From Twitch to YouTube Live: A Systematic Literature Review of Streaming in Higher Education

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Abstract: Although the term streaming is polysemic, nowadays it is generally understood as real time communication between broadcasters of information (or streamers) and their community, through popular platforms such as Twitch or YouTube Live. As there is a lack of knowledge about the educational impact of this kind of streaming on higher education, the main objective is to explore how educational experiences have been documented in scientific literature. The specific research questions are (1) How may streaming educational practices in the university context appear in scientific literature, (2) What types of scientific production (conference proceedings, book chapters, scientific articles, etc.) have documented these experiences? (3) What elements of this culture (specific platforms, communication codes, presence of informal elements, etc.) are present in these practices allowing us to consider them streaming experiences? (4) To what extent have these projects been evaluated and what are their educational results? The study is grounded in theoretical perspectives that challenge the existing gap between educational research and impactful learning practices in both face-to-face and eLearning environments. It explores whether, as we hypothesize, there is a lag between the consolidation of new media in popular culture and various disciplines, and its integration into educational contexts. Following PRISMA declaration guidelines, a systematic literature review (SLR) was carried between June 1st and June 9th, 2024 in English language both in Web of Science and Scopus. Starting with a wide collection of results (Scopus n = 426 and Web of Science n = 354) several exclusion criteria were progressively applied before reaching the final sample. Results show that these experiences have been rarely documented (n = 10) with most of them appearing either on journals or conference proceedings. Most experiences still have an instructional bias, not considering the social and cultural dimension of this phenomenon. Although results seem promising, assessment strategies can be improved. Based on these results, researchers emphasize the need to adapt teaching methodologies to leverage the affordances and cultural dynamics of streaming platforms, providing insights for future research and pedagogical innovation. Additionally, they advocate for enhancing teachers' media literacy to better navigate and utilize the distinct features and cultural codes of this medium effectively.

Keywords: Higher education, Streaming, Twitch, Youtube, Facebook, Systematic literature review

1. Introduction

Streaming has grown as a dominant mode of digital media consumption, impacting not only entertainment but also general educational practices (Steinbeck et al., 2021) and, more specifically higher education (Pozo-Sánchez et al., 2021).

The Merriam-Webster dictionary defines streaming as "the transfer of data (such as audio or video material) in a continuous stream for immediate processing or playback" (Merriam-Webster, 2022). The term, due to its polysemic nature, is used in different ways. The most common is the broadcasting of audiovisual content from servers to a final user, who stores it to reproduce it almost immediately, without completely downloading this content to a device. In this sense, it is common to speak about the well-known on-demand audiovisual platforms (Netflix, Spotify, etc.) as streaming services.

However, given that technology allows the continuous flow of data, this *broadcasting* is often associated with the idea of *live-streaming*. In fact, in English language, there is a certain terminological confusion as, on many occasions, we find an indiscriminate use of the concepts *streaming* (which should be exclusively associated with the idea of broadcasting), and *live-streaming*, which explicitly indicates that the broadcast is real-time, or live. For example, when performing a synchronous videoconference, it is common in the English-speaking context to use any of these two terms.

Also, in the last years, the terms *streaming* and *streamer* have acquired a new connotation in popular culture, due to the upsurge of platforms that allow users to broadcast live programs easily. This represents the dissolution of the barrier between consumers and content creators, which led Toffler (1980) to coin the term prosumer in the 1980s. Although some authors are skeptical with this apparent democratization of content

(Castañeda *et al.*, 2020), it is true that media, dominated for many years by television, radio, and written press, has been transformed, in part, due to this phenomenon.

This creative democratization affects text (the consolidation of blogs and wikis are an example), sound (podcasts), and audiovisual productions (rise of video repositories such as YouTube or Vimeo). However, in the last years, we have seen changes in the way we consume audiovisual content, in particular video. Although video on-demand (VoD) (the possibility of immediately accessing content stored in a repository) seemed to be the most practical option (particularly with free services like YouTube), streaming platforms such as Twitch are increasingly capturing more users. Some examples are the 23 billion hours of content consumed in 2021, the more than 9 million streamers who habitually generate content, or the almost 7 million concurrent viewers in the platform in June, 2022 (Twitch statistics & charts, 2018). These streaming platforms facilitate immediate interaction between streamers and viewers, fostering a sense of community and engagement that is less pronounced in VoD services (Wulf, Schneider & Beckert, 2020). Twitch also offers monetization avenues such as subscriptions, advertisements, and donations, attracting content creators who can engage with their audience in real-time.

This economic model encourages the production of diverse live content, contributing to the platform's growth.

Twitch growth and the consolidation of other live streaming platforms such as YouTube Live or Facebook Live was associated, originally, to videogames. While playing, streamers commented on games while they interacted with their audience through specific communication codes and language, which led some authors to talk about streaming culture (Burroughs & Rugg, 2014; Woodcock & Johnson, 2019) and even Twitch culture (Sjöblom *et al.*, 2019). The phenomena have progressively expanded to other disciplines such as literature (https://www.twitch.tv/entre_tulipanes), politics (https://www.twitch.tv/nanisimo)

or arts (https://www.twitch.tv/sebaguidobono).

1.1 Previous Research on Streaming and Education

Although the incorporation of teachers to live streaming is slow, we can find some interesting education channels such as "Entre profes" (Among teachers) (https://www.twitch.tv/entreprofes), spaces that aim at working with games and gamification of classrooms (https://www.twitch.tv/gamificaitor), or channels oriented towards the creation of educational materials (https://www.twitch.tv/paraprofes).

Even though some authors (Catá, 2019) have detected the risk of disregard for specific collectives, most works have underlined the positive aspects of streaming and its educational possibilities (Pirker, Steinmaurer & Karakas, 2021). Among those, authors have mentioned the empowerment of communities, the interactivity between creators and spectators (Flores-Saviaga, *et al.*, 2019) or the ability to co-create contents between both parts (Sjöblom et al., 2019). However, despite these benefits and the potential of using streaming platforms and their communication codes, no systematic exploration of educational projects on higher education has been conducted.

The penetration of streaming in society and the participation of students in this phenomenon, makes reasonable to explore the possibilities of the medium to broaden the conversations outside the classroom, generate dialogic learning, and ultimately, consolidate students and teachers personal learning environments (PLEs) through experiences based in informal and no-formal learning. Works by Salinas have confirmed that students PLEs, which in most cases include streaming channels, allow "to integrate the institutional virtual environment associated to formal learning, with a more informal environment" (Salinas, 2013, p.53).

1.2 Problem, Purpose and Research Questions

Thus, the problem guiding this work is the lack of knowledge about the educational projects that use streaming in the university context. Particularly, we want to understand how these projects have been documented, and by extension, the way in which their implementation is assessed. The study is significant as it will confirm or refute the existence of a gap between academic production and cutting-edge pedagogical practices. Furthermore, it will serve to identify successful projects that appropriate streaming as a cultural phenomenon, enabling an analysis of its potential and limitations. Ultimately, it will assess the capacity of face-to-face and hybrid education to integrate effective communication practices.

Thus, the purpose of this work is to discover the impact of streaming on higher education according to scientific literature. The specific research questions are (1) How may streaming educational practices in the university context appear in scientific literature, (2) What types of scientific production (conference proceedings, book

chapters, scientific articles, etc.) have documented these experiences? (3) What elements of this culture (specific platforms, communication codes, presence of informal elements, etc.) are present in these practices allowing us to consider them streaming experiences? (4) To what extent have these projects been evaluated and what are their results?

At this point there has not been systematic reviews targeting this topic and the scarce attempts have focus on other educational stages (Garrigos et at., 2022).

2. Methodology

The study is grounded in theoretical perspectives (Miller, 1999; Reeves, 2000) that highlight the existing gap between educational research and impactful learning practices in both face-to-face and eLearning environments. These perspectives highlight the historical lack of applicability of some educational research, and on some occasions, the impossibility of generalizing results from a specific project to other contexts. Thus, it explores whether, as we hypothesize, there is a lag between the consolidation of this new media both in popular culture and diverse disciplines, and its integration into educational contexts.

To confirm this a systematic literature review (SLR) was carried. SLRs are characterized by a rigorous approach based on a specific methodology that allows other researchers to replicate the results (Purssell & McCrae, 2020). Jesson et al. (2011) mentions the phases of mapping, planning and establishing a protocol, documentation, definition of inclusion and exclusion criteria, search and filtering of data, review of the quality, extraction of data, and summary.

In the last few years, diverse initiatives have been created to consolidate these approaches, with PRISMA (Moher *et al.*, 2009) being one of the most successful models. This proposal provides a guide to improve the quality of the reviews, facilitating a clear and common procedure. Following PRISMA declaration guidelines, our search strategy comprised the period between June 1st and June 9th, 2024.

The two researchers jointly reviewed the PRISMA documentation and conducted the searches independently to minimize errors following the next steps:

- Consensus on the search string: Both researchers agreed on the formulation of the search terms.
- Joint determination of inclusion and exclusion criteria: Criteria were collaboratively defined to ensure alignment.
- Independent execution of the search: Each researcher carried out the search separately, confirming the number of results obtained.
- Export of results to independent spreadsheets: The results were exported to two separate files for analysis.
- Autonomous application of inclusion and exclusion criteria: Each researcher applied the criteria independently at each phase.
- Meetings after each phase: After the phases of identification, screening, eligibility, and inclusion, meetings were held to resolve conflicts and disagreements.

The databases utilized were the core collections of the Web of Science (WoS, Clarivate Analytics) and Scopus. Although WoS is currently the most important corpus of scientific searches and academic information (Li, Rollins & Yan, 2018), some authors (Falagas, et al., 2008; Kulkarni, *et al.*, 2009) have questioned its exclusive use, stating that other databases such as Scopus could be more comprehensive, as they include a larger number of sources.

The search string with its corresponding Boolean operators was the same in both cases, although due to the syntax peculiarities of each system, in the case of WOS, the field "TS" was used (equivalent to title, abstract, and keywords), while in Scopus we used the equivalent "TITLE-ABS-KEY". Being aware about the habitual use of real-time video broadcasts in the area of medicine, two operators were included to eliminate the results associated to this area: "medical" and "surgery".

The search, centered on articles written in English, used the following strings:

Scopus:

((TITLE-ABS-KEY ("live stream*") OR TITLE-ABS-KEY ("live-stream*") OR TITLE-ABS-KEY (twitch)) AND (TITLE-ABS-KEY ("higher education") OR TITLE-ABS-KEY (university)) AND NOT (TITLE-ABS-KEY (surgery) OR TITLE-ABS-KEY (medical)))

Web of Science:

(TS="live stream*" OR TS="live-stream*" OR TS=twitch) AND (TS="higher education" OR TS="university") NOT (TS="medical" NOT TS="surgery")

We opted for a greater inclusivity in the first approach, with a subsequent application of other inclusion/exclusion criteria. Exclusion criteria focused on selecting articles directly related to the problem, purpose, and research questions. They were structured around aspects such as accessibility (e.g., fully published articles, excluding in-press works), a focus on educational issues (e.g., excluding disciplines others than education), and focus on the university context (e.g., excluding non-university settings).

Starting with the first results (Scopus n = 426) (WOS n = 354), articles written before 2000 were eliminated, given that the technology for live broadcasting and, more importantly, what is known today as streaming, did not exist then (Scopus n = 293) (WOS n = 311). After the elimination of redundancies, a total of 312 articles were obtained. Despite the elimination of medical results, the list kept included many articles associated to this area. After the elimination of 196 articles, exclusion criteria were applied to the resulting sample (n = 116). As the final objective was to find studies that documented education experiences based on streaming as a contemporary cultural phenomenon, either through didactic formats or the use of platforms associated to this medium, we applied 13 exclusion criteria: disciplines other than education (n = 27), exclusively technical papers (n =18), conference proceedings introduction texts (n = 11), articles that could not be accessed (n = 4), non-university contexts (n = 3), sociological analysis (n = 2), streaming as leisure (n = 1), projects with videos exclusively consumed in a deferred manner (n = 1), documents about project funding (n = 1), non-educational streaming studies centered on videogames (n = 1), articles in press or not published (n = 1), other technologies besides streaming (n = 1), and university management (n = 2). This led us to total of 10 articles (n = 10), which were analyzed intensively to provide answers to the research questions. The following figure (Figure 1) provides a visual summary of the process undertaken to reach the final selection of works.
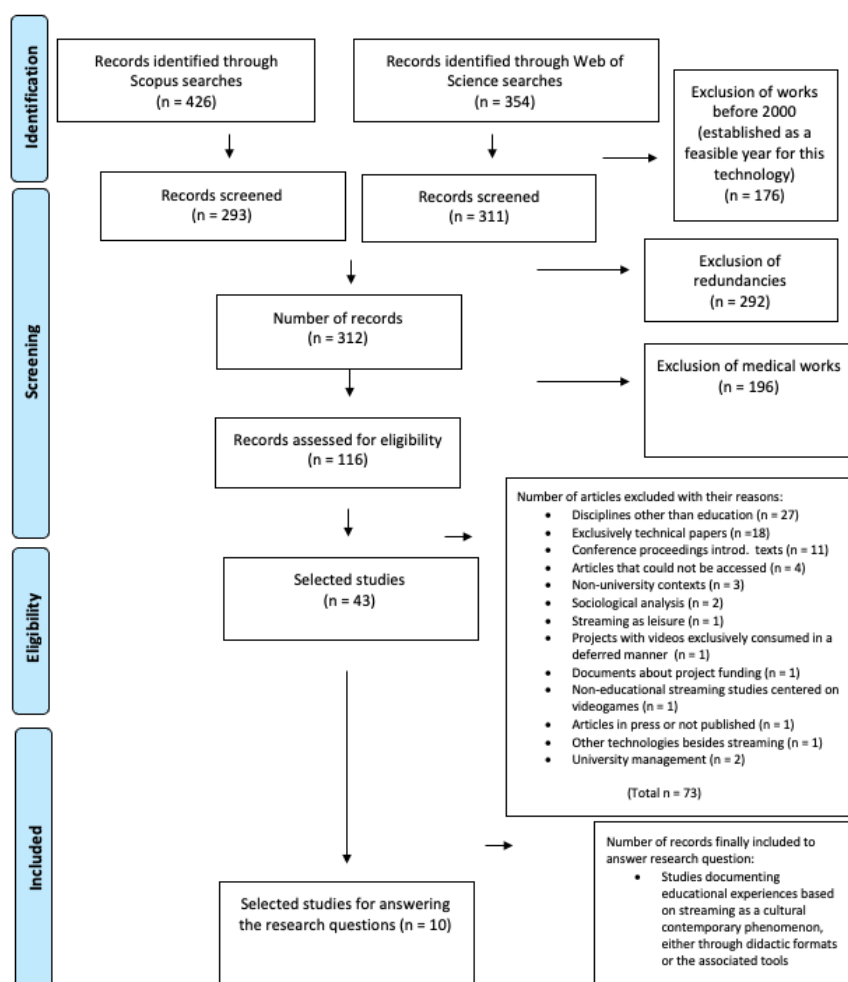

Figure 1: Graphical representation of the process followed in the PRISMA methodology leading to the final sample of works

3. Results

Below, the results for the four research questions formulated are presented. Different tables were created, showing and analyzing the different elements in each case.

Research question 1. Documentation of experiences

To answer the first question, a table was created summarizing projects documented in the scientific literature that have utilized streaming, understood as a contemporary cultural phenomenon, in educational practices in higher education (Table 1). The table shows the number of the article, the authors, the publication date, and its title.

Table 1: Authors, date and title

N.	Authors	Date	Title
1	Liu, I. F., Hung, H. C., & Liang, C. T.	2023	A study of programming learning perceptions and effectiveness under a blended learning model with live streaming: comparisons between full-time and working students
2	Pirker J., Steinmaurer A., Karakas A.	2021	Beyond Gaming: The Potential of Twitch for Online Learning and Teaching
3	ChanLin L.J.	2020	Engaging university students in an ESL live broadcast
4	ChanLin L.J.	2019	ESL live broadcast teaching service in a university library
5	Calatayud, L., Mireia, J., Monsalve, L.	2023	ICT in the University Environment: Twitch and Instagram as Learning Tools
6	Steinmaurer, A., Gütl, C.	2023	Implementation and Experiences of a Flipped Lecture Hall – A Fully Online Introductory Programming Course
7	Aniroh, K; Hanum, L; Ariyanto, AAG	2018	The Effectiveness of YouTube Live Streaming as Digital Learning Media in Tourism and Guiding Subject
8	Wu C. C., Chao H.-W., Tsai C. W.	2021	The effects of Facebook live-stream teaching on improving students' dance skills: Impacts on performance, learning motivation, and physical activity class satisfaction
9	Hertzog P.E.	2018	The use of live streaming in design-based modules for open distance learning
10	Wang S., Pradhan S., Cousins K.	2021	Toward a game-based dialogical pedagogy: Insights from massively multiplayer online role-playing games

In first place, and related to the first research question, it is striking the scarcity of projects, as only 10 of them where aligned with the idea of streaming present in this work. Also, articles 3 and 4, are based on the same educational experience which is divided into two different branches.

Most articles were based on other definitions of the term (see the introduction section), focusing mainly on technology for broadcasting or live classes under classical instruction approaches. This helped us to confirmed that, although videoconference is a common technology in education, the use of tools, communication codes, and language associated to today's streaming culture has been scarcely explored in higher education.

Research question 2. Type of scientific production

To provide an answer to the second research question, an analysis was performed to determine what kind of scientific production was used in each case. The following table shows, in different columns, the format of this production, the name of the specific journal of medium, some of their peculiarities, as well as the databases in which they appeared (Table 2).

Table 2: Sources in which the selected projects appeared: type of production, medium, characteristics, and databases

N.	Type	Medium	Character	DB
1	Article	Interactive Learning Environments	Journal focusing on the design and use of interactive learning environments, focusing on knowledge sharing, adaptive systems, pedagogy	WOS and Scopus
2	Conf.	Annual Conference on Innovation and Technology in Computer Science Education, ITiCSE	Conference on innovation, technology, and computer science organized since 2016. It takes place in different European and Latin American countries. Organized by SIGCSE, a prestigious group interested in education and computer science.	WOS and Scopus
3	Article	Electronic Library	Journal in the area of information management and the ICT. Since 1983, it is centered on matters such as the content creation, its organization, and access to it.	WOS and Scopus
4	Conf.	Asia Pacific Information Technology Conference	Benchmark reference in the Pacific-Asian area about ICT. The works are published in the ACM International Conference Proceeding Series, indexed in Scopus.	WOS and Scopus
5	Article	Revista Iberoamericana de Tecnologías del Aprendizaje	Journal of the IEEE Education Society focused on instructional technology in the Ibero-American context	WOS and Scopus
6	Conf.	Proceedings of the 25th International Conference on Interactive Collaborative Learning (ICL2022	An interdisciplinary conference aims to focus on the exchange of trends, results and practical experience in Interactive Collaborative Learning and Engineering Pedagogy.	Scopus
7	Article	Arab World English Journal	Journal in the area of Language and linguistics. It is in English, but also directed to the Arab world. Created in 2010, it also includes articles related to communication and education.	WOS
8	Article	International Journal of Mobile and Blended Learning	Journal in the area of education created in 2009. Very focused on trends in the area of e-learning and m-learning.	WOS and Scopus
9	Article	World Transactions on Engineering and Technology Education	Journal in the area of engineering and education technology, published by WIETE. It was originally associated to the International Center for Engineering Education of the UNESCO. Its aim is to be a benchmark on teaching of engineering and technology.	Scopus
10	Conf.	Proceedings of the European Conference on Games-based Learning	The most important event in Europe about gamification and game-based learning with a history of almost 20 years. Aside from the academic part, it organized annual contests to award educational games.	WOS and Scopus

As for the second research question, sources were of different types, including articles (the format considered to be the most prestigious within scientific literature) (n = 6), conference proceedings, a more agile, brief format, associated with participation in these events (n = 4).

Research question 3. Elements present in the documents

The third research question aimed to understand what characteristic elements of the streaming culture were present in each experience. The table below summarizes, in different columns, the following: specific aspect that allowed us to consider them streaming experiences, where they were found within the formal-informal continuum, and lastly, in what academic context were they are developed (Table 3).

Table 3: Today's streaming culture elements present in the experiences, place within the formal-informal continuum, and context within which they are developed

N.	Reason for inclusion	Formal-informal continuum	Context and dynamics
1	- Streaming platforms (Facebook live)	Formal but taking into consideration students that could not attend classes in a regular way when buildging the model and scheduilng the broadcasts.	Teaching of coding to students from different degrees in a Taiwanese university combining f2f teaching, asynchronous learning and live streaming.
2	- Streaming platforms (Twitch and Discord) - Levels of interactivity and participation characteristic of streaming	Formal environment with respect to schedules and classes, although the sessions are open to the community.	Training on programing and game design in Master's. Very interactive classes before the pandemic, so Twitch was used to try to maintain the dynamics, in combination with active methodologies: flipped classroom, Q&A, moderated debates, etc.
3	- Streaming platforms and tools (OBS, YouTube Live and Facebook Live) - Anyone can be a streamer	Some sessions take place in regulated schedules, beyond the formal to create learning communities.	Creation of a learning community to improve the use of English of university students. Its peculiarity was that students could act as streamers.
4	- Streaming platforms and tools (OBS, YouTube Live and Facebook Live)	Formal with respect to broadcasting in specific schedules, but re-utilization of materials within the informal learning community manages by the university library.	Re-interpretation of the library as a non-intrusive learning space. Videos are added to the social channels broadcasted in streaming mode that are hosted in their servers. The intention is for the community to be autonomous and that all the users improve their level of English.
5	- Streaming platforms (Twitch) - Used of Twitch connected with other instagram activities	Formal but also implemented due to COVID-19	Subject "History of the School" taught in the Primary Education Teaching Degree at the University of Valencia. Streaming used to share the results of a case study implemented through rol-playing in Instagram.
6	- Streaming platforms (Twitch) -Focus on improving the community interaction	Formal but also implemented due to COVID-19 to setup a flipped classroom experience	Course Introduction to Programming within a computer science-degree at University of Graz.
7	- Streaming platforms (YouTube Live)	Formal. Use of YouTube as an alternative to other more academic tools.	University courses of Tourism and Orientation II in the philology degree. The only element imported is the platform, but the development of the classes is regulated.
8	- Streaming platforms (Facebook Live) - An important part of the experience is developed through mobile devices	Formal (university context) is combined with the non-formal, as it is an optional course worth 0 credits.	Training in the culture of physical education and dance for 1st to 4th-year students Although the synchronous sessions were regulated, the rest of the Facebook elements are utilized to create a sense of community.
9	- Streaming platforms (YouTube Live) - Dynamic interactions through the chat are an important part	Formal environment, although within an eminently practical course. Professionals from the sector are brought in.	Training on the Industrial Projects IV in electrical and mine engineering. Professionals in the sector (in charge of the course) act as streamers before handing in the projects.
10	- Streaming platforms (Twitch) - Cultural processes and codes of streaming as it is an original experience that takes place in the platform itself	Informal setting based on dialogic learning and the acquisition of competences through game-based learning.	Analysis of the perception of a group of players who are at the same time streamers, on the education competences acquired when using Twitch to train other players.

The above-mentioned scarcity of experiences had not to do with the exigency of the criteria, as projects including any element of the streaming culture were considered, even if this was just the use most-common platforms. Among those, Twitch (n = 4), YouTube Live (n = 4), or Facebook Live (n = 2) were the tools used in the selected projects. Also, one case mentioned the use of the open software Open Broadcaster Software (OBS), which is used to produce streams instead of broadcasting them.

Research question 4. Measurement strategies and results

Lastly, to answer the last research question, the strategies utilized to collect and evaluate results were assessed. The following table shows, in different columns, the methodology of each study, the main variables or phenomena evaluated, as well as the results obtained (Table 4).

Table 4: Analysis of the evaluations performed on the selected projects

N.	Methodology	Evidence evaluated	Results
1	Quantitative. 26 working and 28 full-time students. Technique: Self-report a survey and comparison of the two groups through t-test	-Course perceptions -Digital platform usage, and	-Working students found code annotations more helpful than full-time students -Full-time students found class recordings to be more helpful -working students exhibited a superior understanding of data analysis -full-time students found the teacher-student interactions during live streaming to be more helpful for programming learning than the working Students -Similar (and high) level of learning
2	Quantitative. Sample: 145 students. Technique: Student survey.	- Advantages perceived - Disadvantages perceived. - Preferences with respect to other formats - Number of visits to the content.	-Advantages: willingness to participate and interact in a live broadcast, ability to reproduce the sessions as a delayed broadcast, levels of usability, openness to the community and knowledge of the platform. -Disadvantages: a certain impersonality due to the nicks, lack of a voice channel, problems with connection, elements that remove the "seriousness" of the work, distractions of the chat, limits when accessing recorded videos, trolls. -This experienced is preferred over exclusive face-to-face classes and the consumption of recorded videos. -High number of live connections and visits.
3	Qualitative. Sample: 1 educator, 1 librarian and 20 students. Technique: interviews recorded with the professor, the library administrator, and the students.	- Key elements for the success of the experience. - Satisfaction of the participants. - Reach of the broadcasts.	-Importance of technical supervision and planning. -Benefits when the participation of students is promoted. -Offering support to minimize connectivity problems. -High satisfaction of the participants and high number of views.
4	Qualitative. Sample: librarian, professor, technical support personnel, students. Technique: interviews recorded with different agents	- Acquisition of practical guidelines for planning. - Aspects perceived as positive. - Difficulties perceived.	-Need to chat using the students' digital media, importance of using open-source software, and not being intrusive. -Satisfaction of all the agents, ability to connect, through the sessions, with other subjects of interest and resources available in the library. -Difficulty for quality live productions. -Possibility of disconnection of the students if the streamers don't catch their attention.

N.	Methodology	Evidence evaluated	Results
5	Mixed. Sample: 50 students. Technique: Barrado et al. survey for assessing the quality of teaching practice, plus classroom observations	-Interest in the subject -Complement of theoretical content -Improvement of teaching quality	-90% of the students sho an increase in the interest of the subject -96% of the students satisfied with the experience -98% of students confirm that the practical sessions proposed in the subject are a good complement to the theoretical contents -94% of students consider that it improves the quality of their learning
6	Quantitative. Sample: 188 students. Technique: Questionnaire from the universities course management system + two adhoc questionnaires	-Participation -Elements affecting the quality of the experience -Problems and issues	-44% of students attend to all the streams Improvement in course satisfaction (M = 4.66 / 5) -1/3 of all positive feedback related to Twitch synchronous streams. -Interaction in Twitch chat particularly valuable -Some difficulties accessing the experience -Some technical issues -Still missing personal contact
7	Qualitative. Sample: 45 students. Technique: questionnaire (15 item scale).	- Perceived efficacy of communication. - Perceived efficacy of learning. - Use of YouTube Live as streaming tool.	-The efficacy of communication of YouTube Live was considered good, in particular the levels of educator-student interaction. -The efficacy of learning was considered good, in particular the possibility of being able to access the video multiple times. -Depends on the digital literacy of the educator and the involvement of the university in the management of the project.
8	Quantitative. Sample: 128 students. Technique: Validated scales. Pretest-posttest with three groups that used FB Live: One using self-regulated learning, another using experience-based learning (EBL), and a control group.	-Motivation of the students towards the experience (MSLQ) - Satisfaction with the activity - Learning results.	-Motivation: Does not improve with self-regulated learning or EBL. -Satisfaction: Does not improve with self-regulated learning, although it does with EBL. -Learning: Does not improve with self-regulated learning or EBL, although it DOES with the combined use of both approaches.
9	Mixed. Sample: 52 students. Technique: Case study and questionnaire with open-ended and close-ended questions.	- Advantages perceived - Challenges perceived - Other emerging matters.	-Advantages: improvement of comprehension, increase in the desire to participate in the next sessions when perceiving feedback as personal and valuable, preference with respect to the written feedback. Increase in the relevant interactions and access to the teacher, impact on the tasks to be delivered. -Perceived challenges: none beyond matters related with connections by some students. -Other matters: general improvement in communication processes.
10	Qualitative. Sample: 10 active players and streamers Technique: Interviews and treatment of data starting from the Grounded Theory.	-Perception of the education competences acquired when amplifying a learning process (in this case the use of game) through Twitch.	-General improvement of communication skills, development of ability to be "a better professor" and development of formal language or "composure" given the responsibility felt when broadcasting.

In all the studies we found some type of evaluation focusing on variables and/or phenomena through heterogeneous quantitative (n = 3), qualitative (n = 4), and mixed (n = 2) measurement strategies.

Although in many cases the information was based on the perception of the participants themselves, matters such as the positive effects of streaming in education processes, or the satisfaction with the experiences developed were mentioned. In some cases, these perceptions were extended to other variables such as learning.

On the other hand, some elements were pointed out for improving future experiences; these included elements such as the importance of connectivity, participants' literacy, or the fact that streaming tools and codes were not originally thought for formal educational experiences.

4. Discussion and Conclusion

The theoretical framework guiding this research—the gap between social/educational phenomena emerging in popular culture and the impact of these experiences in educational academic literature—extends beyond the realm of eLearning and targets educational innovation as a whole. Specifically, this study's emphasis on streaming—a technology and cultural phenomenon with clear influence on technology-mediated educational processes—and the fact that contemporary university education is inherently hybrid underscore the relevance of this work.

The article presents a systematic literature review on the use of streaming, understood as a contemporary cultural phenomenon, at university. The study allowed us to find different educational projects, and to analyze the academic efforts for documenting and evaluating these experiences, classifying the types of scientific productions, what elements of this culture did contain, and what evidence of its impact was measured.

While answering the first research question, the progressive application of filters reduced the number of experiences identified. This process was valuable in itself, as it showed that only a few educational experiences using streaming (as we understood it today) have been documented. This provides evidence on a great divide between today's contemporary media and culture manifestations and the main resources used in education. In fact, this seems to occur with other cultural forms in our present time, such as comic books (Serants, 2018), videogames (Oceja & González Fernández, 2018), or transmedia narratives (Dudacek, 2015). This is particularly evident in university education, as secondary education seems to be more permeable to these languages (Pozo-Sánchez, *et al.*, 2012). In a time where media (Spilker, Ask & Hansem, 2029) and society in general (Thorburn, 2014) actively participate from these forms of communication, the rigidity of university is reluctant to these practices which dilute the barrier between formal, non-formal, and informal education.

To provide an answer to the second research question, the scientific production including these practices was analyzed, confirming that some projects led to articles in indexed journals, but also conference proceedings. This could be related with the peculiarities of academic conferences, which sometimes provide the opportunity for educators to establish links with academia. In fact, some authors have reflected on the problem of overestimating academic journals as compared to other formats, which, along with congresses and conferences, could foster and represent better successful educational practices (De Vries & Pieters, 2007). The traditional gap between classrooms and scientific literature has led many authors to talk about the "failure of educational research" (Miller, 1999) or the "need [to] confront the sterility of past labors and take radical steps to conduct inquiry in more productive ways" (Reeves, 2000, p. 10).

Despite Scopus and WoS including conference proceedings within their records, it is important to point out, as a limitation of the study, that these databases have traditionally focused on journal articles, ignoring other types of literature such as book chapters and technical reports.

When answering the third question, we confirmed that only some experiences imported the culture of streaming in a comprehensive and significant manner (Pirker, Steinmaurer, & Karakas, 2021; Wang, Pradhan & Cousins, 2021). In most cases, the only identifiable elements were the platforms utilized. In this regard we think that if educators use a platform such as Twitch for being "fashionable" while maintaining a classical instructional and lecture-based approaches, the value of their proposals will be limited. Thus, we consider interesting the combination of today's streaming communication codes with the use of other active methodologies (Pirker, Steinmaurer, & Karakas, 2021; Steinmaurer & Gütl, 2023).

It was also confirmed that when educational experiences utilized open-source tools (software such as OBS) and open and flexible languages (such as the communication codes used in Twitch), although not originally created for teaching, the class was "amplified", favoring the creation of communities, and serving to reach more people. If we consider the guidelines given in the European context on informal education and life-long learning since the 1990s (European Commission, 1999, 2001, 2006) these experiences would be aligned with the views expressed in these documents, with respect to the promotion of education at all levels and encompassing every area, from the formal to the non-formal.

According to Salinas (2013), the idea of openness is associated with quality personal learning environments. Thus, experiences using streaming culture could contribute towards the improvement of all agents learning

ecosystems (educators, students, personnel, etc.). Nothing would be more interesting, for example, than starting with streaming experiences in formal courses, with students posteriorly subscribing to those channels to broaden their knowledge in an informal way. These experiences would serve to "blend the borders between the face-to-face and the virtual, and the school-related and the non-school related", as mentioned by Engel & Coll (2022, p. 225). In fact, what is the sense of a meaningful conversation maintained within a class not being "amplified" to other classmates, and by extension, to any person interested on the subject?

Thus, the projects documented not focusing on theoretical content transmission were particularly interesting. For example, research lines opened by Wu, Chao & Tsai (2021) linked to artistic and physical training, should be explored in-depth. Also those projects combining streaming with other emerging technologies (Calatayud, Mireia & Monsalve, 2023; Steinmaurer & Gütl, 2023) are particularly meaningful. Similarly, even though it was not strictly formal education, the work by Wang, Pradhan & Cousins (2021) was interesting, as it explores the development of competences generated in informal context such as playing videogames. Also, the work by Hertzog (2018) which proposes professionals from different sectors acting as streamers, should be follow.

As for the fourth research question, it was confirmed that the evaluation strategies were very different providing, most of them, positive results (Liu, Hung & Liang, 2023; Aniroh, Latifah, & Abdul Ghoffar Ariyanto, 2018; Wu, Chao & Tsai, 2021; Calatayud, Mireia & Monsalve, 2023; Steinmaurer & Gütl, 2023) and/or recommendations and good practices for better practices (ChanLin, 2020; Wu, Chao & Tsai, 2021). Nevertheless, many evaluations were superficial, and were based on subjective variables such as the individuals' perception of the experience. It is important for these assessments to be complemented with others of a quantitative nature, centered on key variables such as learning achieved, PLEs improvement or the development of specific competences.

In addition, the evaluations pointed out some elements to be considered in future experiences, such as the importance of participants' media literacy (in particular educators), the key role of live interactions, or the need to plan the projects meticulously.

The issues identified in this work (few projects, many of which are either not implemented or rigorously documented), negatively impacts areas such as engagement—a particularly pressing problem in higher education (Quaye et al., 2019)—or the missed opportunity to leverage the capital of informal learning within formal university processes (Law, 2015).

The conclusions of this work are provisional, as the research on streaming culture, its platforms, and its communication codes in higher education, is still very limited. In fact, although our limited final sample could be seen as a limitation of the study, perhaps it is also its main virtue. More specifically, the detection of deficiencies in the projects documented should allow us to formulate new research and intervention proposals.

The scarcity of projects around the educational possibilities of streaming aligns with the theoretical positions guiding this work: the existing gap between educational practice (and its permeability to popular culture) and the academic world. However, this leads us to formulate new questions that need to be addressed in the future: Are there few documented projects because academia is unable to detect them? Do university educators fail to create projects because they cannot find scientific evidence to support them?

We believe this is a multifactorial issue that is difficult to resolve. We know of educators who use Twitch to amplify classroom discussions and would never consider submitting an article to a journal. At the same time, the peculiarities of academic journals (publication timelines, trends, etc.) limit their ability to respond to these types of phenomena. Moreover, the eLearning field continues to be heavily influenced by instructional approaches that are reluctant to recognize the importance of formal and informal learning.

In today's liquid context (Bauman, 2009), where all educational experiences are hybrid (as they are mediated by digital technologies), eLearning studies must move beyond the burden of instructional design frameworks to embrace forms of communication that break down the barriers between formal and informal learning.

In this sense, it is possible to plan some future lines of work: (1) identifying and analyzing other projects conducted by educators that have not been documented and/or that appear in grey literature; (2) improving the strategies for assessing learning; (3) designing new projects through dynamic approaches such as action-research, design-based research, and co-creation.

We believe that there was a need to explore the presence of these news forms of educommunication in the university. The article presents a complete, realistic, international, and in-depth analysis of the current situation

focusing on the existing scientific production aiming, at the same time, to serve as a basis for new transforming experiences.

Acknowledgements

Ethics statement: This study does not involve human participants and is based entirely on publicly available literature.

AI statement: This paper was entirely written and developed by the authors without the use of artificial intelligence tools for drafting, editing, or data analysis.

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