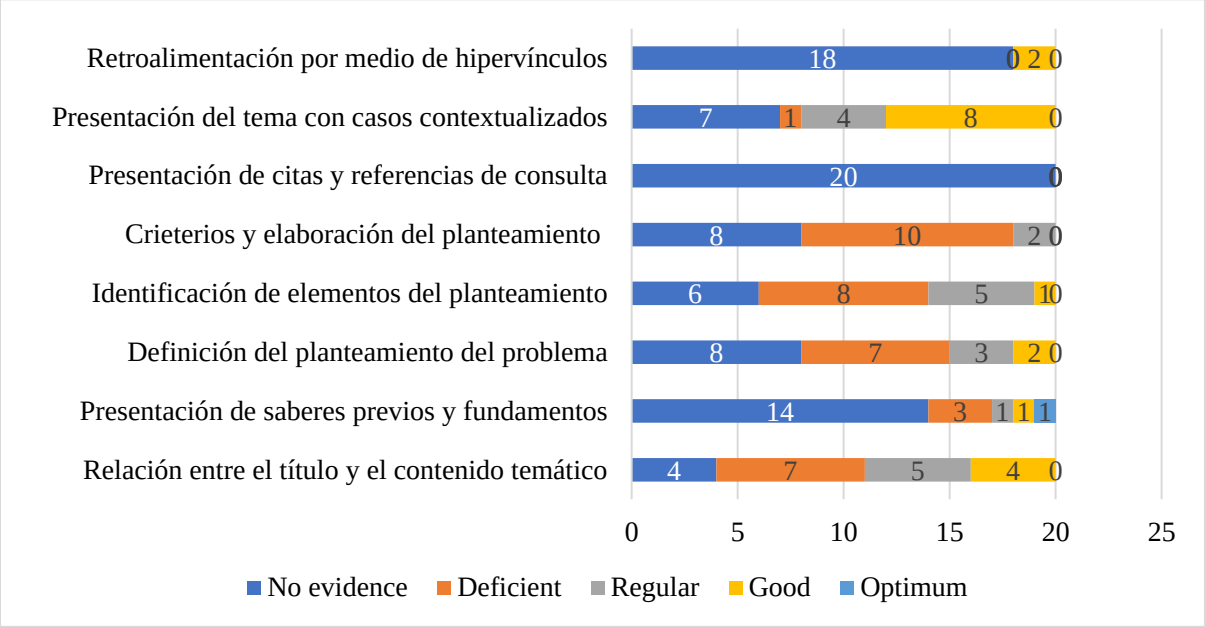



Source: Own elaboration, 2024.

The videos analysed demonstrate an optimal utilisation of relational elements in consideration of spatial parameters, with a comparatively lesser degree of effective deployment of conceptual and visual elements. This stands in contrast to the other block of higher frequencies, which exhibits a deficient utilisation of conceptual and visual elements, in addition to organisers and

animations. This ultimately affects the visual quality of the video content (Liu & Elms, 2019; Makhlouf Akl & Iñigo Dehud, 2022). It is also noteworthy that the highest frequency demonstrates a consistent presentation of textual and visual organisers, which serve to reinforce the theme of the research problem statement. These observations indicate that the video design is lacking in relevance. In light of the above, it is evident that visual quality is of paramount importance in the context of video design. Consumers have certain expectations in terms of aesthetics, clarity and resolution, and a well-edited video of optimal visual quality has the potential to attract curiosity, arouse interest and produce a more satisfying viewer experience (Kurniawan et al., Furthermore, the assimilation of abstract content is facilitated by high-quality videos (Hidayah, 2023). Conversely, low-quality videos may generate negative viewer impressions, discouraging further appreciation and interaction with the thematic content. This is evidenced by the lack of synchronisation between the visual and verbal elements, which is unrelated to the observations made by Persson et al. (2019). These findings demonstrate that the structure of the audiovisual content of the analysed videos is not sufficiently relevant, and thus do not contribute to optimising the learning of the addressed topic.

**Figure 2**. Thematic content in YouTube videos on the problem statement.

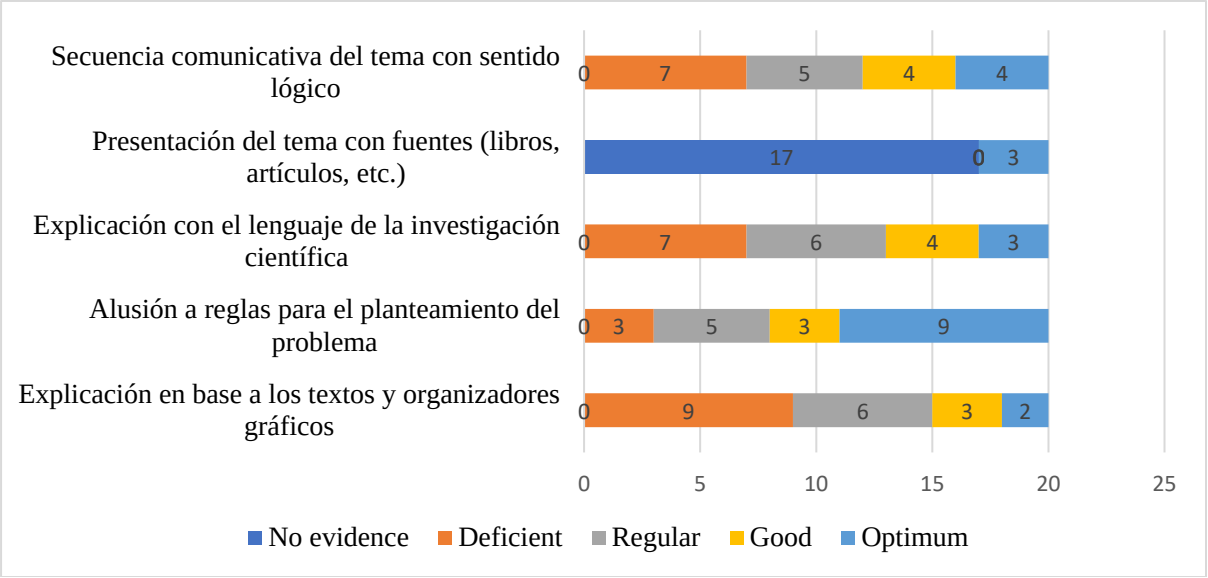



Source. Own elaboration, 2024.

Thematic content analysis of the videos revealed a prevalence of instances where the relationship between the "problem statement" title and the thematic content was either absent, inadequate, or merely satisfactory, failing to achieve the optimal level of alignment. This was observed in the case of a prominent author of research books in Spanish. In his audiovisual resource, he addresses prior knowledge associated with research approaches and routes, which is contrary to what is indicated in his published works. In these, the approach is related to research objectives and questions, as well as to the justification and viability of the study, and even the deficiencies in the knowledge of the research problem Hernández Sampieri et al., 2018; Hernández Sampieri & Mendoza, 2023). However, the author emphasises that the problem statement is of paramount importance in research, serving as the fundamental starting point. They propose that the approach should be derived from the problem statement, diverging from traditional guidelines that originate the approach from the quantitative paradigm and approach. Additionally, they highlight the linear process of quantitative research and the circular process of qualitative research. It is important to note that there is considerable diversity of opinion with regard to the formulation of a problem statement (Bernal, 2010; Hernández Sampieri et al., 2014; Hernández Sampieri & Mendoza, 2018; Lara, 2013). A key finding is the absence of evidence

regarding the definition of the problem statement and the central idea, or, where definitions are provided, their lack of sufficient detail. The highest frequencies indicate a lack of evidence or an inadequate identification of the elements of the approach, which is consistent with the findings of Lara (2013) and Hernández and Mendoza (2018). Furthermore, the highest frequencies demonstrate the absence of evidence or an inadequate presentation of the criteria and steps to follow in developing the approach. Furthermore, the lack of citations or references for consultation is notable. The highest frequency indicates that there is little evidence of hyperlinks for the purpose of feedback or reinforcement of the topic. Additionally, there is a lack of precise use of language, which is not in line with the guidelines set forth by Velarde-Molina et al. (2023). These findings are at odds with the subject matter, which is predominantly presented with contextualised cases. This aligns with the didactic experiences that employ a historical-cultural approach (Gómez and Rubio, 2020). The aforementioned aspects serve to illustrate that, in general, the subject matter of the audiovisual content of the analysed videos is not particularly relevant, as it makes only a limited contribution to optimising the learning of the subject matter.

**Figure 3**. YouTube video communication on the problem statement.

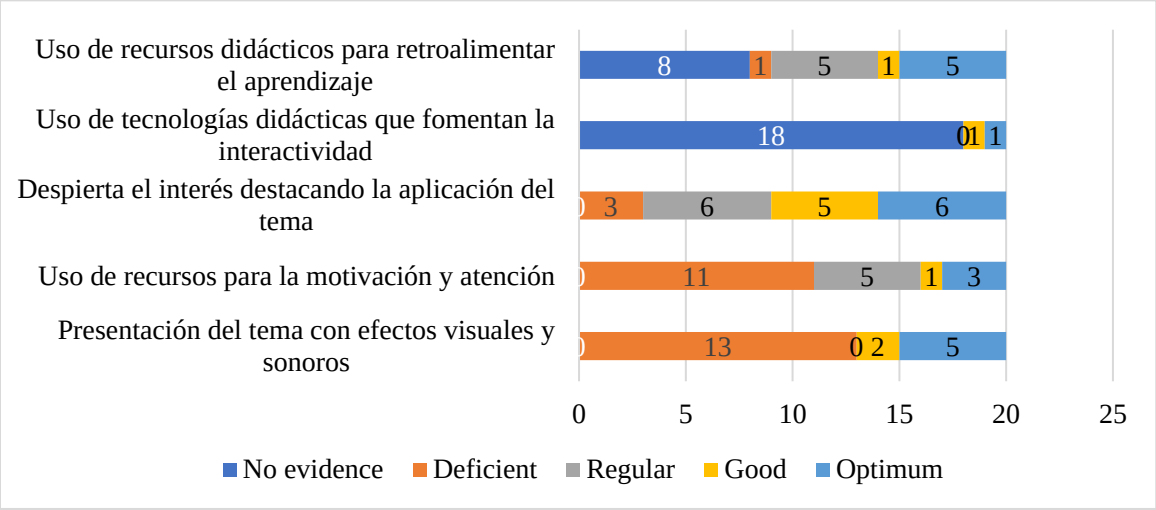



Source. Own elaboration, 2024.

With regard to the verbal explanations provided in the videos, although they are based on texts or graphic organisers, the highest frequencies of observations indicate that the explanations are either deficient or regular. This is because they deviate from the aforementioned texts and graphic organisers without emphasising the visual resources. However, there are also good and optimal explanations, which do not align with the opinion of Mayer (2020). Mayer posits that better learning is achieved if visual and textual elements on a topic are adequately combined in a coherent representation. The highest frequencies demonstrate deficiencies or regular communicative sequences from a logical standpoint, which, in this regard, exhibit a lack of coherence. Additionally, the highest frequency indicates a lack of evidence of communication on the basis of sources (books, articles, etc.), contrary to Miyahira's (2022) indications. The results demonstrate a discrepancy with optimal communication when establishing rules for formulating a problem statement or explaining a topic in accordance with the conventions of scientific research. In some cases, ideas are presented in an ambiguous manner using natural language, for example: The topic is clearly stated, and there is no problem. However, the term 'research problem' is confused with 'problem' as a synonym for 'difficulty' in the procedure of elaborating the statement. The use of scientific language in an irrelevant manner is also evident in the following examples: "the problem we are investigating is a topic" (V4), "the definition of the problem is a proposition expressed in positive terms, or as I mentioned before, through a

question" (V4), "We do not investigate problems, we investigate lines of research" (V19), "in the title what goes is the line of research" (V20). Additionally, circular definitions or ideas are employed, as exemplified by the following: "What is the problem? This constitutes the initial point of departure. The process of identifying the problem entails stating and delimiting it, as outlined by V14. However, this approach deviates from the fundamental tenets of scientific writing, namely precision, clarity, and brevity. The aforementioned aspects, as well as the results presented in the subsequent table, serve to illustrate that the communication and methodology employed in the analysed audiovisual content are not sufficiently pertinent. This is evidenced by the presence of elements that offer limited contribution to the optimisation of the learning outcomes associated with the addressed topic.

**Figure 4**. Methodology used in YouTube videos on the problem statement.

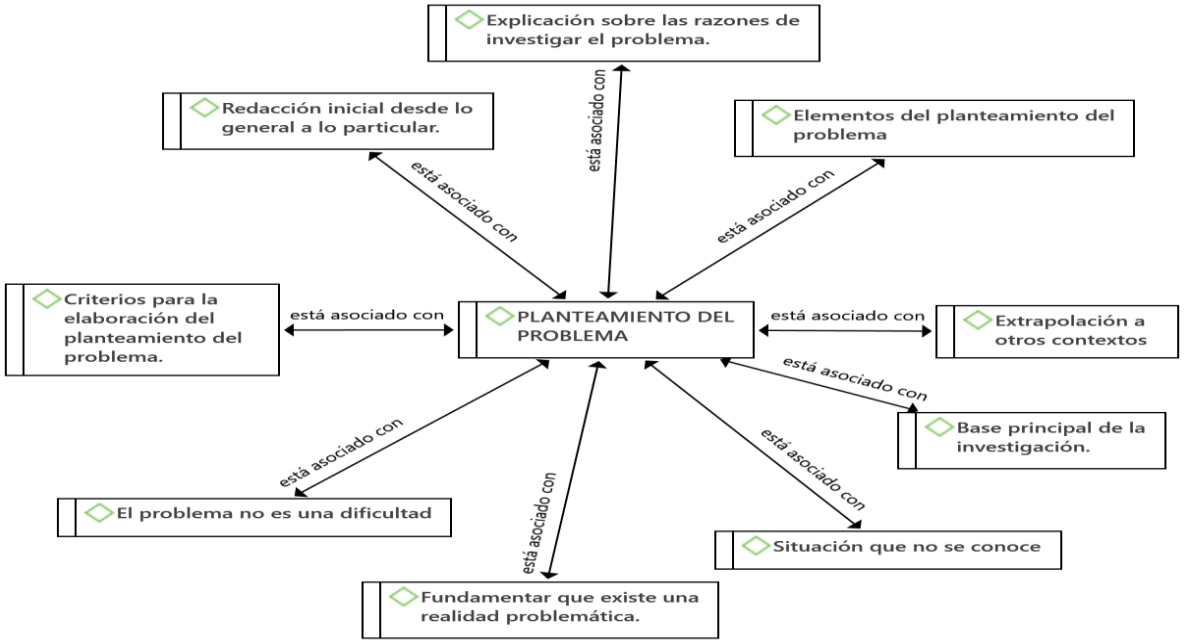



Source. Own elaboration, 2024.

The videos analysed demonstrate a notable absence of evidence pertaining to the utilisation of didactic technologies that facilitate interactivity, as well as the provision of feedback on the learning process in relation to problem-solving approaches. Additionally, the methodology is found to be deficient in terms of the presentation of the subject matter through the use of visual and audio effects. As is the presentation of the subject using resources to motivate the learning process (Rodríguez and Platas García, 2022), and to capture the attention of the audience. However, there are also instances where the motivation or attention-grabbing techniques are either regular or optimal, which can serve as an active learning resource in an inverted classroom setting (Barbero et al., 2024). The highest frequencies indicate a dearth of evidence pertaining to the presentation of resources designed to encourage interactivity and facilitate learning feedback. Some videos merely extend an invitation to subscribe to the channel, which is insufficient for fostering engagement and learning.

The following are the results of the speeches from the video transcripts:

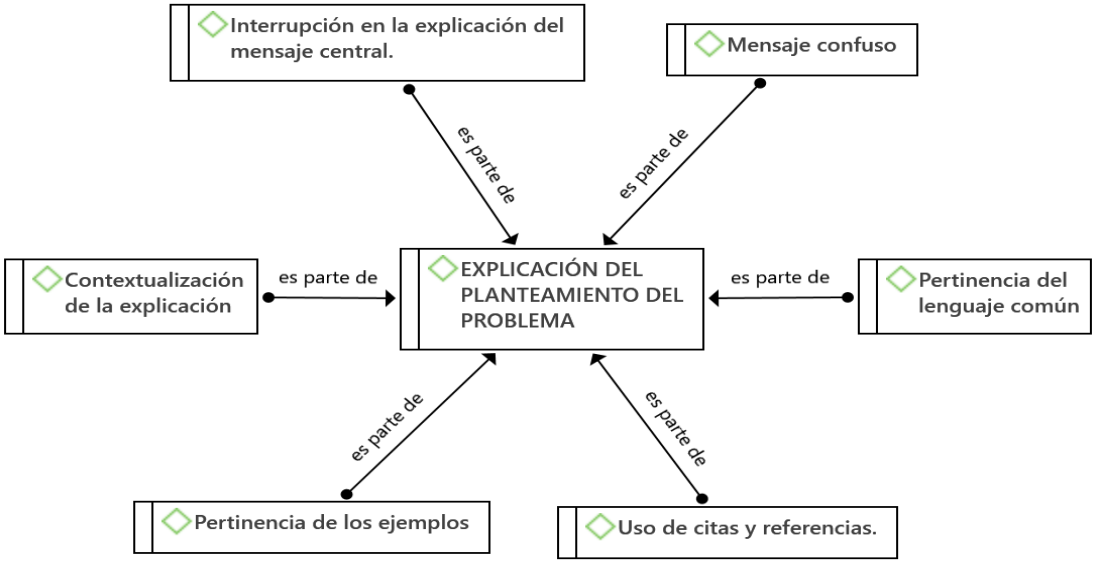
**Figure 5**. Citation category research problem statement.




Note: Own elaboration with Atlas TI software V 8.4.24, 2024.

In regard to the problem statement, certain quotations are particularly noteworthy, as they serve as the foundation for the research and are regarded as the "fundamental pillar" (Video 9-V9). The statement outlines the essential elements: The definition and delimitation of the problem, research questions, objectives, justification, and, in some cases, the handling of aspects (V4) are all elements that should be included in the statement. This is different to what Tafur and Izaguirre (2016) state, which indicates that the statement should include diagnosis, prognosis and control of the prognosis (V7; V17; V20). Some characteristics are particularly noteworthy. It must be clear and unambiguous (V4, V9). It is used to present the problem to be investigated, developing the ideas in an organised and logical manner (V6, V13). The criteria for stating the problem are indicated (V4, V14). The problem is contextualised by providing a brief description of the economic, social and cultural characteristics of the situation in the locality, region and country, which are relevant to the problem under study (V13). This is equivalent to answering: What has occurred at the global level? What has occurred at the regional level? "What has occurred at the local level?" (V11) or to state that "the most appropriate approach would be to do it deductively, that is, from the general to the particular" (V12), which refers to an initial wording that progresses from the general to the particular (V8, V17, V18). In general, the discourses of the videos do not concur on the various aspects of the problem statement, nor do they present the same content. Consequently, viewing one or two videos is insufficient to gain a comprehensive understanding of the subject matter. This indicates that the content is not sufficiently relevant, which is corroborated by the results presented in Fig. 2.

**Figure 6**. Citation subcategory explanation of the problem statement.



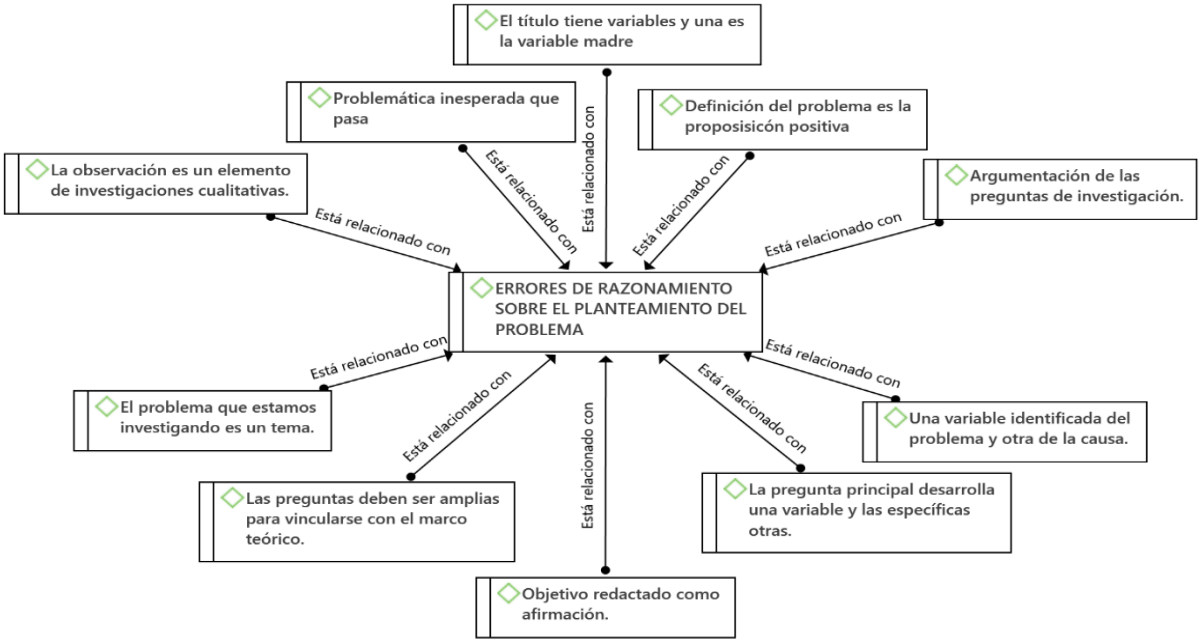

Note: Own elaboration with Atlas TI software V 8.4.24, 2024.

In the explanation of the problem statement, a series of expressions are employed to illustrate this juncture in the research process. Some of these expressions are coherent, clear, and logical, while others lack these features. It is not uncommon for the viewer to be informed that a particular idea will be presented at a later stage, without the specifics being made clear. This can result in an interruption in the explanation of the central message, which in turn may lead to an unnecessarily prolonged wait and a subsequent loss of viewer attention. Furthermore, the use of confusing language can also generate cognitive conflict (Valentín Melgarejo et al., 2022), as exemplified by the following: "The objective is to determine the importance of the facts and the relationship with the other variables" (V9); "The problem statement is the presentation of the general description of the current situation" (V11); "The research problem is what should go in the title" (V19); "Once the problem statement has been established, the research will proceed without difficulty" (V1, V4). "The problem or the formulation of the problem is the first step in the research process" (V14, V19).

"Well stated your problem, I insist, you will not have any problem" (V20).

The second word 'problem' indicates difficulty but can be confused with 'research problem'. The approach is to determine the diagnosis (symptoms and causes), prognosis and control of the prognosis (V17, V20). The problem statement should conclude with questions (V18). It is necessary to begin gathering information about the reality that is being problematised, and this section should be based on these sources (V5). The problem to be investigated should be presented in an organised and logical manner (V6). The approach emphasises the importance of defining the units of observation, that is, the specific individuals or phenomena with which the researcher will engage. It is also common to highlight the necessity of providing a detailed description of the problem under investigation, encompassing its global, national, and local contexts. This can be expressed as a need to contextualise the problem, or to proceed from the general to the particular. Furthermore, the lack of citations detracts from the rigour of the ideas presented, with only a few references to authors such as Kerlinger, without adherence to a consistent format. It should be noted that some examples are not necessarily relevant or illustrative, given that they deal with ordinary subjects with little didactic value. In general, the explanations provided in the videos lack sufficient relevance to serve as a valuable resource for students seeking to expand their understanding of the subject matter, a finding that aligns with the results depicted in Figures 2 and 3.

**Figure 7.** Citation subcategory errors in reasoning about the problem statement




Note: Own elaboration with Atlas TI software V 8.4.24, 2024.

The videos observed and analysed exhibited a series of expressions that were incoherent and lacked scientific logical rigour. For instance, it is stated that "there are lines of research that are not problems" (V19), which represents an evident confusion between research line and problem. Additionally, the title is said to have variables, with one being identified as the "mother variable." However, the term "mother variable" is not defined within the context of scientific research. The definition of the problem is presented as a proposition expressed in positive terms (V4), which suggests that the definition of the problem is akin to a hypothesis. Additionally, the line of research is identified as the key element in the title (V19), while the term 'research problem' is defined as a topic (V4). This indicates a lack of clarity regarding the distinction between a title, a topic and a line of research. Furthermore, the notion that a research problem is simply a problem or difficulty is also presented (V4). This presents a significant confusion between the concepts of a research problem, a topic and a line of research. "This is a significant error." (V3). Other expressions deemed inappropriate in relation to the problem statement include: "In the main question, a variable is developed, and the specific ones are formulated otherwise." This is contrary to the fact that the general question is formulated with the variables and the specific ones according to the variables and with their respective dimensions, in the case of quantitative studies.

"It should consist of six paragraphs" (V3). The first paragraph presents the situation. The second paragraph outlines the potential issues that may arise from this situation. The third paragraph considers the possible consequences of not addressing this situation. The fourth paragraph offers a concluding statement that the research will address this situation. This approach is problematic because it conflates the situation with the diagnosis, which is an inappropriate and inaccurate representation of qualitative research. The term "broad questions to relate it to the theoretical framework" is mentioned, which is an ambiguous expression due to the use of the term "broad questions." This term implies the existence of "narrow questions," which is not a stipulation of scientific language. It is asserted that observation is an element of qualitative research, as if observation were not a technique of quantitative research. Additionally, the term "problem statement" is defined as "an unexpected problem that happens," and the term "statement" is defined as "the whole text," with "formulation" being defined as "simply the question" (V14). Furthermore, it is stated that "there are lines of enquiry that are not problems" (V19), and that "if I collect quantitative data and qualitative data separately, I am not in mixed methods" (V16). Finally, it is argued that "we cannot work on empirical facts when we are working

on research." It is typically advisable to work on a firm foundation. Such deficiencies are evident from the absence of citations and references to reliable sources, indicating that the content of the videos is not sufficiently relevant and aligned with the findings in Figures 2 and 3.

## 4. Conclusions

Videos on social networks represent a valuable educational resource for university students, offering a wealth of supplementary material to enhance their asynchronous learning experiences on a diverse range of subjects. These videos facilitate informal learning, providing students with a convenient and accessible avenue for expanding their knowledge on a multitude of topics. On YouTube, the most frequently consulted network, videos with an educational tenor represent approximately one-ninth of those intended for gaming; and those on the problem statement are often designed without even showing evidence of technical parameters to achieve the didactic relevance of audiovisual content in terms of structure, thematic content, communication and methodology.

With regard to the design of the YouTube videos on the problem statement that were analysed, it was found that the highest frequencies indicated a lack of effective use of visual (colour, size and contrast) and conceptual (point, line and plane) elements, as well as a lack of effective use of graphic organisers and animations, and a lack of effective use of text and visual organisers in terms of emphasis on the topic. These deficiencies are in stark contrast to the fact that the majority of the videos demonstrate an optimal utilisation of relational elements in terms of spatial organisation. Regarding the analysis of the thematic content of the videos, the highest frequencies indicate a deficient relationship between the term "problem statement" and the thematic content. Furthermore, there is a lack of evidence of previous concepts and fundamentals of the topic, which impairs the achievement of meaningful learning. Similarly, the definition of the central concept "problem statement" is either not evident or deficient, which leads to confusion due to the ambiguity of the concepts used for this purpose. Regarding the elements and criteria for the elaboration of the approach, the majority of them either present scarce evidence or, if they do exist, are deficient. This is further complicated by the absence of evidence in terms of showing quotations and references of the ideas expressed and the lack of hyperlinks that lead the viewer to the feedback of the subject with other sources. However, a strength is the use of contextualised examples. With regard to the audiovisual content of the analysed videos, it can be observed that it lacks sufficient relevance in terms of design and thematic content. Consequently, it cannot be considered a suitable resource for didactic transposition, which would have an adverse effect on the informal learning of the problem statement by viewers.

With regard to the communication in YouTube videos on the approach to the research problem, the highest frequencies indicate that the explanation of the topic is deficient or regular and is based on texts and graphic organisers. A similar situation occurs with the communicative sequence. Furthermore, the highest frequency indicates the presentation of the topic without stating sources (books, magazines, etc.), which is a complicating factor. In contrast with the preceding results, the highest frequency of videos observed refers to optimal communication regarding the allusion of rules for the statement of the problem, although they are not homogeneous in all cases. In terms of methodology, the highest frequencies indicate deficiencies in the presentation of the topic with visual and sound effects, as well as the use of resources for motivation and attention. Similarly, the majority of frequencies indicate an absence of evidence of the utilisation of resources and technologies to facilitate interactivity and feedback for learning. It can therefore be concluded that the observed videos lack sufficient relevance in terms of both communication and methodology, which has an adverse effect on the informal learning of the viewers.

## References


Andrade-Vargas, L., Iriarte-Solano, M., Rivera-Rogel, D., & Yunga-Godoy, D. (2021). Jóvenes y redes sociales: Entre la democratización del conocimiento y la inequidad digital. *Comunicar, 29*(69), 85–95. https://doi.bibliotecaupn.elogim.com/10.3916/C69-2021-07

Ausubel, D. P. (1978). *Psicología Educativa. Un punto de vista cognoscitivo.* Trillas.

Barbero, J., González-González, E. J., Lucena-Giraldo, J., Picatoste, X. & Rodríguez-Crespo, E. (2024). La utilización del vídeo como recurso de aprendizaje activo en un entorno de aula invertida. *Revista de Estudios Empresariales, Época 2*(1), 55–72. https://doi.org/10.17561/ree.n1.2024.8189

Bernal, C. A. (2010). *Metodología de la investigación* (3ª ed.). Pearson Educación.

Betancur-Chicué, V., & Muñoz-Repiso, A. G. V. (2023). Aplicación de los principios de la teoría cognitiva del aprendizaje multimedia al diseño de situaciones de aprendizaje y escenarios de formación: Revisión sistemática de literatura. *Education in the knowledge society (EKS), 24*, e30882-e30882. https://doi.org/10.14201/eks.30882

Colás-Bravo, P. & Quintero-Rodríguez, I. (2022). YouTube como herramienta para el aprendizaje informal. *Profesional de la información, 31*(3), e310315. https://doi.org/10.3145/epi.2022.may.15

Delgado Cobeña, E. A., Briones Ponce, M. E., Moreira Sánchez, J. L., Zambrano Dueñas, G. L. & Menéndez Solórzano, F. A. (2023). Metodología educativa basada en recursos didácticos digitales para desarrollar el aprendizaje significativo. *MQRInvestigar, 7*(1), 94-110. https://doi.org/10.56048/MQR20225.7.1.2023.94-110

Espinoza Freire, E. E. (2018). El problema de investigación. *Revista Conrado, 14*(64), 22–32. https://conrado.ucf.edu.cu/index.php/conrado/article/view/808

Fonseca-Peso, J., Caro-González, A. & Milosevic, N. (2020). Innovative CoCreative Participatory Methodologies for a Dreamt-of Quality Education in Europe. *Sustainability, 12*(16), 63-85. https://doi.org/10.3390/su12166385

Gómez, T. & Rubio, J. (2020). *Enseñanza-aprendizaje universitaria integral: una propuesta educativa, basada en el paradigma de la complejidad y el enfoque histórico-cultural*. Periferias.

Greenhow, C., & Chapman, A. (2020). Social distancing meet social media: digital tools for connecting students, teachers, and citizens in an emergency. *Information and Learning Sciences, 121*(5-6), 341-352. https://doi.org/10.1108/ILS-04-2020- 0134

Gupta, S. & Bashir, L. (2018). Social networking usage questionnaire: development and validation in an Indian higher education context. *Turkish online journal of distance education, 19*(4), 214-227. https://doi.org/10.17718/tojde.471918

Hernández Sampieri, R., Fernández Collado, C. & Baptista Lucio, P. (2014). *Metodología de la investigación* (6ª ed.). McGraw Hill.

Hernández Sampieri, R. & Mendoza, C. (2018). *Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta.* McGraw Hill Education.

Hidayah, L. (2023). The Importance of Using Visual in Delivering Information. *VCD Journal of Visual Communication Design, 8*(1). 52-61. https://doi.org/10.37715/vcd.v8i1.2720

Kerlinger, F. (2000). *Investigación del comportamiento técnicas y metodología.* McGraw Hill.

Kulgemeyer, C. & Wittwer, J. (2023). Misconceptions in Physics Explainer Videos and the Illusion of Understanding: an Experimental Study. *International Journal of Science and Mathematics Education, 21*, 417–437. https://doi.org/10.1007/s10763-022-10265-7

Kurniawan, A., Putri, S., Pratondo, A., & Putri, D. (2022). Application of Visual Design Principles and Motion Graphic in Re-Design Interactive Learning Video. *IJAIT (International Journal Of Applied Information Technology), 5*(1), 51-58. https://doi.org/10.25124/ijait.v5i01.4264

Lange, C. & Costley, J. (2020). Improving online video lectures: learning challenges created by media. *International Journal of Educational Technology in Higher Education, 17*(16), 1-18. https://doi.org/10.1186/s41239-020-00190-6

Lara, E. M. (2013). *Fundamentos de Investigación. Un enfoque por competencias*. Alfaomega.

Liu, C., & Elms, P. (2019). Animating student engagement: The impacts of cartoon instructional videos on learning experience. *Research in Learning Technology*, *27*. https://doi.org/10.25304/rlt.v27.2124

López Gómez, E. J., Cruz Camacho, L., Martín Pérez, J., & Garcés Pérez, M. (2018). Relación entre lingüística y metodología de la investigación en la expresión consciente del lenguaje científico. *Edumecentro, 10*(4). https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=83112

López-de-Ayala, M. C., Vizcaíno-Laorga, R., & Montes-Vozmediano, M. (2020). Hábitos y actitudes de los jóvenes ante las redes sociales: influencia del sexo, edad y clase social. *Profesional de la información, 29*(6), e290604. https://doi.org/10.3145/epi.2020.nov.04

Luby, S., & Southern, D.L. (2022). Achieving Clarity and Conciseness. En: *The Pathway to Publishing: A Guide to Quantitative Writing in the Health Sciences* (pp. 73–86). Springer, Cham. https://doi.org/10.1007/978-3-030-98175-4_6

Maldonado García, F. E., Jácobo Morales, D., & Gonzales Medina, M. A. (2023*). Audiovisual language in social networks in Iberoamerica: A Systematic review of the literature between 2012 and 2022. 21st LACCEI International Multi-Conference for Engineering, Education, and Technology: "Leadership in Education and Innovation in Engineering in the Framework of Global Transformations: Integration and Alliances for Integral Development"*, Hybrid Event, Buenos Aires - Argentina, July 17-21, 2023. https://laccei.org/LACCEI2023-BuenosAires/papers/Contribution_399_a.pdf

Makhlouf Akl, A., & Iñigo Dehud, L. S. (2022). The importance of visual language in educational videos. *VISUAL REVIEW. International Visual Culture Review*. *Revista Internacional De Cultura Visual, 12*(3), 1–19. https://doi.org/10.37467/revvisual.v9.3742

Martínez-Domingo, J. A.; Trujillo-Torres, J. M.; Rodríguez-Jiménez, C.; Berral-Ortiz, B. & Romero-Rodríguez, J. M. (2021). Análisis de los canales de YouTube como influencers del aprendizaje en educación primaria. *Revista Espacios, 42*(3), 130-145. https://doi.org/10.48082/espacios-a21v42v03p10

Martínez-Salgado, C. (2012). El muestreo en investigación cualitativa: principios básicos y algunas controversias. *Ciência & saúde coletiva*, *17*, 613-619. https://www.scielo.br/j/csc/a/VgFnXGmqhGHNMBsv4h76tyg/?lang=es

Matos Deza, L. & Vera Leyva, R. (2017). *Metodología de la Investigación. Un enfoque teórico-práctico*. Fondo Editorial de la Universidad Privada Antenor Orrego.

Mayer, R. E. (2020). *Multimedia learning* (3rd ed.). Cambridge University Press. https://doi.org/10.1017/9781316941355

Mayer, R. (2021). Evidence-Based Principles for How to Design Effective Instructional Videos. *Journal of Applied Research in Memory and Cognition, 10*(2). 229-240. https://doi.org/10.1016/j.jarmac.2021.03.007.

Mayer, R. E., Fiorella, L., & Stull, A. (2020). Five ways to increase the effectiveness of instructional video. *Educational Technology Research and Development, 68*(3), 837-852. https://doi.org/10.1007/s11423-020-09749-6

McGrady, R., Zheng, K., Curran, R., Baumgartner, J., & Zuckerman, E. (2023). Dialing for Videos: A Random Sample of YouTube. *Journal of Quantitative Description: Digital Media*, 3. https://doi.org/10.51685/jqd.2023.022

Medina Romero, M. A., Hurtado Tiza, D. R., Muñoz Murillo, J. P., Ochoa, D. O. & Izundegui Ordóñez, G. (2023). *Método mixto de investigación cuantitativo y cualitativo*. Instituto Universitario de Innovación, Ciencia y Tecnología. https://doi.org/10.35622/inudi.b.105

Miyahira, J. (2022). Importancia de citar y referenciar correctamente en los trabajos académicos. *Revista Médica Herediana, 33*(4), 225-226. https://doi.org/10.20453/rmh.v33i4.4400

Monroy Andrade, J. (2024). El uso de las nuevas tecnologías en la enseñanza de las matemáticas: una revisión sistemática. *Tecnología, Ciencia y Educación*, *28*, 115-140. https://doi.org/10.51302/tce.2024.18987

Ortega Bastidas, J. (2020). ¿Cómo saturamos los datos? Una propuesta analítica "desde" y "para" la investigación cualitativa. *Interciencia, 45*(6), 293-299. https://www.redalyc.org/journal/339/33963459007/html/

Pattier, D. (2022). Enseñando matemáticas a través de YouTube: El caso de los edutubers españoles. *Digital Education Review,* (42). 65-80. https://doi.org/10.1344/der.2022.42.65-80

Persson, J., Wattengård, E. & Lilledahl, M. (2019). The effect of captions and written text on viewing behavior in educational videos. *LUMAT General Issue, 7*(1). 124–147. https://doi.org/10.31129/LUMAT.7.1.328

Ramires-Lima, K., Souto-das Neves, B.-H., Cadore-Ramires, C., dos Santos-Soares, M., Avila-Maritini, V., Freitas-Lopes, L., & Billio-Mello-Carpes, P. (2020). Student assessment of online tools to foster engagement during the COVID-19 quarantine. *Advances in Psychology Education, 44*(4), 679-683. https://doi.org/10.1152/advan.00131.2020

Ramírez, T. (1999). *Cómo hacer un proyecto de investigación*. Panapo.

Rodríguez, M. S.& Platas García, A. (2022). Uso de videos tutoriales en el proceso de aprendizaje de estudiantes universitarios. *Revista electrónica de investigación educativa*, *24*, e21, 1-12. https://doi.org/10.24320/redie.2022.24.e21.4176

Sabariego, M. & Bisquerra, R. (2004). El proceso de investigación (parte 1). En, R. Bisquerra (coord.). *Metodología de la Investigación Educativa* (pp. 89-125). La Muralla.

Selltiz, C., Wrightsman, L. S., & Cook, S. W. (1976). *Research Methods in Social Relations.* Holth Rinehart and Winston.

Tafur, R. & Izaguirre, M. (2016). *Cómo hacer un proyecto de investigación*. Alfaomega.

UNESCO. (1998). *Informe mundial sobre la educación. Los docentes y la enseñanza en un mundo en mutación*. Santillana/ Ediciones UNESCO.

Valentín Melgarejo, T. F., Rivera Trujillo, O. C., Álvarez López, J. R., Gómez Segura, R. L. & Oscátegui Nájera, G. J. (2022). Conflicto cognitivo en la metamotivación para el desarrollo de capacidades en estudiantes universitarios. Horizontes, *Revista de Investigación en Ciencias de la Educación, 6*(22), 246-257. https://doi.org/10.33996/revistahorizontes.v6i22.332

Velarde-Molina, J. F., Montesinos-Valencia, C. C., Laura-De La Cruz, K. M., Espinoza-Vidaurre, S. M., Condori-Chacolli, M. S. & Espinoza-Villalobos, L. E. (2023). Un Análisis sistemático del uso de vídeos educativos para mejorar el proceso de enseñanza-aprendizaje en la Educación Superior. *Revista Ibérica de Sistemas e Tecnologías de Informação*, (E56), 422-437.

Vera Balderas, S. & Moreno Tapia, J. (2021). Experiencias de aprendizaje en YouTube, un análisis durante la pandemia de COVID-19. *IE Revista de Investigación Educativa de la Rediech*, (12), e1139. https://doi.org/10.33010/ie_rie_rediech.v12i0.1139