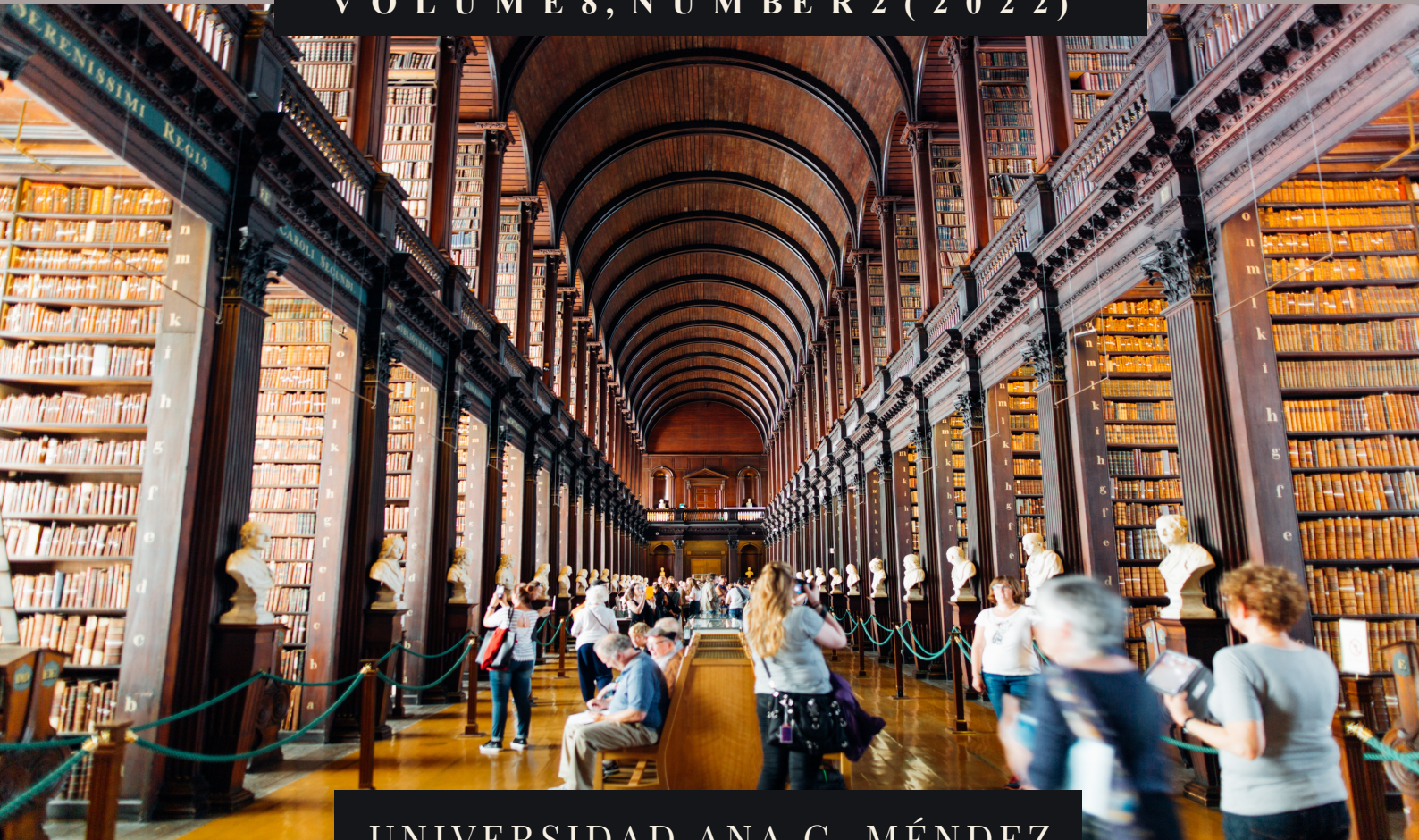


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Universidad Ana G. Méndez (UAGM), Recinto de Cupey
Escuela de Educación, PO Box 21150 San Juan, PR 00928-1150
Editor-in-Chief: **José Gómez Galán**

International Journal of Educational Excellence

DESCRIPTION

The *International Journal of Educational Excellence* (ISSN 2373-5929) is a multidisciplinary scientific journal which main objective is the dissemination of studies that provide answers to the main educational scientific and social problems present in higher education, in order to achieve excellence quality in all their areas. Papers will be welcomed, regardless of the subject area to which they belong as long as they entailed a contribution, innovation or breakthrough in the development of models of teaching or scientific research in the scientific world which lead to a social improvement. Research work performed in other educational levels may also be considered, if they demonstrate a strong and justified relationship to higher education. All papers submitted for publication must be unpublished and originals, and should not be under any evaluation procedure for publication in other journals. Theoretical work as well as work based on field studies and empirical laboratory experiments are accepted. All kinds of strategies and methodological approaches may have been used for the study. They have to comply within the parameters of current scientific and technological research. The review criteria and selection process will take into account mainly the quality of the work under consideration: if it makes a significant contribution to the object of interest, main interests of the journal and if it offers a breakthrough or significant contribution to the current scientific knowledge and, ultimately, if it contributes to the progress of our society. This journal is of free and direct access (Open Access, OA), and it serves the international scientific community and open knowledge.

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Original submissions to the *International Journal of Educational Excellence* (IJEE) will be reviewed by external referees, a process known as peer review. Reviewers are academics and researchers who are experts in the corresponding specialized field of knowledge. Their main task will be to study all submitted papers critically and constructively. For a paper's evaluation a "double-blind" system will be used. This method consists of one in which authors and reviewers are not known to each other, aiming at a maximum objectivity in the evaluation of the manuscript. Those articles that are considered by the editorial and scientific committee of the journal with high possibilities for publication will be submitted to referees who will determine the relevance of their acceptance. It may be the case that they be sent back to the authors with suggested changes and then back again to the journal to continue with the evaluation process, which ultimately will assess the relevance of the article to be published or rejected.

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The periodicity of the *International Journal of Educational Excellence* will be two issues per year, and these will form a volume. The first issue is published in the first half of the year, the second issue in the second half. There is no deadline for the submission of manuscripts, which will remain open during the whole year and publication of the

article will possibly appear in the following issue after a positive evaluation of the work. For monographs, in which contributions to a specific topic will be requested, the deadline for receipt of manuscripts for evaluation corresponds to June 30 for the first issue and December 31 for the second issue, both referred to volume of the year following the call of articles.

IDENTIFICATION AND ACCESS TO THE JOURNAL

The journal is named *International Journal of Educational Excellence*, and it is abbreviated IJEE. Its ISSN (International Standard Serial Number) number is 2373-5929. For cataloging, it should be referred to as International Journal of Educational Excellence (IJEE): ISSN 2373-5929. Access to the journal may be performed from the main web address: http://www.suagm.edu/umet/oa_pe_edu_ijee.asp

AUDIENCE

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For all parties involved in the act of publishing (the author, the journal/publisher and the peer reviewer) it is necessary to agree upon standards of expected ethical behavior. The ethics statements for the International Journal of Educational Excellence (IJEE) are based on the Committee on Publication Ethics (COPE) Editors (www.publicationethics.org).

The value of scientific publishing relies on everyone involved behaving ethically. The publication of an article in the International Journal of Educational Excellence, a peer-reviewed journal, is a direct manifestation of the quality of work of the author and the institutions that support them. Peer-reviewed articles support and embody the scientific method. Ethics topics to consider: Authorship: Authorship should be limited to those who have made a significant contribution to the reported work. The authors should ensure that their study is original and written by them and their work has not been previously published and has been submitted only to the journal. / Originality: The authors should ensure that where material is taken from other sources (including their own published writing) the source is clearly cited and that where appropriate permission is obtained. / Data access: Authors may be asked to provide the raw data in connection with a manuscript for editorial review, and should be prepared to provide public access to such data. / Acknowledgement of sources: Proper acknowledgment. / Conflicts of interest: The authors should ensure that any real or apparent conflicting or competing interest is clearly stated on submission of their manuscript. / Reporting standards: Authors of reports of original research should present an accurate account of the work performed. / Human or animal subjects: The authors should ensure that they adhere to all research ethics. / Confidentiality and impartiality of the reviewers: The reviewers must maintain the confidentiality of the review process and conduct themselves fairly and impartially; immediately alert the editor-in-chief of any real or potential competing interest that could affect the impartiality of their reviewing and decline to review where appropriate.

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DESIGN, COMPOSITION AND LAYOUT

Prof. Dr. José Gómez Galán

DESIGN AND WEB MAINTENANCE

Sr. Vidal Torres Miranda
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AUTHOR GUIDELINES

1. Introduction

The *International Journal of Educational Excellence* (IJEE) is open to all scientific articles which provide answers to the main educational and scientific problems currently impacting higher education with the purpose of achieving quality excellence in all areas. Papers will be welcome, regardless of the subject area to which they belong, as long as they entail a contribution, innovation or breakthrough in the development of models for teaching or scientific research within the university environment leading towards social improvement. Research work performed in other educational levels may be also taken into account, as well as they provide an adequate justification and a valid relationship with higher education issues.

All papers submitted for publication must be unpublished and original, and should not be under evaluation for publication in other journals. Theoretical work as well as those based on field studies and empirical laboratory experiments contributions, are accepted. All kinds of strategies and methodological approaches may be employed; however, the selected method for each research has to be in compliance within the parameters of current scientific and technological research. The review criteria and selection process will mainly assess the quality of the work under consideration in terms of the following criteria: significant contribution to the object of interest of the journal, a breakthrough to the current scientific knowledge and, ultimately, the contribution to the progress of our society.

2. Details for Submission

Manuscripts should be sent preferably sent in digital format. All manuscripts should be addressed to the journal Editor-in-Chief (email: jogomez@suagm.edu). Prior to submission, publishing standards should be carefully read at the following web site http://www.suagm.edu/umet/oa_pe_edu_ijee.asp. Only those articles that meet all the requirements and characteristics described at the web site will be accepted.

Submission of original digital file will preferably be in RTF format. The .ODF format is also accepted. Other formats (such as DOC, .PDF, etc.) are excluded.

In the rare event that the author (s) of an article cannot submit manuscripts electronically, the article shall be traditionally mailed. However, it should include a copy of the article in the previously outlined digital formats. Manuscripts will be sent by postal mail to the following address: International Journal of Educational Excellence (IJEE), Escuela de Educación, Universidad Ana G. Méndez (UAGM), Recinto de Cupey, PO Box 21150 San Juan, Puerto Rico, 00928-1150. The attention should be directed to: Editor in Chief.

3. Authorship and Responsibility

The author (s) of the article should submit one copy of the original article and a statement certifying that the work is original and has not been published before and that it has not been evaluated by another journal editorial committee.

The author (s) must also declare that [a] all named authors have materially participated in the development of the research or study that has led to the article, [b] any conflict(s) of interest, and [c] the sources of funding of research presented in the article or of the preparation of the research.

They shall also explicitly accept the journal rules of publication and the decision regarding the publication or rejection of an article. The *International Journal of Educational Excellence* (IJEE) assesses and requires all high international standards of ethical conduct of research and journal publication.

4. Preparation of Manuscripts

Articles should be submitted in proper English (British or American, however, but a mixture of both will not be allowed), whose length will be at least 3500 words and a maximum of 12,000, including references, notes, tables and figures. Exceeding this amount of words will be a major negative factor in evaluating the article, although articles exceeding this extension can be exceptionally published if they are properly justified and the work stands out for its quality.

The article must be preceded by an abstract thereof with a minimum of 150 and a maximum of 300 words. It must also be submitted in English language along with Spanish and Portuguese translated versions. The summary should also include five to seven key words in English, Spanish and Portuguese.

Articles of theoretical nature as well as those based on field studies will be accepted, and they will be considered as a positive evaluation element if those articles maintain the classical structure in scientific research papers, consisting of separate sections and subsections (eg. Introduction, Objectives, Methodology, Analysis, Results, Discussion, Conclusions, Appendices and Appendixes, etc.). However, freedom is offered to the authors to establish the most appropriate structure, depending on the nature and characteristics of their research (and is especially significant in the case of theoretical articles). What is required in all cases is that the division of the article be clearly defined and numbered by the structure 1 (with 1.1, if 1.1.1, 1.1.2, etc.), 2, 3, etc. Each title and subtitle of the sections and subsections should be clearly identified through the use of spaces.

Standards of quotation, including references, must be governed by the style of the APA (American Psychological Association), contained in the *Publication Manual of the American Psychological Association*. Please see the following examples which are explained within the next paragraph:

Citations to text:

Whenever there is a quote of the author or authors of a publication, it should appear in the text in parenthesis followed by the year -for example if a single author is cited (Smith, 2014), if the citation refers to two to five authors (Smith & Brown, 2011 / Smith, Brown & Torrero, 2009), or if there are more than six authors (Smith et al, 2014) - and the full reference will appear in the list of references at the end of the article. If two or more works are cited, they will appear in the same order in the reference list separated by a semicolon (James, 2001, Smith, 2014). If in the article two or more references by the same author published in the same year are cited, they should be differentiated by lowercase letters (a, b, c, d, etc.) added to the year; in the text quote, the corresponding lower case letter will be used in each specific reference (Smith, 2014a).

If the citation refers to a general idea of the work, or if it is a general reference to an article, book or full investigation, but is not literally quoting a portion of the reference, it is only necessary to refer to the author and year of publication, without specifying the page intervals.

If the citation is literally quoting a text from a specific work, the author, year of publication and the page intervals should be entered preceded by "p" for example, according to Smith (2014) "the university teachers with many teaching hours have difficulty in carrying out research work" (p. 379), / in his study he argued that "university teachers with many teaching hours have difficulty in carrying out research work" (Smith, 2014, p. 379) but the author did not show the statistical analysis of the survey results.

In case the direct quotations exceed 40 words it is necessary to set up them within a separate text block, and quotation marks are omitted. It is recommended to begin the quotation on a new line with a tab on the left margin

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of ½ inch or 1.25 cm, maintaining this margin along the length of the cite. Page intervals should be indicated as described in the preceding paragraph.

Sometimes, in the work, it may be necessary to refer to indirect quotations, i.e. presenting information or ideas of an author who has been picked up and quoted by some other one. In this case, the two authors are cited; starting with the indirect reference, for example, Brown (cited by Smith, 2014, p. 179) suggests that research is essential in university teaching. It is also recommended to find out and cite the original source.

References List:

The list of references should appear at end of the article. With this information, the reader may access any of the sources that have been cited in the main body of the work. Each and every one of the sources cited should appear in the reference list. Similarly, each of the references that appear in this list should appear in the main text of the article at some point.

The references list appears at the end of main body of article, and after two spaces, using the title "References", with the same format as each of the subtitles that make up the work. All lines subsequent to the first line of each entry in the reference list should be indented ½ inch or 1.25 cm. The names of the authors appear inverted (last name then first initial or initials of the first names). The entries in the reference list should be ordered alphabetically according to the first author of each work. If several works by the same author have been cited, these entries should also be collected in chronological order, starting from oldest to the most recent. The full title of the work should be provided, keeping the title used by the publication. Capitalization of all major words of journal titles is recommended.

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At present, the rules of APA citation are widespread in the field of social research, and its style is the most currently used to cite sources in this area. Therefore, in case of any doubt regarding citations, we recommend consulting the *Publication Manual of the American Psychological Association* (6th edition), where it multiple examples of formats of research papers, text citations, footnotes, references, etc. can be found; here we have offered only general guidelines.

General Format of Manuscripts:

The manuscript should follow the general format not only meeting the scientific requirements requested by this journal but also identifying the best possible characteristics of the article. Submission the manuscript in digital format, or RTF .odf, double-spaced in a standard size paper (8.5 "x 11") or A4 (21 x 29.7 cm) 1 "(or 2 cm) margins, is recommended. Although any easily readable source may be used, the use of Times New Roman 12 point is recommended. The manuscript should include a header at the beginning of the page, providing the main scientific information of the author and the work. These data are:

Title: should be as concise as possible, reporting the content of the article. It should be taken into account that quite often titles are used by scientific database systems and information retrieval, so it is advisable that it contain words directly related to the content of work. It must not contain abbreviations or acronyms that are not widely known. The title should be centered as the first element of the header. The APA recommends that it does not exceed 12 words in length, but if it were required by the nature of the work, it shall not prevent the acceptance of the manuscript.

Name of author (s) and affiliation: should appear in full below the title, separated by a double space using the following format: First Name, Middle Initial (if applicable) and last name (both names if Latin American author (s). Titles (Dr.) or degrees (PhD) may not be used. In order to allow the precise localization of the institution where the research was performed, its full address should appear below the name of each author (City, country, zip code). Finally, below the institution's address, the e-mail of each author should appear.

Mailing address of the corresponding author: In addition to email, full address for correspondence is recommended but not mandatory (telephone numbers, country and local codes). It may appear as a footnote.

Abstract: It should be placed after the name, affiliation and email address of the corresponding author separated by double space. As indicated above, it should have a length between 150 and 300 words. It will be sent in English, Spanish and Portuguese and should summarize the main features of the research work (as a minimum it is advisable to include a summary of the objectives, methodology and results, especially if it is based on fieldwork research). Future research may be included, especially if it has given rise to different questions that invite subsequent effort.

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Keywords: will be entered below the summary separated by a double space. We recommend providing five to seven key words that identify the work more precisely, and may help other researchers to find it in the international databases. The keywords will be sent in English, Spanish and Portuguese, and for their selection it is advisable to use the thesaurus most used in the specialty.

Article: Below the keywords, the author will place the main body of the text submitted for publication in the International Journal of Educational Excellence (IJEE), in accordance with the recommendations given in this Guide for Authors.

Scientific and professional record of author (s): Placed below the main body of the manuscript leaving three lines and as the last element of the manuscript to be submitted. The scientific and professional background of each author should not be longer than 300 words, specifying recent published papers.

Notwithstanding the guidelines outlined above, it is strongly recommended for preparing manuscripts, to follow the APA style compiled in *Publication Manual of the American Psychological Association* (6th edition).

5. Publication of Articles

Submission of a manuscript to the *International Journal of Educational Excellence* (IJEE), implies a previous statement by the authors that the work submitted to the journal is original and unpublished, that it has been the result of the authors' work, that all the signatories have materially participated in its preparation, and that the manuscript is not under evaluation for publication elsewhere, whatever the media, especially that it is not under evaluation by other scientific journals. All journal rules are also accepted, as well as final the opinion resulting from the academic evaluation of Article whether it is accepted or rejected for publication.

The editorial staff of the *International Journal of Educational Excellence* (IJEE) is not responsible for the opinions, analysis, or results collected by the authors in their articles. It is also assumed that all material in articles are free of copyright rights and therefore it is not responsible for any disputes or claims related to intellectual property rights, which are the sole responsibility of the authors.

The decision to accept or reject the publication of the manuscript will be notified within a maximum period of four months. The notification will be sent electronically (e-mail) to the corresponding author. If accepted for publication, the paper will appear in the next volume of the journal.

The articles published in the *International Journal of Educational Excellence* (IJEE) are digitally edited and will retained all the characteristics of those published in traditional print journals. The articles appear in PDF format, conveniently typeset and numbered as classical journals. Therefore, in this sense the editors facilitate their distribution of the journal and articles and the scientific citation or its contents according to all current standards, making available to the scientific community, valuable contributions resulting from the research. We can say, that in general, this is a publication that takes advantage of all the benefits that ICT offers for easy editing and distribution, considering also the ecological side of publishing without paper. This means that only those parts that are needed should be printed if the case arises. In addition, the digital format of the articles of the *International Journal of Educational Excellence* (IJEE) is adapted to the new computer and telematics tools used in scientific and academic contexts, easily allowing information searching, online and bases data indexing, etc. Access to the content of the *International Journal of Educational Excellence* (IJEE) is free, thereby contributing to the globalization of science and culture.

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Podcast in Education: Performance and Co-Word Analysis in WoS

**María-José del Pino-Espejo ^a, Antonio-José Moreno-Guerrero ^b,
Jesús López-Belmonte ^b & José-Antonio Marín-Marín ^b**





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Abstract: Podcasts have become a digital resource currently used as a means of transmitting information. In the educational area, podcasts have shown a great didactic potential that can be designed by both teachers and students for different purposes. The aim of this study is to analyse the concept of podcasts in the field of education. To do so, a bibliometric methodology has been used. This is based on a documentary analysis and scientific mapping by means of co-word analysis of the reported literature. The study focused on the Web of Science database. A unit of analysis of 439 documents was used. The results reveal that publications on the state of the art have been of interest to the scientific community in recent years. In addition, research is focusing on the pedagogical methods used for their application in learning spaces, the technological resources used for their development and the benefits they generate in students.

Key-words: podcast; literature review; scientific mapping; scimat; co-word analysis.

1. Introduction

Throughout its history, society has undergone major changes. In recent times, these changes have been marked, among other aspects, by the evolution of information and communication technologies, commonly known as ICT

^a Pablo de Olavide University, Seville (Spain).  ORCID 0000-0002-5271-5820. mjpinesp@upo.es. Coauthor: Antonio-José Moreno-Guerrero, ^b University of Granada (Spain)  ORCID 0000-0003-3191-2048. ajmoreno@ugr.es. Coauthor: ^b José-Antonio Marín-Marín, ^b University of Granada (Spain)  ORCID 0000-0001-8623-4796. jmarin@ugr.es. Correspondence: Jesús López-Belmonte, ^b University of Granada (Spain).  ORCID 0000-0003-0823-3370. Department of Didactics and School Organization, Faculty of Education, Economics and Technology, Cortadura del Valle s/n. 51001, Ceuta (Spain) jesuslopez@ugr.es.

(Moreno-Guerrero et al., 2021). Thanks to this evolution, various technological resources have emerged, including podcasts.

Podcasts have their origin from the union of the terms "iPod", due to the audio system that Apple's iTunes system established in its beginnings; and the term "broadcast", related to the dissemination of content (Ferreira et al., 2020). Podcasts are defined as a multimedia resource for regular digital publishing (Kennedy et al., 2018; Shamburg, 2020). Such a resource is primarily in audio format, although it may also be available in video format (Mirza, 2020). Podcasts can be downloaded to any device, as long as there is an internet connection and an application for receiving, managing and listening or viewing (Wentzel and De Hart, 2020). In addition, podcasts can be included on a website or blog, but can also be listened to on platforms such as iTunes, Spotify, SoundCloud or Ivoox (Riddell et al., 2020). Podcasts should not be confused with radio, since podcasts can be listened to at any time, asynchronously. Radio programmes are played synchronously (McNamara and Drew, 2019; Rockhill et al., 2019).

Podcasts are mainly characterised as a digital resource, mainly audio, which allows combining voice, music and various sound effects (García-Marín and Aparici, 2020) and are usually free of charge (Konig, 2020). They can also be in various audio formats, although the most commonly used is mp3 (Barnes et al., 2020). They are often hosted on websites, for downloading or listening (Newsom et al., 2019). In addition, they have a wide variety of subject matter, ranging from news to the presentation of educational content (Woods et al., 2020). They are usually created by experts in a particular subject area (McNamara and Drew, 2019). To generate a podcast, a digital recording system is needed (Ibarra, 2019). In addition, podcasts offer a personal and even emotional link between the author and the listener (Blum, 2018).

In order to create a podcast, a series of steps or phases must be taken into account. Firstly, it requires pre-production, where the author identifies the subject to be dealt with, analyses it in depth and writes the content to be explained. Secondly, it requires production. In other words, the recording of the content, requiring a digital recording and editing system. Various resources and audio effects can be used in the recording. Thirdly and finally, post-production is needed, analysing the work done, retouching and publishing the content generated (Killeen and Summerville, 2020; Tarchichi and Szymusiak, 2020).

In education, podcasts have not gone unnoticed. They can be created by the teachers themselves, or even by the students themselves. Everything will depend on the purpose of the teaching and learning processes established. As in any educational process, creativity plays a fundamental role in the use of podcasts in education (Ferrer et al., 2019; Kane et al., 2019; Leton et al., 2018; Rowell, 2019). Podcasts can be used with innovative methods such as

flipped classroom or project-based learning, among many others. It can also be used as a supplement to educational sessions or as reinforcement material for parents and learners. Or they can even be used to share experiences and resources in teacher networks. They can also be used by students for content creation (Besser et al., 2021; Celaya et al., 2020; Maher et al., 2020; Makina, 2020).

Educational research on the use of podcasts shows how they increase praise in students' behaviours, thus improving their predisposition towards learning (Miller and Uphold, 2021); improve student interest and motivation in teaching and learning processes (Berk et al., 2020; Elekaei et al., 2019; Rodman et al., 2021; Sendag et al., 2018); and are accepted by students as an educational resource (Bueno-Alastuey and Nemeth, 2020; Young et al., 2021).

Moreover, they improve students' academic performance (Bianchi-Pennington, 2018; Elekaei et al., 2019; Mnatzaganian et al., 2020); increase self-reflection, self-awareness and metacognition (Fouz-Gonzalez, 2019; Jeong, 2019; Matulewicz et al., 2020); enhance creativity and self-expression (De los Ríos, 2020; Kornieva and Vashchylo, 2019); consolidate learning and autonomous learning (Samuels et al., 2020; McNamara and Haegele, 2020; Wall, 2019); enhance students' listening skills (Stefancik and Stradiotova, 2020); and enable the generation of unique learning environments (McNamara and Drew, 2019).

In conclusion, podcasts in the field of education are a versatile and adaptable techno-pedagogical resource that can generate many benefits in the teaching and learning processes. This can be reflected positively in student learning (Dmytriieva, 2018).

2. Justification and Objectives

This paper is based on the importance that information and communication technologies (ICT) have reached nowadays (Blanco et al., 2015; Ortiz-Echeverri et al., 2018). This projection has been increased not only as a consequence of the technological evolution that society has experienced in recent years (Rodríguez-Reséndiz et al., 2012; Rodríguez-Ponce et al., 2015), but also due to the impact of COVID-19 on people's daily actions, as many processes have been digitised (García-Peñalvo and Corell, 2020). This study derives from the project entitled Study on pioneers and founders of Sociology (Code EXP 118/21).

In order to carry out this study on the projection of podcasts in the field of education (PODCAST-EDU), a bibliometric aspect of the research was used. That is, bibliometrics has been used to ascertain the state of the question. This research methodology focuses on the analysis of published scientific documentation (Carmona-Serrano et al., 2021). With this, a state of

the art on the subject under analysis can be revealed to the scientific community. All this thanks to the study of various variables such as authorship, keywords, journal, countries, language, source of origin, among the most important (Corell-Almuzara et al., 2021).

The selection of the database in this type of study is essential. Specifically, for this work, the Web of Science (WoS) database has been selected as a repository that covers a large volume of documents referring to the Social Sciences and due to the relevance of this database in the Journal Citation Reports (JCR) (López-Belmonte et al., 2020; Martín-Martín et al., 2018).

The purpose of this research is to analyse the concept of PODCAST-EDU in WoS publications. After this analysis, it will be possible to generate new knowledge about the projection of this concept. This will allow readers to reflect on the path already travelled, as well as to draw new lines of action, based on what has already been collected in the published literature. Due to the novelty of this study, this work is positioned under an exploratory aspect. In short, the objectives of this research are the followings: (1) To find out the documentary performance in WoS on PODCAST-EDU; (2) To determine the scientific evolution in WoS on PODCAST-EDU; (3) To reveal the most significant topics in WoS on PODCAST-EDU; (4) To locate the most influential authors so far in WoS on PODCAST-EDU; and (5) To predict the most important topics and authors in WoS on PODCAST-EDU.

3. Method

In this research, an analysis of the literature concerning PODCAST-EDU is carried out, from the analysis of documentary development to a co-word analysis as an innovative approach based on scientific mapping. In order to carry out the study correctly, the guidelines of experts in this particular spectrum of bibliometrics were followed (Carmona-Serrano et al., 2020; Segura-Robles et al., 2020). Likewise, the analytical model presented in previous impact studies has been used. All this has been done in order to produce and present an analysis of the state of the art in a relevant and unbiased manner (López-Belmonte et al., 2021; Marín-Marín et al., 2021).

3.1. Research Design

Bibliometrics has enabled the development of various processes (literature search, registration, analysis and prediction) (Mac Fadden et al., 2020). These processes are necessary for the achievement of the objectives. In addition to these actions, an analysis of co-words (Hirsch, 2005; López-Belmonte et al., 2019) and various indices such as h, g, hg and q2, was carried out. All this gave rise to different maps with nodes representing subdomains

with the reported concepts. Also, these maps reveal the evolution of the topics addressed in the literature over time (Moreno-Guerrero et al., 2020).

3.2. Procedure

Based on previous studies (Moreno-Guerrero et al., 2022), the research has followed a series of actions: 1-Selection of the database (WoS); 2-Definition of the search concept (podcast); 3-Development of the search equation ("podcast*") for its application in the metadata title of the publications; 4-Concretion of the search, to refine the results, selecting the categories of education (Education Educational Educational Research, Education Scientific Disciplines, Education Special and Psychology Educational). In addition, various WoS indexes were covered (SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC).

These actions allowed a report of 457 publications. In order to refine the volume of documents, various criteria were used for both inclusion (all years except 2021, where one document was found because it had not been finalised) and exclusion (repeated or poorly indexed documents = 17). This produced a final unit of analysis of 439 documents.

Similarly, the sequence of processes articulated in the PRISMA protocol for this type of study was used as a reference.

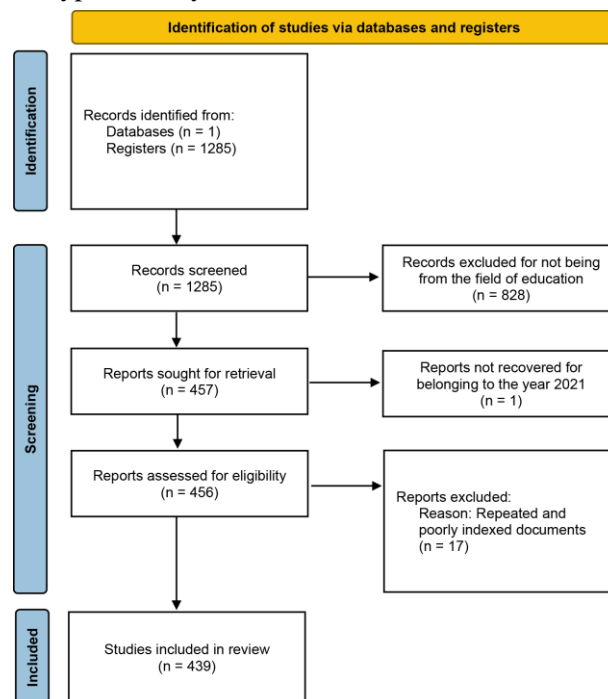


Figure 1. Flowchart according to the PRISMA declaration.

Due to the large amount of information reported and the limitations to reflect all data in a single document, several requirements have been established for a correct representation of production and performance: language ($x \geq 2$); areas of knowledge ($x \geq 16$); type of documents ($x \geq 30$); institutions ($x \geq 6$); authors ($x \geq 4$); sources of origin ($x \geq 8$); country ($x \geq 11$); and the four most cited documents.

3.3. Data Analysis

The data analysis was carried out using three applications. In order to know the authorship, country, type of document, institution, language, medium and most cited documents, two WoS tools integrated in its platform (Analyze Results, Creation Citation Report) were used. SciMAT was used to carry out the structural and dynamic longitudinal development of the extracted documents. This programme also allowed the co-word analysis to be carried out. For optimal use of the software, the considerations of experts and previous studies (Soler-Costa et al., 2021) were taken into account.

In order to develop the co-word analysis, the following processes were carried out:

- Recognition: 1035 keywords were analysed from the document volume. After a purification process, 982 keywords were identified. Then, maps of co-occurrence nodes and a normalised network of contiguous words were drawn up. Finally, using a clustering algorithm, the most prominent themes and concepts were identified.
- Reproduction: the thematic connections and strategic maps were designed. The latter are articulated in four zones. The upper right zone compiles the relevant and driving themes. The upper left zone contains the isolated and entrenched themes. The lower left zone sets out the disappearing or projected themes. The lower right zone reflects the cross-cutting or underdeveloped themes. In all these actions carried out in this process, the principles of density (internal strength of the network) and centrality (level of terminological connection) have been taken into consideration.
- Determination: the volume of documents was divided into three time periods (P1 = 2005-2010; P2 = 2011-2015; P3 = 2016-2020). For the authors' analytics, a single period (PX = 2005-2020) was configured. The strength of association between the periods is extracted through the number of common keywords or themes.
- Achievement: in order to carry out this process it is necessary to establish the output indicators together with their inclusion criteria (Table 1).

Configuration	Values
Analysis unit	Keywords authors, keywords WoS
Frequency threshold	Keywords: P1 = (2), P2 = (2), P3 = (2) Authors: PX = (2)
Network type	Co-occurrence
Co-occurrence union value threshold	Keywords: P1 = (1), P2 = (1), P3 = (1) Authors: PX = (2)
Normalization measure	Equivalence index: $e_{ij} = c_{ij}^2 / \text{Root}(c_i - c_j)$
Clustering algorithm	Maximum size: 9; Minimum size: 3
Evolutionary measure	Jaccard index
Overlapping measure	Inclusion rate

Table 1. Production indicators and inclusion criteria.

4. Results

4.1. Scientific output and production

The scientific research collected in WoS on PODCAST-EDU began in 2005. From that date to the present day, its production has been constant although irregular. There are different stages in its scientific production. In the first stage, between 2005 and 2008, both inclusive, the production is increasing, although with a reduced volume of production. During this period, the number of manuscripts produced did not exceed twenty per year. The second stage runs from 2009 to 2011. This is the period with the highest volume of production. During these three years, scientific production remained constant, with a volume of approximately 50 manuscripts per year. The third stage runs from 2012 to 2020. During these years, the output has experienced many ups and downs, with several peaks and troughs. The highest peaks of production in this period occurred in the years 2013, 2016 and 2020. The lowest peaks of production in this period occurred in 2015 and 2018. The highest volume of all scientific output was generated in 2009 (Figure 2).

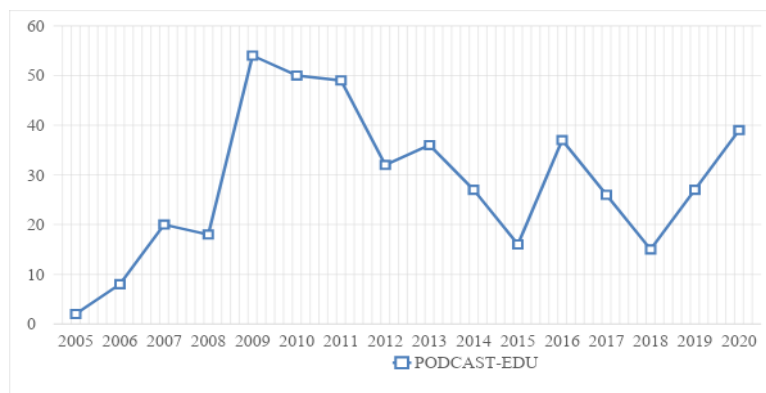


Figure 2. Evolution of scientific production

The language selected by the scientific community to present the results of their manuscripts is English, which accounts for the majority of scientific productions. The other languages do not have a significant presence in WoS (table 2).

Languages	n
English	418
Spanish	21
Portuguese	7
French	5

Table 2. Scientific language used

The main area of knowledge in PODCAST-EDU is Education Educational Research, and its production is very high compared to the rest of the areas of knowledge. In addition to the field of education, it can be seen that the areas of computer science, health and linguistics carry out research in this line of research (table 3).

Denomination	n
Education Educational Research	375
Education Scientific Disciplines	97
Computer Science Interdisciplinary Applications	33
Healthcare Science Services	28
Linguistics	18

Table 3. Areas of knowledge

The main type of manuscript used by the scientific community to present their research is research articles. Other documents have a much lower volume than research articles (table 4).

Denomination	n
Article	296
Proceedings Paper	103
Book Chapter	36
Editorial material	32

Table 4. Type of document

In PODCAST-EDU's field of study there is no institution of reference, as far as the production volume is concerned. In this case, the number of productions from the principal's institutions show similar stocks. The first two institutions are the State University System of Florida and University of Leicester, with 9 productions each (table 5).

Denomination	n
State University System of Florida	9
University of Leicester	9
University of Virginia	8
Islamic Azad University	7
Pennsylvania Commonwealth System of Higher Education (PCSHE)	7

Table 5. Institutions

There are two principal authors in scientific production different from the institutions: Abdous, M. and Facer, B.R. Both of them have a production volume of 14 manuscripts each. The rest present lower stocks than these two authors (table 6).

Authors	n
Abdous, M.	14
Facer, B.R	14
Kennedy, M.J.	8
Lee, M.J.W.	7
Chan, A.	5
Thomas, C.N.	5

Table 6. Most prolific authors

In the PODCAST-EDU field exists a variety related to the origin. In the first place, if the volume of production is taken into account, there are scientific magazines and conference proceedings books. In this case, the scientific magazines' head is Computer & Education, while the principal conference proceeding book is INTED Proceedings (table 7).

Source titles	n
Computers & Education	18
British Journal of Educational Technology	14
INTED Proceedings	14
Edulearn Proceedings	13
Medical education	9
Medical Teacher	9

Table 7. Source of origin

The country with the most volume production related to PODCAST-EDU is the United States. Its production is superior to the rest of the countries (table 8).

Countries	n
USA	152
England	67
Australia	35
Canada	26
Spain	26

Table 8. Country

The most cited manuscripts in the investigation line of PODCAST-EDU is Evans' manuscript (2008) with 300 quotes. In this manuscript is analyzed the m-learning effectiveness related to the podcasting in students of the undergraduates in higher education. The next manuscript most quoted is Cople's (2007) with more than 200 quotes. This research analyzes the effectiveness of a video podcast production method by using basic software. The next more quoted documents are McGarr (2009) and McKinnery, Dyck and Lubert (2009), with 151 and 133 quotes (table 9).

Reference	Citations
Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in higher education. <i>Computers & Education</i> , 50(2), 491-498. doi: 10.1016/j.compedu.2007.09.016	355
Copley, J. (2007). Audio and video podcasts of lectures for campus-based students: production and evaluation of student use. <i>Innovations in Education and Teaching International</i> , 44(4), 387-399. doi: 10.1080/14703290701602805	208
McGarr, O. (2009). A review of podcasting in higher education: Its influence on the traditional lecture. <i>Australasian Journal of Educational Technology</i> , 25(3), 309-321. doi: 10.14742/ajet.1136	151
McKinney, D., Dyck, J.L., y Lubert, E.S. (2009). iTunes University and the classroom: Can podcasts replace Professors? <i>Computer & Education</i> , 52(3), 617-623. doi: 10.1016/j.compedu.2008.11.004	133

Table 9. Most quoted articles.

4.2. Structural and thematic develop

The evolution in the keywords in a field of study allows us to see whether there is an established line of research on a given topic. Or if on the contrary there is a no defined research base and new proposals are being created. Before analysing the Figure 3, we have to take into account several elements in order to properly interpret the information. The circles represent the number of keywords in a given period. The upward lines show the keywords that are dropping out of one period in relation to the next. The ascending line indicate new keywords added in a given time period. The horizontal lines indicate the percentage of keywords that match between contiguous periods. In this particular case, the field of study of PODCAST-EDU is at the limit. There is a 30% overlap between the first period (2005-

2010) and the second period (2011-2015), and between the second period (2011-2015 and the third period (2016-2020). This means that there is a line of research that has been established over time, but is not consolidated. New lines of research can be investigated.

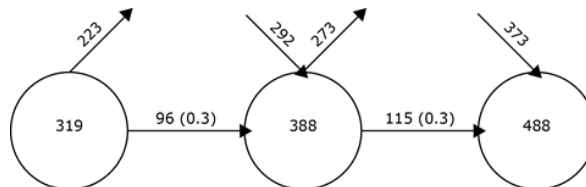


Figure 3. Keywords' sequence between consecutive intervals.

The following figures show different types of information. The information is relevant but also is complementary to the rest of the data that conform the figure itself. These figures represent pre-established time periods. three elements must be taken into account. First element, interval diagrams. These are located in the top left of the figure. The diagram shows the themes derived from the applied co-word analysis. According to their location, they will be more relevant in this specific period. In order to establish the diagram's position, we have to take into account the Callon's index. This index is classified by density and centrality. Density is based on the strength of the connection between internal links. Centrality is based on the strength of the connection between external links. The second element is the performance analysis. This is located at the top right of the figure. The performance analysis shows information on various bibliometric indicators of the topics resulting from the co-word analysis. The third and last element is the cluster' network. These elements are represented in the rest of the figure, below the interval diagrams and the performance analysis. These cluster networks show the interrelation between a topic and other topics or keywords. Cluster' networks are used to find out lines of research on a specific theme.

Starting with the first period (2005-2010), 'podcasting' is the subject with the highest bibliometric value, with an h-index of 11. If its position in the interval diagram is analysed, its position indicates that the period was considered a basic and transversal issue. So what were the themes in this period? In this case, are 'multimedia/hipermedia systems' that relates with 'media-in-education', 'form', 'distance-education-and-telelearning', 'teaching/learning-strategies', 'university', 'postsecondary-education', self-efficacy' and 'pedagogical-issues'; and 'education', in relation with 'm-learning', 'learning', 'internet', 'podcast', 'wikis', 'e-learning', 'weblog' and 'teaching'. In this period the relevance in the field of study of PODCAST-EDU is considered to focus on pedagogical methods related to distance learning, teaching and learning strategies for the application of podcasts in the

pedagogical act and in several educational stages, especially in higher education and secondary education (Figure 4).

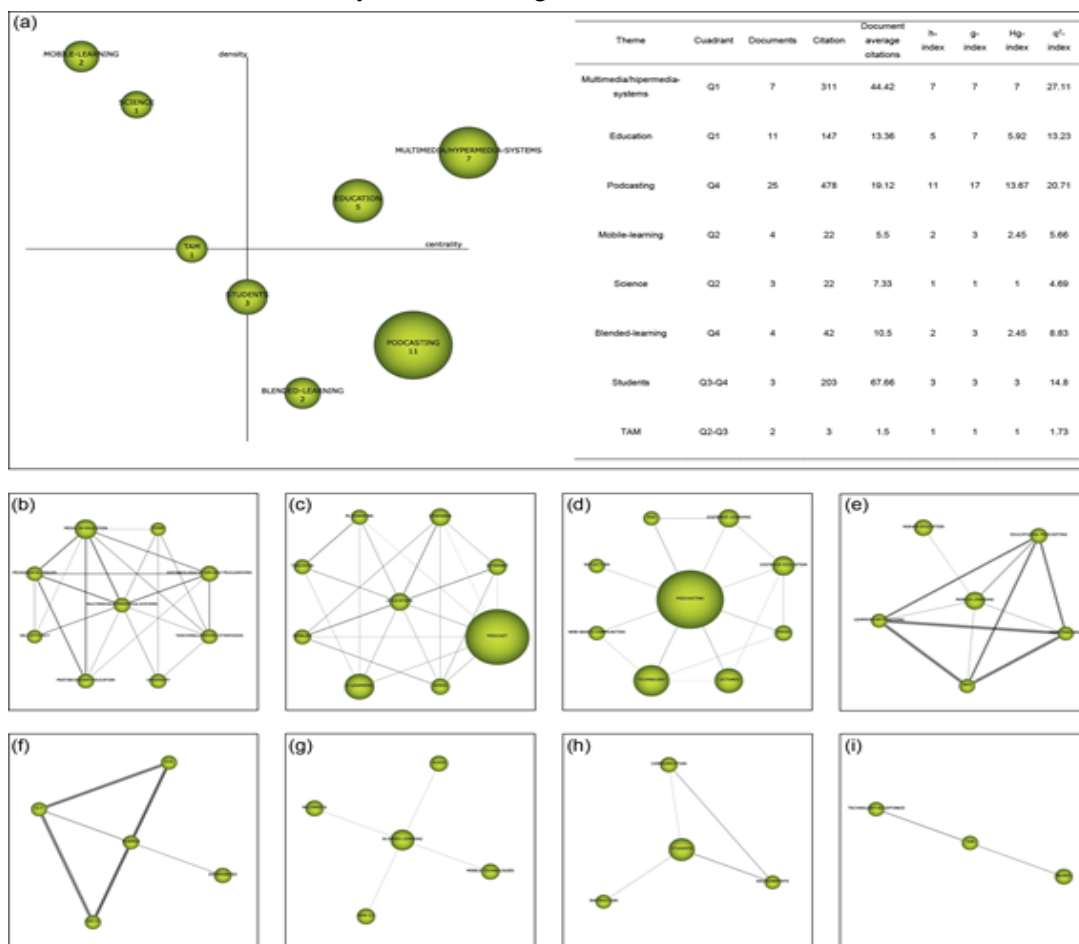


Figure 4. (a) Strategic diagram (h-index) and performance from 2005 to 2010. Themes are shown as follows: (b) “multimedia/hypermedia-systems”; (c) “education”; (d) “podcasting”; (e) “mobile-learning”; (f) “science”; (g) “blended-learning”; (h) “students”; (i) “TAM”.

In the second period (2011-2015) the subject with the highest bibliometric value is ‘podcasting’, with an index h of 7. In this case, this theme is very close to themes such as ‘podcast’ and ‘university’. A temporal continuity can be observed if the performance analysis is taken into account. Nevertheless, as in the previous period, this theme is not considered a principal theme in this period. This privilege belong to ‘video-podcast’ themes which is related to “geography”, “flexible-learning-spaces”, “cognitive-load”, “ICT”, “support”, “streaming-video”, “social-constructivism” and “implementation”; “university”, that is related to “instructional-tool”, “classroom”, “audio”, “students”, “portability”, “mobile-

assisted-learning”, “lifelong-learning” y “itunes-u”; “perceptions”, that is related to “internet”, “college”, “beliefs”, “blogs”, “lectures”, “performance”, “needs” and “medical-education”; and “knowledge”, related with “multimedia”, “education”, “assessment”, “ipods”, “technology”, “vodcasts”, “pedagogy” and “online-learning”. This period is notable because the most relevant lines of research focus on the educational media used for the presentation of podcasts. The use of video associated with podcasts, in students’ perceptions in order to use the podcast as a way to develop learning and pedagogical methods applied in the teaching and learning processes (Figure 5).

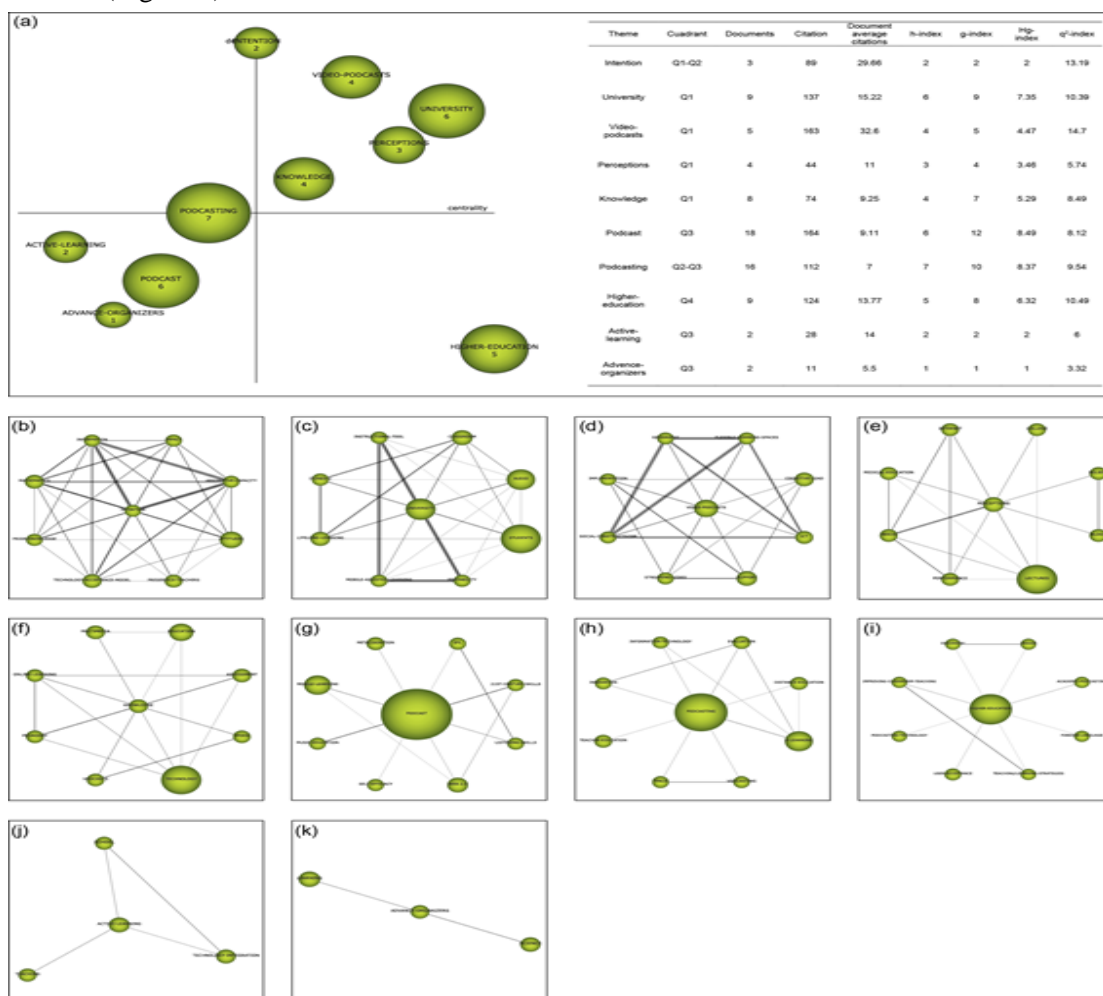


Figure 5. (a) Strategic diagram (h-index) and performance from 2011 to 2015. Themes are shown as follows: (b) “intention”; (c) “university”; (d) “video-podcasts”; (e) “perceptions”; (f) “knowledge”; (g) “podcast”; (h) “podcasting”; (i) “higher-education”; (j) “active-learning”; (k) “advance-organizers”

In the third and final period (2016-2020), “podcasting” ceases to be the theme with the best bibliometric value and assigns this position to two themes. This is particularly the case for “e-learning” and “education”. In this period, “e-learning” is also one of the themes considered as a driving force and the other ones are “experience”, “science” and “multimedia”. Undertaking a deep research on each of these, the theme “multimedia” seems to be related to “preservice-teaching-knowledge”, “efficacy”, “candidate-knowledge”, “intervention”; “literacy”, “technology-perspectives”, “teacher-education” and “special-education”; “experiences” can be linked to “media”, “learning-strategies”, “adult-learning”, “video”, “online”, “surgery”, “social-media” and “media-in-education”; “science” is related to “implementation”, “design”, “adult-education”, “adolescent”, “vocabulary”, “perspective”, “knowledge” and “instruction”; and “e-learning” can be linked to “medical-students”, “medical-education”, “clerkship”, “lectures”, “undergraduate”, “residents”, “performance” and “mobile-learning”. This period stands out for the fact that the research focuses mainly on the inclusion of the podcast in the teaching and learning processes, on the different pedagogical strategies for its right implementation, its inclusion in the medical field and in the training of adults, and of students with learning difficulties. In addition, the themes “impact”, “radio” and “podcasting” should be taken into account due to their position in the diagram. In this case, they are considered as unknown themes, because they may disappear from the research lines or they may be the next driving themes (Figure 6).

The table 10 is deduced from the data collected from the tables 4, 5 and 6. In this table, the themes are shown according to its location in the diagram in the different periods of time established. Based on the data obtained, we can say that the theme “podcasting” appears in every period. This shows that the area of study PODCAST-EDU presents a conceptual line. This does not mean that it is the most relevant theme of the set of research. Examples include the location of this theme in the different diagrams determined. In none of the periods has it been located as a driving theme.

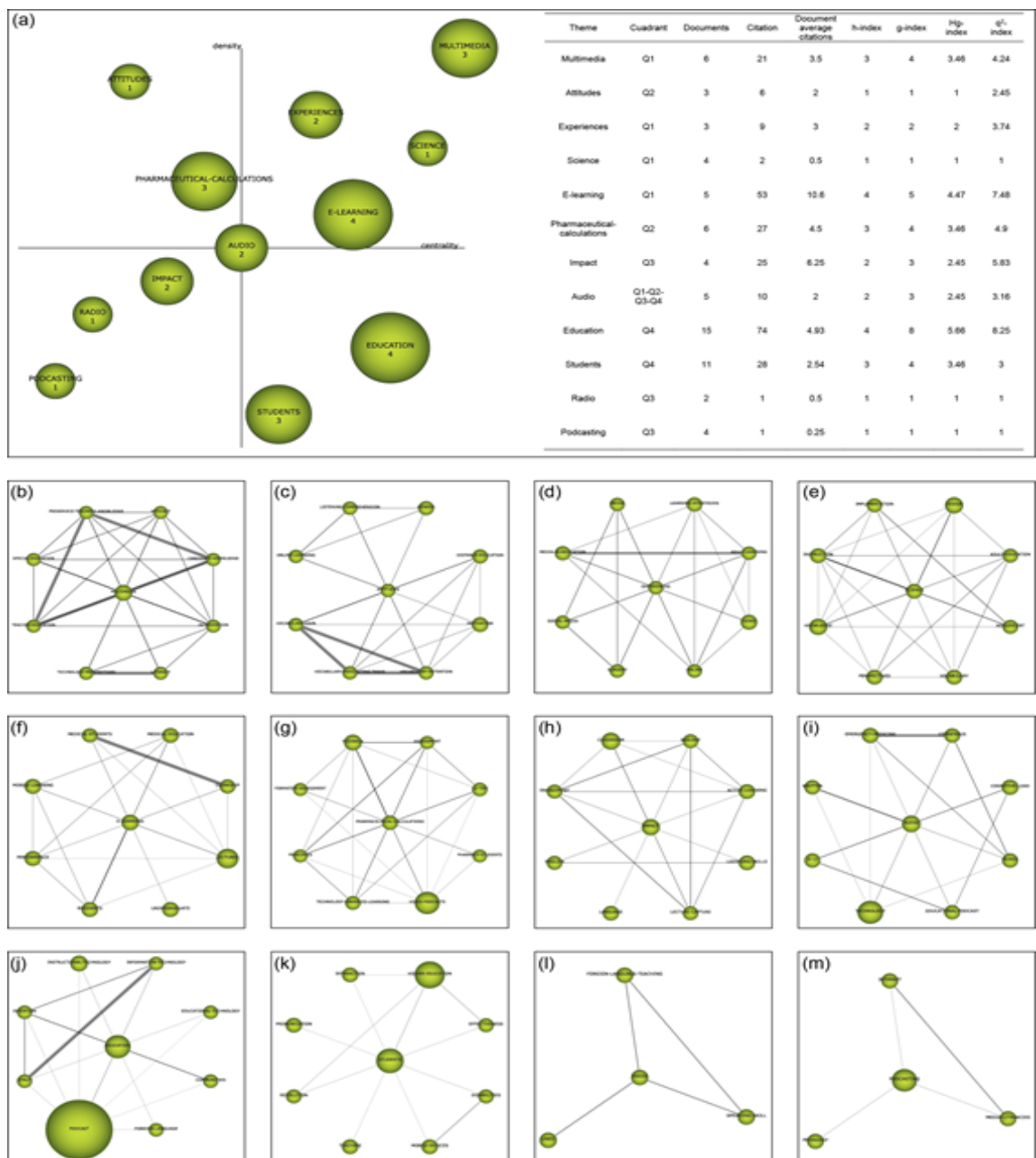


Figure 6. (a) Strategic diagram (h-index) and performance from 2016 to 2020. Themes are shown as follows: (b) “multimedia”; (c) “attitudes”; (d) “experiences”; (e) “science”; (f) “e-learning”; (g) “pharmaceutical-calculations”; (h) “impact”; (i) “audio”; (j) “education”; (k) “students”; (l) “radio”; (m) “podcasting”.

	P1(2006-2015)	P2(2016-2018)	P3(2019-2020)
Multimedia/hipermedia-systems	Q1(40.52/59.59)		
Education	Q1(23.23/0.62)		Q4(84.98/24.41)
Podcasting	Q4(38.8/9.14)	Q2- Q3(52.43/13.31)	Q3(11.57/9.66)
Mobile-learning	Q2(4.7/93.61)		
Science	Q2(0.25/78.33)		Q1(118.51/42.11)
Blended-learning	Q4(22.87/2.5)		
Students	Q3- Q4(13.72/12.04)		Q4(72.17/6.39)
TAM	Q2- Q3(8.04/13.89)		
Intention		Q1- Q2(67.85/125.2)	
University		Q1(102.23/75.79)	
Video-podcasts		Q1(74.31/91.85)	
Perceptions		Q1(84.24/31.43)	
Knowledge		Q1(68.19/25.04)	
Podcast		Q3(32.68/12.33)	
Higher-education		Q4(109.47/9.04)	
Active-learning		Q3(10.9/12.5)	
Advances-organizers		Q3(30.46/9.72)	
Multimedia			Q1(132.55/112.96)
Attitudes			Q2(39.8/69/44)
Experiences			Q1(75.64/48.92)
E-learning			Q1(80.2/32.82)
Pharmaceutical-calculations			Q2(64.4/34.66)
Impact			Q3(63.02/27.28)
Audio			Q1-Q2-Q3- Q4(70.59/31.14)
Radio			Q3(18.94/25)

Note: (X/Y), X=centrality; Y=density

Table 10. Principal research themes related to PODCAST-EDU from 2005 to 2020

The theme evolution of an area of study shows the link between the different themes resulting from the co-word analysis. The Jaccard index must be taken into account to establish this relation. The results shown in figure 7 show a variety of information. On the one hand, it provides the relationship between themes from attached periods. This relationship may be one of two types: the conceptual relationship, which is represented by a constant line and indicates that there is a common theme between two attached temporary themes, and non-conceptual relationship, which states that there is an overlapping keyword between two attached temporary themes. The width of

the lines, both continuous and discontinuous, shows the number of matching themes or keywords. The greater the width, the greater the number of matches. According to these aspects, it can be said that in the field of study of PODCAST-EDU there are several lines of research which have been established over time, but none of them is more relevant than the rest. Thus, in this case, it can be seen the research lines of "podcasting-podcasting-podcasting-e_learning", "podcasting-podcasting-podcasting", "science-advance_organizers-science", "mobile-learning-higher_education-students", among others. The data also indicate that there are more conceptual than non-conceptual links, which shows that there is a relationship between the several lines of research established on PODCAST-EDU.

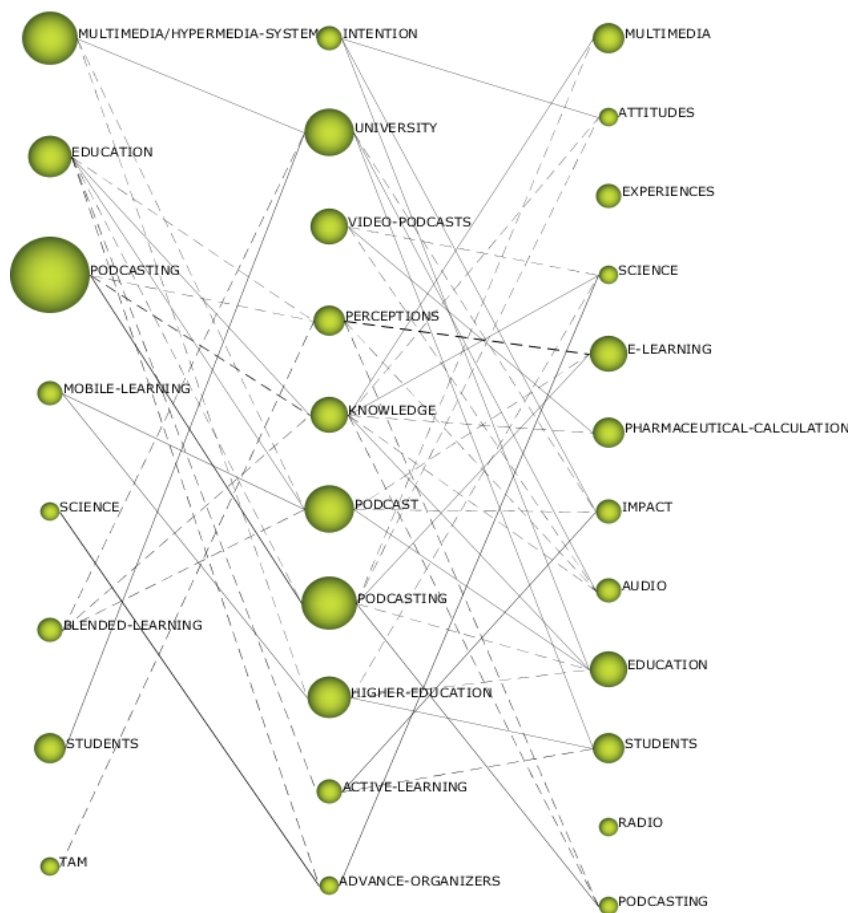


Figure 7. Theme progress by h-index

4.3. Authors with the highest index of relevance

Among the various authors who carry out research on PODCAST-EDU, Armstrong, G.R. stands out as a leading author in this field of study. Moreover, Kennedy, M.J. should also be borne in mind, as he is not just the one with the highest bibliometric indicator, but also ranks as an anonymous author. This means that he can be a reference in this field of study in the coming years (figure 8).

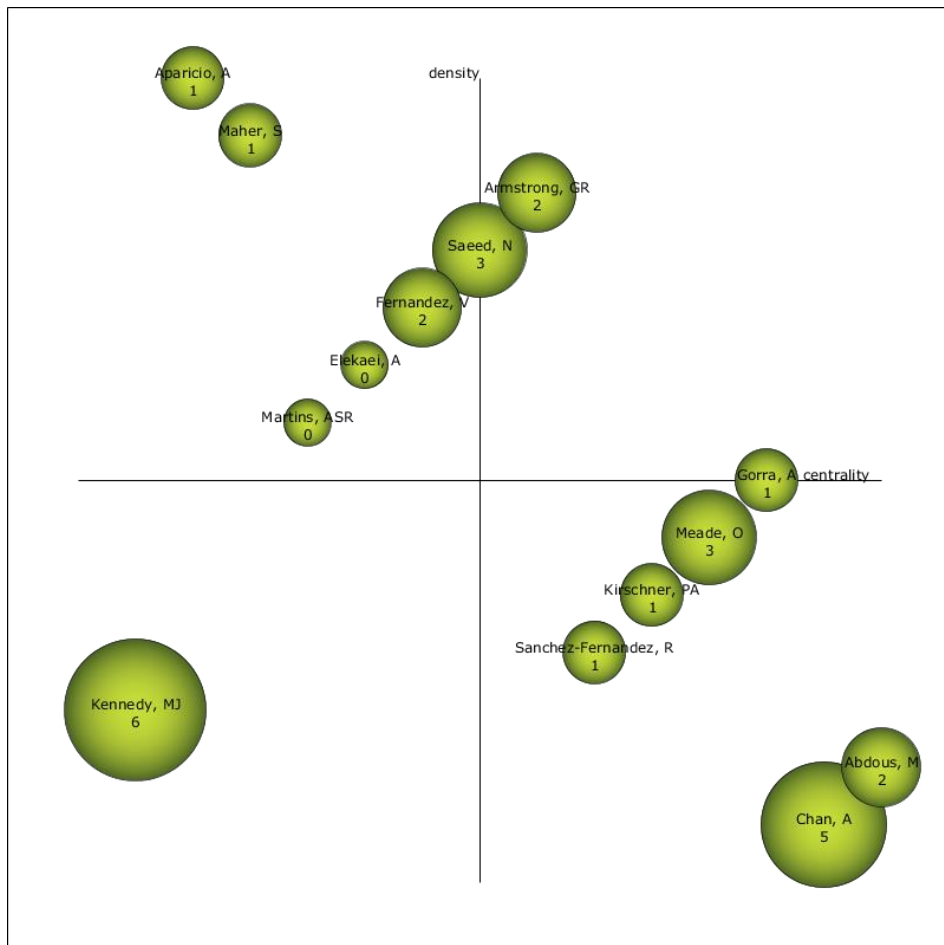


Figure 8. Strategic diagram of authors of all scientific production.

5. Discussion

Research on PODCAST-EDU in the WoS database began in 2005. In this case, it can be said that this line of research is relatively recent in the scientific field. Furthermore, if we analyse the studies on podcasts over the same period, we can see that research focused on the educational sphere

accounts for 35.56% of the total number. That is, of all the research on podcasts (n=1285), a total of 457 are education-oriented. From its beginnings until 2020, its progress has been very irregular, as three periods have been identified – the first period, from 2005 to 2008, with a relatively low but steadily increasing production volume; the second period, with the highest volume of production in its existence, from 2009 to 2011; and the third period with ups and downs in scientific production. This evolution points that the theme shows relevance depending on the time and the year. Nowadays, the media and various music playback applications – such as Spotify – are constantly including this resource, both from an informative and educational perspective. This suggests that this field of research is likely to become highly relevant to the scientific community. Analysing the academic output of the scientific production on PODCAST-EDU, it can be seen that the language selected by the scientific community to present their studies is English. This is a common fact in WoS analyses, because this database is mainly based on research carried out in the English-speaking world. In addition, it should be noted that Journal Citation Reports (JCR) is fed by this database, so the scientific community is aware that in order to reach as many researchers as possible, they must make use of English.

The knowledge area that collects studies on PODCAST-EDU is Education Educational Research followed by Education Scientific Disciplines. This is normal due to the fact that this study is focused on the educational domain of the podcast. However, other areas of expertise, such as computing, health and linguistics, can be seen. This allows us to discern that these areas are aware of the use of podcasts in their training processes.

Research articles are the main type of manuscript used by the scientific community to present their scientific results. This shows that this field of study is becoming established in the scientific community. This fact is contrasted in other research (Carmona-Serrano et al., 2021), given that when a field of study is generating new lines of research, it tends to present a high volume of proceedings papers. Among the journals with the highest volume of output are *Computer & Education*, and the *British Journal of Educational Technology*. Both journals are ranked in the top quartiles of both JCR and Scimago Journal & Country Rank (SJR) databases, being a reference in the field of social sciences. INTED Proceedings is one of the most important conferences for PODCAST-EDU research.

There is no institution that stands out above the rest. Moreover, the top posts are not occupied by institutions from the same country, so there is diversity. The institutions with the highest production volumes are the State University System of Florida and the University of Leicester. This states the wide dissemination and scientific interest it creates at an international level. It is true that the United States is the largest producer, but there are a number of other countries that provide knowledge and data through their research.

Analysing the authors with the highest volume of production, two authors can be observed: Abdous, M. and Facer, B.R. Despite their large production volume, they are not considered to be the most relevant ones. This achievement belongs to Armstrong G.R., who is considered to be the main author in this field of study. Furthermore, looking ahead to the future, Kennedy M.J., who may be a referent in the coming years, should be kept in mind. Additionally, this author has the highest h-index. In any event, all these authors are a reference and a guarantee for researchers willing to analyse and study the use of PODCAST-EDU.

Among the most cited works, Evans (2008) is the most noteworthy, showing a relatively large citation volume by comparison with others studies developed in the field of education (Moreno-Guerrero et al., 2021). That work analyses the effectiveness of podcasting in the formation of undergraduates. It strengthens the data obtained in this study, in which one of the main interests in the scientific community on PODCAST-EDU is the effectiveness of using podcasts in the teaching-learning process. Other studies, such as Copley (2007), McGarr (2009) and McKinney et al. (2009) have a medium-large citation volume. Consequently, they should be considered by the scientific community when developing and analysing studies about PODCAST-EDU.

The evolution of keywords shows how studies on PODCAST-EDU on the threshold between establishing lines of research and appearance of new ones. This indicates that, in forthcoming years, new research in new areas will be generated while still studying aspect already relevant to the scientific community.

The three periods analysed have revealed that there were diverse trends, though following a guiding thread, as in the case of podcasting. This subject has been the one with the highest bibliometric indicator, in the first period (2005-2001) and in the second ones (2011-2015). Nevertheless, it has not been the most relevant in any of the three periods. In the first period (2005-2010), the analysis of pedagogical methods focusing on distance learning, the variety of teaching and learning strategies used for the development and implementation of didactic processes and the educational stages of secondary education or university have been the main focus of the scientific community, particularly in terms of relevance. In the second period (2001-2015), this tendency changed slightly, due to the relevance of researches of PODCAST-EDU were more oriented towards the technological resources used to introduce and show podcasts to students and students' perceptions about the use of these resources in teaching and learning processes. In this period, the analysis of pedagogical methods used in didactic procedures continued. In the third period (2016-2020), the pedagogical methods used for the implementation of podcasts in educational processes continue to be important, but also, the use of PODCAST-EDU in the medical FIELD and in treatment of students with learning difficulties begins to gain relevance. In other words,

the relevance in the field of PODCAST research has evolved from the importance and identification of the pedagogical methods used for the application and implementation of teaching-learning processes to the interest and implications that the use of podcasts generates in students.

Among the diverse lines that could be observed throughout the various periods in PODCAST-EDU studies, it is not possible to determine or indicate that there is one line of research that highlights above the rest. There are several current lines of research, including “podcasting-podcasting-e_learning”, “podcasting-podcasting-podcasting”, “science-advance_organizers-science”, “mobile-learning-higher_education-students” ...

This confirms what was already indicated previously. Therefore, it is a field of study that has established lines but it is settling in the scientific community. It should also note that there is a relation between the diverse lines of researches established, which means that there is a common thread in this field of study.

6. Conclusion

The conclusion is that research on PODCAST-EDU has been relevant and interesting for the scientific community relatively recently, from 2005 to the present, although its evolution and interest has been fluctuating abruptly. The main area of interest is the pedagogical methods used for its application in the teaching and learning processes, although the scientific community continues to be interested in the technological resources used for its development and use in the classroom, as well as in the implications and benefits that this resource generates for students. In recent years, its use with students with difficulties is gaining importance and relevance, as well as gaining relevance in medical formation.

The limitations of this study lie in several aspects. Firstly, only the WoS database has been analysed, so the results obtained are only based on this database. Additionally, database cleaning is a major challenge for researchers, who must analyse the documents collected from the database one by one. On some occasions, duplication is possible in the database or documents on other subjects are included. For this reason, a meticulous cleaning of the database is necessary in order to ensure that the analysis is successful. Finally, other aspects to keep in mind in the limitations are the values applied to the SciMAT statistical programme due to variation in the data may lead to different results. For these reasons, the data provided in this study should be taken as a reference, but with caution. Future lines of research include a similar study in other databases, such as Scopus and Google Scholar.

6.1. Study implications

This study generates a number of implications, both theoretical and practical, that need to be considered. Some of the theoretical implications include the fact that this study offers results that expand the field of knowledge. There are no similar studies in the internationally relevant PODCAST-EDU database. Furthermore, this study provides a more detailed knowledge of authors, countries, journals, international conferences, most cited papers, etc., which facilitates access to the most relevant information for any scientist interested in this field of study. This research also allows us to identify the most relevant lines of research for the scientific community and the current trends in PODCAST-EDU. This fact could help researchers' chances of success in publishing their scientific results in the most relevant international journals, as well as focusing their studies on lines of research of relevance to the scientific community.

In terms of practical implications, this study offers an overview of the needs of the diverse educational administrations in the field of PODCAST-EDU studies. The results obtained revealed the need for pedagogical formation by teachers in the application and use of podcasts in the educational field. It is evident in the PODCAST-EDU studies, as they focus their research on learning processes. Moreover, this research shows the existence of studies that focus on the design and presentation of podcasts in education. Finally, this study shows research that can be a pedagogical reference for other teachers who want to apply podcasting in teaching-learning processes. Ultimately, this research offers the real necessities of teacher formation, as well as promoting or offering references on real and viable pedagogical models in order to include podcasts in the pedagogical process.

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Technological Mediation from Didactic Principles in Virtual Graduate Students: A Case Study in Mexico

María Guadalupe Veytia Bucheli ^a, & José Gómez Galán ^b



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Abstract: Information and Communication Technologies (ICT) have increased considerably in different areas of human life, and education is no exception. In particular, educational offerings have diversified, mainly at the levels of Higher Education, in virtual and distance modalities, allowing people to organize their time for work, study, and family and continue with their education. The objective of this study was to identify the perception of virtual graduate students mediated by technology from the didactic principles in their teaching-learning process. A quantitative methodology was used, an exploratory, descriptive cross-sectional study was carried out using a non-experimental design, working with the survey method, and a questionnaire was applied to 281 virtual graduate students. Among the findings, a positive perception of the use of didactic principles in the teaching-learning process was identified based on the development of individualization, activity, creativity, autonomy, play, and motivation. The results recommend enriching the processes of socialization and interaction among group mates since most of the activities are carried out individually.

Key-words: didactic principles; postgraduate; mediation; technology; virtuality.

1. Introduction

Today's society is characterized by the continuous and accelerated changes that occur in different contexts; what is new today ceases to be new very quickly (González & Esteban, 2013; Díaz-Barriga, 2013; Lindgren,

^a Autonomous University of Hidalgo State (Mexico). Correspondence: María Guadalupe Veytia Bucheli, Universidad Autónoma del Estado de Hidalgo (UAEH), Carr. Pachuca - Actopan Km. 4.5, Campo de Tiro, 42039 Pachuca de Soto, Hgo., Mexico, dra.veytiabucheli@gmail.com  ORCID 0000-0002-1395-1644. ^b Ana G. Méndez University (Puerto Rico-United States), Cupey Campus, & University of Extremadura (Spain)  ORCID 0000-0002-9417-8824.

2021). Information and Communication Technologies (ICT) and digitizing all information and communications have greatly influenced any area of human life (Mañero-Contreras, 2016; Gómez Galán, 2020; Burrell & Fourcade, 2021). They have modified the way of relating and the communicative processes both synchronously and asynchronously; it has blurred the space-time barriers (Sánchez & Vera, 2016, Ajabshir, 2019; Ordaz & González, 2019), which generates a dynamic that demands new ways of living, of acting, that demand better organization, and training not only for life, but throughout life (Alvarado, 2014; Voitovska & Tolochko, 2019; Eynon & Malmberg, 2021).

The massification of means of communication from the use of the Internet, digitalization processes, and the management of different technological resources and web applications (chat, email, online forums, wikis, social networks, blogs) are evident in other areas. Education is no exception (González & Margallo, 2013), which has allowed working from new formats, expanded the times and spaces, and improved teaching-learning models in both formal, non-formal, and informal areas (Nygren et al., 2019; López-Meneses, 2020).

However, it is essential to reflect that the use of ICT alone does not guarantee progress toward learning; it is necessary to design changes that allow the transition from an Information Society to a Knowledge Society (González & Margallo, 2013, Puerta et al., 2020) where conceptual knowledge (knowledge, theories, and laws), procedural knowledge (skills and abilities), as well as attitudinal knowledge (interests, motives, and modes of action) are mobilized. The competencies of Higher Education teachers and students in digital technologies are fundamental today (Concepción et al., 2019; Veytia et al., 2019; Gómez-Galán et al., 2021; Jorge-Vázquez et al., 2021).

In general, using technological tools as alternatives to design pedagogical strategies (Rivero, Gómez & Abrego, 2013) that favor the construction of conceptual, procedural, and attitudinal knowledge in students both individually and collaboratively (Durán-Medina & Durán-Valero, 2018) and in which the subject develops the ability, for example, to identify information, use it in specific contexts, interact with that information, is today one of the challenges of the university. In addition, that allows teachers and students to increase the alternatives to face the challenges presented to them in the different spaces in which they develop and face multiple problems.

Specifically, the incorporation of ICT in educational contexts has increased considerably (Díaz-Barriga, 2013), and Virtual Learning Environments and Environments offer the opportunity to strengthen the development of cognitive operations such as interpreting, questioning, reflecting, debating, discussing ideas and points of view (De Agostini, 2013). In addition to the fact that the use of ICT strengthens learning to learn

permanently and autonomously (Infante, 2014; Boykov & Goceva, 2019) by generating necessary aids in students such as: 1) communicating and clarifying teaching activities, 2) planning teaching-learning processes, 3) providing better and more current contents, 4) having more solid support for the construction of knowledge, 5) working a more horizontal communication between teachers and students (Monereo, 2005).

Higher Education faces several challenges when using ICT in the teaching-learning process since it is necessary to rethink education in such a way that it links the academic field with the labor field, as well as to respond to the constant challenges identified in the society of the 21st century (Romero et al., 2014). The transition from a teaching society to a learning society (Arroyave, Arias & Gutiérrez, 2011) allows building intersubjective relationships, knowledge, skills, abilities, and skills for the use of technological tools as a means for the development of thinking skills, in addition to the fact that an Information Society that transitions to knowledge and learning continuous demand learning throughout life (Juca, 2016; English & Mayo, 2019).

2. Scientific Literature Review

The use of Information and Communication Technologies in Higher Education has allowed strengthening different modalities (García & Pineda, 2011; Fernández, 2016) that are sometimes handled as synonyms in various texts, however, it is essential to specify the features that characterize each of them, Distance Education arises before the use of ICT, the sending of materials by correspondence or physical delivery in educational institutions, where students have the opportunity to learn at their own pace to meet the established objectives, Virtual Education is mainly based on the binomial technology/education (Alvarado, 2014), students use ICT to download their materials and upload their activities and tasks, however, it is not necessary to coincide in a specific time with their classmates and teachers, finally Online Education is based on the use of different technological tools for the development of activities and tasks, in addition to coinciding in a specific schedule with their teachers and classmates for the completion of their classes (Saltmarsh & Stherland-Smith, 2010).

One of the characteristics of Distance, Virtual, and Online Education is the realization of asynchronous work, which provides a flexible space (Peñalosa, 2010), placing both students and teachers in an active role since it allows the completion of activities and tasks at any time and from any device with internet access (Kurtz & Sponder, 2010; Morado & Ocampo 2019, Perazzo, 2000), it generates spaces for interaction and research among the learning community (Flechas & Juárez, 2017), it offers access opportunities to groups that find it challenging to attend educational institutions in person,

either because of distance or because they divide their time between study and work (Nieto, 2012), it crosses any barriers (Arroyave, Arias & Gutiérrez, 2011) which allows enrollment in universities located in other parts of the world (Goldín, Kriscautzky & Perelman, 2013).

When analyzing Higher Education in its Distance, Virtual and Online modalities from a critical point of view, it is pertinent to reflect on the didactic design of the courses, as well as the needs that arise from the use of various technological tools, and thus consider the didactic principles that are present in the teaching-learning process based on instructional design (Fernández, 2016; Savard, Bourdeau & Paquette, 2020; Kale, Roy & Yuan, 2020). Yuan, 2020), since sometimes there is a more significant concern for the use of the technological medium and the didactic-pedagogical foundation is neglected, or proposals are presented with a weak approach to work them (Díaz-Barriga, 2013), where sometimes the blackboard is replaced by the digital whiteboard. However, the traditional teaching-learning process based on a vertical perspective in which the teacher transmits knowledge mainly from an expository methodology continues; it is necessary to move to a horizontal paradigm where a learning community is configured where each of its members has something to learn and something to contribute, so it cannot be considered that the increase in technology is necessarily proportional to the increase in educational quality (Escueta et al., 2020).

Rather than seeing technologies as a resource that supports the didactic part, they should be considered as one that strengthens the development of capabilities, as well as the versatility for the construction of knowledge (Vargas & Jiménez, 2013; Bouton, Tal & Asterhan, 2021); breaking with the paradigms that limit the ways of teaching and learning and considering the development of skills to coexist in virtual environments (Asterhan, 2021) fails with the paradigms that specify the teaching and learning methods and feels the development of skills to coexist in virtual environments. Nevertheless, it is a complex process (Flechas & Juárez, 2017) to generate a change of dynamics between the didactic triangle formed by teachers, students, and knowledge mediated by technology.

Regarding the trends in the incorporation of Information and Communication Technologies in education, Díaz Barriga (2013) mentions three main ones: (a) those that consider enabling teachers to use different technological programs; (b) those that are oriented to develop contents that can be presented online through different digital materials; and (c) those that seek the incorporation of ICT in the classroom from a perspective in which didactic principles are taken into account.

García-Aretio (2016) recovers a series of didactic principles that have been used in face-to-face spaces and that are currently still valid in the teaching-learning processes that are carried out from technological mediation, which are listed below:

Individualization: Each human being is unique and unrepeatable; it is, therefore, essential to consider the individual characteristics of the subjects, the processes of assimilation, accommodation, balance, imbalance, and rebalance (Piaget, 2001), the experiences, personal characteristics, aptitudes, attitudes, interests, scope and limitations to be adapted to the teaching-learning process. The importance of individualized attention respecting each subject's learning styles and pace (Peñalosa, 2010). In ICT-mediated education processes, students can choose the didactic materials that are most interesting to them and generate their own Personal Learning Environments.

Socialization and interaction: Man is a social being and requires others to relate, to work in a community, to socialize, to generate spaces where collaboration among the members of a group is strengthened, as well as peer education. In this sense, the importance of the context acquires a fundamental relevance since it allows the transition from a zone of actual development to an area of proximal development (Vygotsky, 1996). In a learning environment mediated by ICTs, the processes of interaction, communication, and dynamism with the presentation of multimedia resources are favored (Rodríguez, Iglesias & Juanes, 2018; Peñalosa, 2010), the conformation of networks (Perazzo, 2000), a horizontal collaboration between teachers and students (Díaz-Barriga, 2013).

Activity: Activity is a propositional, contextual, contingent phenomenon (Leontiev, 1983) that the learner carries out; it is the functional relationship of the subject with the object where the activity is concretized through actions, operations, tasks, and motives. In this sense, education based on the transmission of knowledge is rejected; the realization of a cognitive effort beyond manual or psychomotor activity is sought. The protagonism of the subject in Virtual Learning Environments increases (Gros, 2011) and constitutes an indispensable element from which teaching is organized, and student learning acquires meaning and significance through active participation in forums (asynchronous communication), videoconferences (synchronous communication), as well as collaborative activities such as Wikis.

Autonomy and independence: The ability allows students to regulate their learning and become aware of their own cognitive and socio-affective. It constitutes the awareness in which the individual performs cognitive and metacognitive processes, i.e., they reflect on their thinking, which allows them to make the best decisions (Crispín, Caudillo, Doria & Esquivel, 2011). As a student progresses through the educational levels, they need to acquire advanced degrees of autonomy and take responsibility for their learning, which with the online, virtual, or distance learning modality, develops more rapidly since it requires organizing their time, achieving the established goals, as well as carrying out a series of activities independently.

Intuition: The resources of real or printed, audiovisual, and computerized character are of practical help for the teaching-learning process since they potentiate the students' learning, mainly used in the levels of Basic Education. However, it is also necessary to consider them in Middle and Higher Education. With the use of different technological tools, it is possible to use diverse materials that allow the recovery of text, images, and sound, but also the use of interactive materials where an intuitive design is required so that they can be easily manipulated and fulfill the objective for which they were created.

Creativity: A world in constant evolution generates problems that demand solutions, and advances in science and technology demand a continuous response to needs. Learning characterized by innovation is increasingly necessary for the society of the 21st century, and the educational process requires preparing students to face different challenges and increase the number of creative solutions. It is essential to develop innovative minds, generate contributions in the various fields of science, feed curiosity, and produce different answers. The use of technological tools favors creativity processes in students by presenting a topic in different ways, using other didactic resources, and sharing different materials with the learning community.

Gamification: The game is an educational factor of enormous importance frequently used in Basic Education levels, and in Higher Education, it is worked with a low percentage. There is a vital link between the game and the development of different skills such as creativity, collaboration, search, analysis, and evaluation of information, in addition to the fact that it increases interest in particular topics and a system of rules, norms, and achievement of objectives is worked on, in addition to the fact that learning becomes more attractive. The subject has an active role during the process. Gamification has made it possible to incorporate game dynamics in the teaching-learning process with the aim of students acquiring knowledge in addition to improving their skills and competencies (Martínez, Santos-Martínez, & Puche, 2018).

Motivation: The analysis of student motivation in the teaching-learning process is fundamental since it is mainly linked to the impact on learning. Though, several factors significantly influence it, such as the type of learning, the characteristics of the students, the discipline being worked, the interest in education, the relationship between students and teachers, the linking of new learning with previous knowledge, the application of knowledge to specific contexts or problem-solving (Díaz-Barriga, 2013). The use of ICT tends to increase the motivation processes in students. However, the mediation carried out is fundamental since, in the beginning, it may be a novelty for the student to handle a specific technological resource, and then the interest decreases.

After having reviewed the incorporation of ICT in educational environments, as well as the importance of recovering the didactic aspects for its implementation, the objective of this research is to identify the perception of Higher Education students mediated by technology regarding the use of didactic principles in the development of their teaching-learning process.

3. Materials and Methods

The research was conducted using a quantitative methodology, which is characterized by the measurement and descriptive statistical analysis of the results (Naupas, Mejía, Novoa & Villagómez, 2014; Coe et al. 2021), the type of study is cross-sectional descriptive being its purpose of describing the qualities of a group of people at a single time (Salinas & Cárdenas, 2009), through a non-experimental design.

The technique used was the survey, and the instrument was the questionnaire "*Didactic Principles in ICT-Mediated Higher Education*" (Table 1), for its design was considered as a basis for the objective established for the study as well as the ICT-mediated didactic principles proposed by García-Aretio (2016), which is made up of 32 items with a Likert-type scale with five response options: Always, Almost always, Sometimes, Rarely and Never; conformed by eight dimensions: (a) *Individualization* (1-4); (b) *Socialization and interaction* (5-8); (c) *Activity* (9-12); (d) *Autonomy and independence* (13-16); (f) *Intuition* (17-20); (g) *Creativity* (21-24); (h) *Gamification* (25-28); and (i) *Motivation* (29-32).

Dimension	Item
Individualization	1.- I organize my time according to my needs. 2.- I study at my own pace. 3.- I take responsibility for my formative process. 4.- I select the resources that suit my learning style.
Socialization and Interaction	5.- I participate in collaborative activities with my group mates. 6.- I synchronously communicate with my peers. 7.- I communicate with my colleagues asynchronously. 8.- I carry out co-evaluation processes.
Activity	9.- I link theory with practice. 10.- I apply what I review in the different subjects in my context. 11.- Development of activities that favor reflection. 12.- Development of activities oriented to analysis.
Autonomy and independence	13.- Increase autonomous learning. 14.- I identify progress in my learning. 15.- I generate self-evaluation processes.

	16.- I make decisions aimed at improving my learning.
Intuition	17.- I intuitively manage the platform. 18.- I identify the different spaces that make up the platform. 19.- I use a variety of resources on the platform. 20.- I increase my learning by reviewing the resources on the platform.
Creativity	21.- I develop creativity when performing my activities and tasks. 22.- I apply the acquired knowledge innovatively. 23.- I solve problems in my context based on what I have seen in the subjects. 24.- I increase my productivity through online study.
Gamification	25.- I consider the game as an educational factor. 26.- I learn through play. 27.- I achieve different objectives through the use of the game. 28.- I use playful software for my learning.
Motivation	29.- It motivates me to carry out my studies virtually. 30.- Making progress in my activities increases my motivation to study. 31.- Reading the feedback given by the teacher increases my motivation. 32.- Participating with my peers increases my motivation.

Table 1. Dimensions and items of Didactic Principles in ICT-mediated Higher Education.
Source: Own elaboration

To validate the instrument, the evaluation of 15 expert judges with recognized experience in the object of study was used, where they were asked to evaluate the questionnaire both in content and form through the reliability analysis of Aiken's V (Aiken, 1985) using dichotomous values of 0 and 1 to determine clarity, coherence, and relevance, obtaining results of .96. A pilot test of the questionnaire was applied to 15 students with similar characteristics where the relevance and pertinence of the items were confirmed. The instrument presents a Cronbach's Alpha of 0.937.

The application was carried out digitally through the Google Drive questionnaire in November 2021 utilizing a non-probabilistic sampling where the study's objective was specified, and the data handling was confidential. A total of 281 graduate students who study in Virtual mode participated, of which 68 were men (24.2%) and 213 women (75.8%), where the average age was 41.

4. Results and Discussion

The results show that the students correctly and successfully fulfilled the didactic principles in the virtual graduate course. This is demonstrated by obtaining higher values than the accepted theoretical average and confirmed by the different statistical tests performed.

Thus, the Kolmogorov normality analysis was carried out to check that a variable is distributed symmetrically or bell-shaped (Lilliefors, 1967); in this case, the data are not homogeneous. That is why it was considered to apply the Wilcoxon test for non-parametric samples (Pedrosa et al., 2015; Flores & Flores, 2021).

From the results, it is observed that all the items are above the theoretical mean, that is, higher than 3, where the principle that obtains the highest score is the item "I take responsibility for my training process" with 4.8, which refers to the importance of generating greater autonomy when studying in the online modality. The lowest values are in the synchronous and asynchronous communication modalities. Table 2 presents the differences in didactic principles in virtual graduate students concerning a theoretical mean, in this case, 3.

Didactic Principles	Media	V	p-Value	Standard Deviation
I organize my time	4.441	33948.5	< 0.001	0.674
Study at my own pace	4.598	36540	< 0.001	0.584
I take responsibility for my training process	4.808	38757.5	< 0.001	0.446
I select resources that suit my learning style.	4.58	36985.5	< 0.001	0.611
I participate in collaborative activities	4.146	27760.5	< 0.001	0.966
Synchronous communication	3.537	17981	< 0.001	1.183
Asynchronous communication	3.573	19011	< 0.001	1.144
Co-evaluation	3.676	20154.5	< 0.001	1.136
linking theory and practice	4.566	35998.5	< 0.001	0.601
Application in context	4.591	34940	< 0.001	0.621
Reflection activities	4.516	35245	< 0.001	0.604
Analysis activities	4.495	34401.5	< 0.001	0.639
Autonomous learning	4.673	36315	< 0.001	0.554
Identification of learning progress	4.651	36244	< 0.001	0.597
Self-evaluation	4.391	31744.5	< 0.001	0.753
Decisions to improve learning	4.651	36781	< 0.001	0.585
Intuitive operation of the platform	4.352	30563.5	< 0.001	0.841
I identify the different spaces that make up the platform.	4.534	34624	< 0.001	0.649

I use a variety of resources on the platform	4.37	31851	< 0.001	0.736
I increase my learning by reviewing the resources on the platform.	4.566	35909.5	< 0.001	0.635
I develop creativity when performing my activities and tasks	4.473	34167.5	< 0.001	0.687
I apply the acquired knowledge in an innovative way	4.441	32640	< 0.001	0.658
I solve problems in my context based on what I have seen in my subjects.	4.466	32799	< 0.001	0.686
Increasing my productivity through online study	4.53	34579.5	< 0.001	0.665
I consider the game as an educational factor	4.53	33419	< 0.001	0.702
I learn through play	4.278	28084	< 0.001	0.833
I achieve different objectives through the use of the game.	4.253	27739.5	< 0.001	0.856
I use didactic software for my learning	3.94	22113.5	< 0.001	0.978
It motivates me to study virtually.	4.516	32687	< 0.001	0.702
Advancing in my activities increases my motivation to study.	4.73	37371.5	< 0.001	0.526
Reading the feedback given by the teacher increases my motivation.	4.694	37142.5	< 0.001	0.614
Participating with my peers increases my motivation.	4.377	31739	< 0.001	0.87

Table 2. Differences in didactic principles in virtual graduate students for an accepted theoretical mean of 3.0. Source: Own elaboration

The results also indicate that the mediation processes that the students perceive on the part of the teachers are appropriate. These results align with other research in which mediation has also proved to be very useful for the positive development of the teaching-learning processes in a virtual context. A study in Mexico agrees on the importance of techno-pedagogical mediation in higher education (Lara Villanueva, 2019). As happens in the Latin American cultural sphere (Martínez et al., 2018; Aguirre et al., 2020), in which we have entered our study.

On an international level, some studies have also highlighted the importance of technology mediation and the need for institutions to provide targeted support to teacher educators across disciplines to adopt consistent technology frameworks for their programs (Nelson, Voithofer & Cheng, 2019).

In the context of the COVID-19 pandemic, which has boosted the use of virtual contexts in higher education, technological mediation has become even more necessary, as demonstrated in a study by Acosta Álvarez, Ortega

González & Díaz Cruz (2020). In this case, it was a face-to-face mediation for the development of virtual processes within a *b-learning* context that has been so frequent in times of pandemic.

Precisely some of the limitations of our work focus on this area. It has been carried out in a completely virtual postgraduate course, but comparing it with a postgraduate course with a mixed methodology (face-to-face and virtual) would be interesting. It is appropriate to analyze whether technological mediation in the face-to-face setting, when ICTs are only used as a support, is as necessary as in a complete e-learning scenario. Some studies suggest that focusing solely on technology-enhanced learning can be misleading and that different emotional, cognitive, and behavioral approaches are needed to assess the true impact of engagement in the pedagogical use of these tools (Dunn & Kennedy, 2019). In addition, research conducted internationally in this context presents studies of a very different nature, such as adoption, critique, social media, podcasting, and blended learning (Shen & Ho, 2020), which make it challenging to establish the representativeness and scope of the findings.

5. Conclusions

In our case study, carried out in a specific virtual program of Higher Education in Mexico, the established objectives have been achieved, and the evident result is a positive perception on the part of the subjects of study towards the use of ICT from the application of didactic principles in their teaching-learning process. The satisfactory results confirm the positive link between ICT and learning.

It is also interesting to observe the access that the study subjects have to ICTs from mobile devices, mainly the use of cell phones and Internet access in their homes, since most of them stated that they have a connection from their homes, which does not require them to travel to other spaces to carry out their activities and tasks. This is fundamental in extreme scenarios, as in the case of the COVID-19 pandemic, which allows the development of teaching-learning processes even in confinement.

In our case, focusing on the adult population and in the context of lifelong education and a professional environment, it can be affirmed that ICT has been incorporated both instrumentally and didactically in the didactic processes in Higher Education, which has allowed people to have the possibility of organizing their time for study, work, and family, and to achieve the objectives of continuing their preparation, being updated and having the opportunity of promotion in their work.

It is pertinent to point out that the mediation processes perceived by the students on the part of the teachers are adequate since the results obtained reflect a high degree of satisfaction in terms of respect for their learning

process, pace, and style, the development of activities to work on higher order processes -such as analysis and synthesis- and to strengthen autonomy and independence. As several of the activities are carried out asynchronously and are required to comply with established times, they have perceived the organization of the platform intuitively. In addition, they have developed creativity and have felt motivated to continue with their studies.

As for interaction and collaboration spaces, it is essential to continue strengthening them since most of the activities carried out by students are individual, a smaller percentage is collaborative, and it is also enriching to consider co-evaluation processes that allow strengthening the formative evaluation in this teaching-learning modality.

For future studies, it will be relevant to apply the same questionnaire to Higher Education students who use ICTs as a support in their teaching-learning process in a *b-learning* context to assess similarities and differences found between those who use ICTs as a learning modality and those who use them as a complement to their learning. In this way, it could be identified whether their use is only instrumental or they have already moved on to a didactic and pedagogical use of ICTs.

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Rethinking the Learning of Reading Comprehension and Writing Skills of University Students in the Teaching of Spanish: An Exploratory Study

Nicole Roberts ^a

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Abstract: Writing well in a foreign language (FL) is no easy feat because it demands a higher level of skill and competency. Oftentimes students cite continuous errors in writing as a challenge and indicate that the discouraging impact of continuously making mistakes and the very real struggle to figure out which words to use for correct expression impacts their motivation. This article reflects on the move to a blended program of study for Reading Comprehension and Writing Spanish among final year university students. The study's central purpose is to address students' lack of motivation in reading and writing in the foreign language and to propose some solutions to increasing reading and writing ability among the students through the asynchronous module. Key objectives for the study include a close reflection on the tasks assigned to the students and the level of motivation among students in performing the reading/writing assignments. The study is an exploratory one as it seeks to determine possible best practice in reading comprehension and writing classes at the university level. Undoubtedly, the 21st century learner must be critical in ICT as globally, current trends in education demand the integration of ICT in all curricula; an idea much reinforced following the COVID 19 pandemic. Overall, the study found the asynchronous module to be quite effective in teaching reading comprehension as well as in the practice of writing. However, interactivity is key to student motivation and overall success as much as the use of socially-relevant topics in the global and regional contexts.

Key-words: motivation; foreign language learning; teaching reading; comprehension; writing online; ICT.

^a The University of the West Indies, St. Augustine (Trinidad and Tobago). Correspondence: Nicole Roberts. Faculty of Humanities & Education. The University of the West Indies, St. Augustine. Trinidad and Tobago. nicole.roberts@sta.uwi.edu,  ORCID 0000-0002-1301-4423.

1. Introduction

Writing well in a foreign language (FL) demands a higher level of skill and competency. Additionally, students cite continuous errors in writing as a challenge to writing practice as well as the very real struggle to determine the correct word/s usage. In many of my Hispanic literature classes for example, students continuously indicate that they do not feel adequately equipped in terms of their FL writing skills both to express themselves in the ways in which they would want to and of course in a way so as to receive high grades. Ironically, at the same time, writing is a skill which substantially improves with continued practice and with extensive reading. These are clearly two skills which draw upon similar knowledge bases.

The lack of student motivation to write and/or engage in writing activities, especially in a foreign language, is well documented. (Widdowson, 1983) Moreover, in today's online culture, with blogs, tweets and social media posts, academic writing is oftentimes seen as old-fashioned or worse, archaic. The tedium associated with it is clearly perceived as antithetical to the instantaneous benefits of casual writing, so normative for online success. At the same time, to remain cost-effective, competitive and pedagogically sound, University programs today must ensure online programming and the University of the West Indies (UWI) St. Augustine, is no exception to this logic. One basic assumption made in the writing of this paper is that boredom, especially in relation to the FL reading comprehension and writing classroom is a factor of importance; first because over the years in course surveys, students have self-reported this issue together with the notion that they are mainly interested in just passing the course. Thus, taking Paulo Freire's (2005) concept of "problem-posing education" which has as its base the concept of fostering critical thinking, the idea for this study was born. That is, the use of socially relevant topics as a way of alleviating not only the boredom but also the complicated issue of the lack of motivation among students in the FL reading comprehension and writing module. In addition, it was felt that these topics would spur student interest and thus also address the issue of increased linguistic strategies through specific, intensive readings. Thus, the study's central purpose is: to gain an understanding of the reasons surrounding the lack of motivation among final year students of writing in the Spanish degree program at the UWI, St. Augustine and to discover and propose some solutions to increasing their reading and writing ability.

2. Background

Much of the research conducted to date on language learning strategies are descriptive (Oxford, 2011). However, the use of technology in FL teaching is increasing. The Spanish language undergraduate degree program at the

UWI, St Augustine campus is indexed against the Common European Framework of Reference (CEFR). The students in the final year of the program are expected to attain a C1 level. For the program, Spanish is taught in three modules; Reading Comprehension and Writing, Listening Comprehension and Conversation and Communicative Grammar. In the final year of the program, students read two semester-long courses SPAN 3001 - Spanish Language IIIA and SPAN 3002 - Spanish Language IIIB. The Spanish Reading Comprehension and Writing module is two hours in length on all three levels of the degree program. All of the modules are delivered in small group sessions (tutorial style) with approximately fifteen (15) students in each class. At the introductory level (first year), the module was taught online for the 2014-2015 and 2015-2016 academic years with limited success. (Arrieta et al, 2016) In the main, students felt the workload between this module and the other two modules was not balanced.

Until 2016-2017, Reading Comprehension and Writing was taught only as a face-to-face module for students in the final year of the degree program. However, in the main because of their advanced level, the program Lecturers took the decision to move to teach the module online to students in the third year, that is, the final year of the BA in Spanish degree program rather than in the first year of the program. It was felt that in keeping with the UWI's *Triple A Strategic Plan 2017-2022: Revitalising Caribbean Development* (2017) which continues to list "IT skilled and information literate" as one of the seven (7) key attributes of the ideal UWI graduate, the final year students of the program would most benefit from a Reading Comprehension and Writing module taught asynchronously online. Indeed, it can hardly be disputed that the 21st century learner must be critical in ICT as globally, current trends in education demand the integration of ICT in all curricula. This innovation was necessary not simply because of the inclusion of digital literacy in the Spanish program but also because the Spanish program needed to address the issue of lack of motivation and decreased levels of reading and writing among students in the face-to-face class sessions. Overall, the paper also attempts to assess the success of that online module and make recommendations for the future of the programming for the final year of the Spanish degree program at the UWI, St. Augustine.

3. Methodology

Over the academic year 2017-2018, final year students of Spanish of the course SPAN 3002 - Spanish Language IIIB in the Reading and Writing module were surveyed via questionnaire to determine their attitudes toward writing in Spanish. The same survey was repeated to a second cohort of students from the 2018-2019 academic year and the results were compared. For this paper, the responses from the surveys were used to formulate a

perspective regarding the development of these FL students' motivation to write. The study did not track the number of hours or pages read by individual students. Indeed, it assumed the completion of all reading tasks by the individual students as assigned by the Lecturers of the course. In essence, the aim of this research was exploratory: to describe the module as well as the assignments and to evaluate/assess if the FL writing among final year students at the UWI. St Augustine is best served in the asynchronous online format especially given that the Spanish section signals as one of its program goals the production of students who are able to effectively communicate in the L2 both orally and in writing and who are confident in the use of a variety of digital tools. In addition, given the online aspect of the module, the use of new technologies were assessed to further unpack if student progress in FL writing is linked in any ways to their levels of digital literacy. In essence, this project can be viewed as innovative for two reasons; first it seeks to increase the motivation in reading in Spanish among final year University students in a Caribbean context through the use of socially relevant topics and thus to increase their writing output but also, a second innovation is the focus on digital literacy through the asynchronous online mode to teaching.

Referencing Kellner (2012), Kaume-Mwinzi points out that when twenty-first century teaching is taking place "learners should be excited by flexible, open-ended, project-based and real-world learning situations that not only teach content skills but that also instill curiosity- fundamental to lifelong learning. They should develop communication and teamwork skills and should appreciate the freedom and responsibility that comes from taking charge of their own learning." (p. 81) In the main, it is this learner-centered teaching approach which is at the core of programming in Spanish in the department of Modern Languages and Linguistics at the UWI St Augustine. The students are seen to be at the very center of the learning experience and student learning is measured through both formal and informal forms of assessment including 'forums,' 'quizzes' and 'tarefas' [an extended semester-long written assignment]. The weekly exercises seek to ensure both student participation as well as a continuous measuring of student practice and learning.

Participants for the study were final year students who were majors in Spanish at the undergraduate level. The students were from two cohorts; one in the 2017-2018 academic year and one in the 2018-2019 academic year. The first group of students comprised n=34 and the second n=32. Group one was comprised of more females (n=22) than males (n=12) while group two was similarly composed, that is n=24 females and n=8 males. This gender disparity is not surprising as the majority of students pursuing the degree in Spanish at St Augustine are female. Following the findings of a 2016 survey where students felt to be digital natives (Prensky, 2001) admitted to being wary of online learning, citing issues from the unreliability of internet (wireless)

supply to a lack of computer skills (familiarity only with the smart phone), it was nevertheless decided that the online course would be offered in the final year given the expected level of maturity among final year students. Indeed, as Leu et al (2011) point out: “it is clear that skill with the new literacies of the Internet and other Information and Communication Technologies (ICTs) will become an important determinant of an engaged life in an online age.” (p. 5) In group one, a total of n=13 students responded to the survey while n=18 responded in group two.

For both academic years (2017-2018 and 2018-2019), the modules were taught using the Moodle platform (adapted at the UWI, St Augustine as myeLearning). The course page was populated at the start of the semester with all reading material and assessments. Because the module was taught in an asynchronous manner, it relied on cooperative learning as its mainstay with the teacher’s role being mainly one of coaching so as to guide students through the wealth of material presented in the course and to provide feedback on the written exercises and review student progress. Students were expected to embrace autonomy, hands-on and independent learning. Specific to the Trinidadian context, Mideros (2016) argues that this may be problematic as “students reproduce practices that have been culturally constructed and conceptualized as normal in their previous lived experiences” (p. 222) and the reality is that Trinidad and Tobago remains largely an examination-driven culture. Nevertheless, technology has made it possible for all students to access abundant information and to be/come more flexible. Over the twelve weeks of the semester, the modules’ exercises centered around the themes of ‘Narcotrafficking’ (3 weeks), ‘Gender, Women and Sexuality’ (3 weeks), ‘Art’ (3 weeks) and ‘Ethics’ (2 weeks). Student assignments are detailed in Table 1 below:

Week	Reading topics & Writing Assignments
<i>Week 1</i>	Pre-reading reflection Reading material: “Narcotráfico” article Reading Comprehension (Group activity) Forum: Personal opinion commentary
<i>Week 2</i>	Pre-reading reflection Reading material: “Narco arte” article Reading Comprehension (Individual activity) Forum: Debate on Narco Art Group activity: Invent a new narco-related tendency (art, music, food)
<i>Week 3</i>	Choice of an article (Individual) Forum: Discussion on how to write a review Assignment: Write a review of the chosen article
<i>Week 4</i>	Reading material: Gender, Women and Sexuality (Carnival in Trinidad)
<i>Week 5</i>	Reading material: “La pluma violeta” article Reading Comprehension (Individual activity)

	Forum: Discussion on topic “It’s better to ask for forgiveness than to ask for permission”
Week 6	Reading material: Gender, Women and Sexuality Reading Comprehension (Individual activity) Forum: Discussion on the topic “Machismo and Misogyny: The music of Maluma.”
Week 7	Reading material: El arte Assignment: Art critique Forum: Open discussion on topic of choice
Week 8	Reading material: El arte Wiki: Reading Comprehension Forum: Discussion on the topic “Which door would you choose?”
Week 9	Assignment: Critical commentary on the video “Picasso Baby” by JayZ.
Week 10	Reading material: Ethics Forum: Discussion on the formation of values: Caricatures and other forms of social commentary.
Week 11	Reading material: Ethics Forum: Discussion on Bioethics
Week 12	Submission of Tarea Final (Writing exercise of 700-750 words)

Table 1. Assignments. Source: Own elaboration

Since reading comprehension is an interactive process, but also because the module is online and fully asynchronous, students were encouraged to generate their own comments, to answer questions posed in the fora and to not see the course in the traditional light of the teacher providing questions and the students giving the ‘right’ or the ‘wrong’ responses. Indeed, Nuttall (1996) argues that students linking their prior knowledge to new information in a text helps them to develop their level of comprehension. Essentially teaching reading comprehension cannot exclude the other skills. However, central to our concern in this module was to ensure that students read effectively and could then integrate reading with writing for example in their short comments made in the fora or in the summaries produced for the course. (Nuttall 1996)

4. Analysis and Discussion

In terms of the assignments for the course, in the main these were devised and assigned by the Lecturers. However, in week 3, students were given a choice to research and choose an article and then write a review of the chosen article and in week 7, they were asked to write a forum entry on a topic of their choice within the theme. Student responses to the questionnaire suggested several areas of commonality which were the motivational factor, an increase in reading, and by extension reading comprehension, an increment in thinking directly in the FL and digital literacy. Not surprisingly grammatical errors continued to be of concern for many and increasing online skills for a few. Overall students did indicate an appreciation for the online

module and the asynchronous setting which allowed them to set their own pace.

4.1. Motivation

For many of the students in the project, reading is normally carried out online to research and to get information before writing. However, of itself, the act of reading in Spanish was not seen as particularly motivational. Most (n=26) pointed out that for them, motivation came from the topics of the course. As Robert F indicated: "I quite like to write and to read but for me the topic is what most motivates me. The 'foros' were tedious, but in my group, we had differing and different perspectives for some of the topics and that was great" (Group 2) This student clearly demonstrates what Ferhan (1999) argued, which is, that top-down processing is more effective because the prior knowledge of the reader is deemed to be important.

4.2 On becoming a reader

Overall, very few students (n=3) indicated an initial feeling that the online class forced them to read a lot more. However, others said that it forced them to read more widely albeit not necessarily on topics of interest. No real enthusiasm was displayed for reading with the exception of one student who indicated an absolute love for reading. Interestingly, some students (n=7) specifically indicated that they had done or had felt the need to do additional readings however these were mainly on social media sites such as Facebook, Twitter and one student indicating the use of www.rtve.es. No student indicated the desire to carry out additional writings in Spanish outside of the assignments for the module. This finding lent support to one instructional change as the Lecturers reflected on the future of the course; they decided that for the 2019-2020 course, they would add in to the final 'tarea' student research to identify and read one expert so as to be able to cite on the topic for the 'tarea' as well as one oppositional critic on the topic.

4.3. Looking at mistakes as learning opportunities

Mistakes are inevitable so not letting them discourage was the focus of the "foro." It helped students to be comfortable with expressing their ideas without centering on grammatical errors. Some agreed that it also helped them to identify the areas in which more practice was needed. Accordingly, Chaudron (1988) agrees that this free flow of communication can help to reinforce motivation and thereby serve a greater overall goal than merely correcting grammatical errors which oftentimes remains ineffective. Indeed, as evidenced by this student Alice M (Group one) who said: "I changed my process for reading in Spanish. Now I read every day and I think more about the speed of my reading, the way I read and my global understanding of the text instead of constantly stopping to check the meaning of every word I don't

know.” Of course, this type of practice does not address the student who easily becomes anxious if s/he does not understand a word or phrase and there is no denying that further research would be needed on such students as well as on ways to alleviate their anxiety. But there can be no denying that the online forum removes the pressure of performance that a face-to-face class demands.

4.4. Thinking in the Foreign Language (FL)

Some students pointed out that in the face-to-face class setting, especially if put on the spot or called out to answer a question, the easiest thing to do was to try to directly translate the English thought as it came to mind. However, one aspect that this project revealed is that in the weekly forum, students indicated that translation is avoided and this is mostly because they felt that they had the time to think sufficiently, to not rush to give a response. The time needed to process the thoughts on the specific topic was there and then to transfer them to the page making it easier to read the question (or idea) in Spanish, to think more calmly in Spanish and to post a response in Spanish. The following is an example of a forum post on the topic of immigration in Trinidad and Tobago by one student (Group 2):

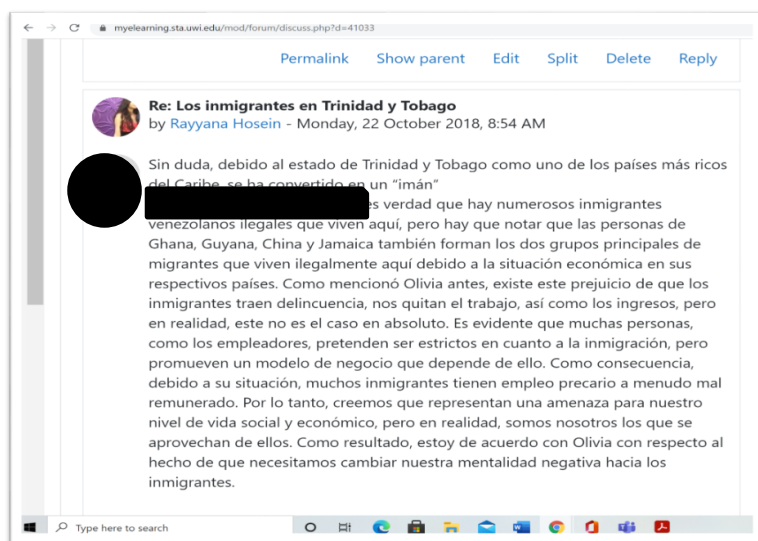


Figure 1. Forum post 'Los inmigrantes en Trinidad y Tobago'

By its length, this forum post (Figure 1) shows clearly that this student found the topic to be stimulating. Moreover, we should consider that the student's response is a reflection on three ideas which had been circulating in the forum post, that of the Venezuelans making up only a small part of the total migrant and refugee population across the country, the reason for the influx of migrants to Trinidad, that is the significant economic prosperity of

the country and the negative aspects associated with the migrants such as the surge in criminal activity. The post ends with a sense of introspection as the student queries the precarious nature of life for the migrants and the general exploitation which they suffer at the hands of Trinidadians. This was a local topic but also one which connected to a much larger global issue. Notably, second language performance was valued above all else in the posts to the forum. However, if glaring grammatical mistakes were made in a posting, then they were corrected, but smaller errors which did not impede comprehension of the message (as is the case in this posting) were simply left. Students were constantly encouraged to post or to react to posts as clearly and as succinctly as possibly in the L2 and this appears to have been enthusiastically embraced.

4.5. Challenging and engaging ways to using digital resources

We have already pointed out that for some students the topics were engaging. However, for some students (n=6) the interactive nature of the module as well as the variety of media used (You Tube videos, online articles, newspaper articles and blogs) was also a positive source of engagement.



Figure 2. Foro

For example, the above screen shot (Figure 2) is taken from the course (2017-2018) myeLearning page. In this particular forum which was used in week 8, students were asked to look at a short video clip presenting a controversy which broke out surrounding an art expo. Students had to discuss and explain their particular choice given the circumstances which were as follow: At a museum, attendees of the art exposition were given two options: to enter through the main door however, they would have to pass through (in between) two nude persons facing forwards (one male and one female), the subjects were close enough to force someone entering to brush up against the

two nude persons and face one of them; or attendees could enter the exhibition through a small, hidden-away, side entrance. This forum received lengthy posts. For example, this student Stephen D. describes the main door entry as his choice indicating that it is “the only logical option” given that art is subjective. He also raises the concern of sexuality:

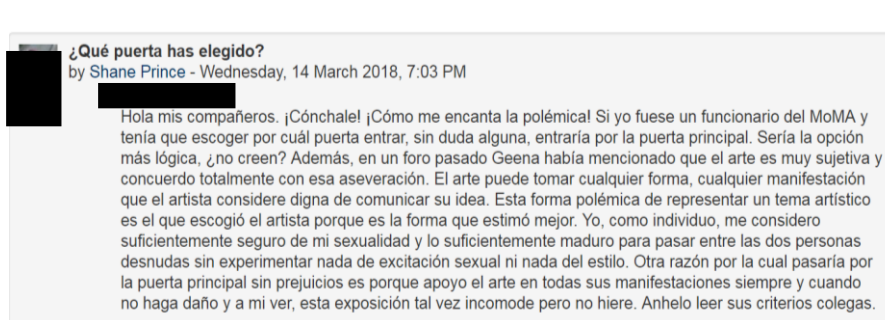


Figure 3. FORO entry ¿Qué puerta has elegido?

What is striking with this forum entry (Figure 3) is the perception that ‘contemporary art’ allows for all/any representations but the student also raises the issue of sexuality which was not part of this discussion but, given the nude subjects at the entrance to the exposition, forces a comment. His ability to easily converse on these topics signals a certain level of mastery in the language. Indeed, the language which he uses is informal, grammatically sound and at the same time quite effective.

4.6. Digital Literacy

No students indicated problems with the use of technology for the course. All students indicated that they had possession of a smart phone, as well as access to a tablet or laptop together with internet connectivity for the module. The ease of writing was also facilitated because the course provided them with links to access information to which they may not have been privy. For example, how to change to a Spanish keyboard or the use of shortcut keys for accents (on the English keyboard), as well as explanatory videos for assignments. No students complained of a lack of typing skills. One additional factor with relevant implications for digital literacy is that students who normally complain about group work, were able to share comments, thoughts, ideas with others through the forum, or a Google docs page shared on myeLearning thus creating a sort of innate ecosystem for sharing, discussing, cross talking and ultimately practicing the kind of collaborative sharing so necessary in today’s world of work.

All of the students who responded (n=34 and n=32) indicated the maintaining of the online module for the final year Reading Comprehension and Writing Module for the course. Overall, the issue of time was a central

concern but in a positive manner. One student Peter S (Group two) said: “It gave me autonomy but most importantly it gave me the time to read and write wherever I wanted. So, I could use the journey home in the maxi [a route taxi in Trinidad and Tobago] to read the assignment or to read the article and even begin a response or to do the response at home later.”

5. Conclusions

The present study supports the notion that reading comprehension and writing interlock. In this particular context, that is, a study of final year students in a Caribbean university setting, it is clear that one way by which students can improve their reading comprehension is strategy instruction. In this study, the effect of the use of socially relevant topics was investigated and students were found to particularly enjoy the contemporary aspect of the topics as well as the timeliness of their social relevance. For example, immigration was a topic with significant impact given that Trinidad and Tobago continues to receive an influx of Venezuelan migrants and refugees, due to the situation with its very porous borders as well as the ongoing humanitarian crisis in Venezuela, a mere 11 kilometers away.

It is clear that for FL writing, practice is the key. And this is exactly what students managed to do in the forum as well as the extended ‘tarea final’. What was more important than the brevity of the writings was the fact that in every week of the semester students were writing something in Spanish. Also, with the online module, students get the additional bonus of the development of skills such as word-processing, conducting research, collaboration in teams and of course the use of digital technologies in the construction and presentation of their work. The reading comprehension and writing module online at the final level of the degree program was a success with 100% of the students (n=34 and n=32) indicating a desire to continue this module online due to its flexibility and ease. Clearly though, an innovation should not be maintained simply because it affords students a greater ability to manage their time. Nevertheless, this aspect cannot be ignored as it represents a common challenge among many of our students at the St Augustine campus.

To underscore its real-world usefulness, it is as Leu et al. (2011) indicate: “Individuals, groups, and societies who can identify the most important problems, locate useful information the fastest, critically evaluate information most effectively, synthesize information most appropriately to develop the best solutions, and then communicate these solutions to others most clearly will succeed in the challenging times that await us.” (p. 5) Interestingly what Leu et al (2011) could not predict was the Covid-19 pandemic of March 2020. And when the pandemic hit, the Spanish program was well placed. Students in the Spanish degree program had already indicated their acceptance of this potential as they resoundingly recognized

the need for the inclusion of online reading and writing as a central element to their degree major. This article described the results of a small study. Online reading and the use of the internet for research are clearly demonstrated in the writing produced by the students and this is admirable. What remains clear is that the students must continue to be prepared academically for the online age of information and in this the Spanish program at the UWI must continue to demand ICT competence as an important module of the curriculum.

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Bibliometric Analysis of the Evolution of Artificial Intelligence Research Applied to Education

**Esther Fernández-Márquez ^a, Verónica Baquerizo Álava ^b,
María Belén Morales Cevallos ^b, & Eloy López Meneses ^a**

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Abstract: Artificial Intelligence (AI) is a new technology that has the potential to revolutionize education by providing personalized learning experiences and enhancing many educational processes. This paper used a hermeneutic approach based on a mixed methodology to carry out a bibliometric analysis of the scientific publications indexed in the Scopus database, focusing on the keywords AI and Education, limiting the results to those publications categorized in the field of Social Sciences. The results reflect 3875 indexed Social Sciences documents proposing the integration of AI in Education. From the results obtained, it is possible to ratify the significant impact of artificial intelligence in the educational sector. The analysis facilitates implementing innovations in the classroom, whether working on skills and soft skills, developing educational theories, adapting AI systems to specific educational environments, and configuring social values.

Key Words: artificial intelligence; learning; educational innovation; social values; universities; educational theories.

^a Universidad Pablo de Olavide (Spain). ^b Universidad ECOTEC (Ecuador). Correspondence: María Belén Morales Cevallos, Universidad ECOTEC, Km 13.5 Vía Samborondón, Samborondón, Guayas 092302, Ecuador, mmoralese@ecotec.edu.ec  [ORCID](#) 0000-0002-9874-3229. Coauthor: Esther Fernández-Márquez,  [ORCID](#) 0000-0003-0111-2533. Coauthor: Verónica Baquerizo Álava,  [ORCID](#) 0000-0001-9919-9133. Coauthor: Eloy López-Meneses,  [ORCID](#) 0000-0003-0741-5367.

1. Introduction

Artificial Intelligence (AI) is transforming many aspects of modern life, including education, and it can potentially improve the educational experience for both students and teachers. As a technology, it is a branch of computer science that includes cross-cutting concepts related to logic and learning. It involves designing computer tools that simulate human intelligence processes, including learning, reasoning, and self-correction (Avila, Mayer, & Quesada, 2020).

In essence, AI involves the development of computer systems capable of performing tasks that would typically require human intelligence—for example, understanding natural language, recognizing images, or solving problems. Some of the crucial techniques in AI are machine learning, which involves training computer systems to recognize patterns in data and make predictions based on them. Another essential technique is natural language processing, which teaches computers to understand and generate human language.

Other fundamental concepts of AI are knowledge representation and reasoning, which represent information about the world so that a computer can understand and use it to draw conclusions and make decisions. Planning and decision-making are also needed, involving the development of algorithms that can help computers make informed decisions based on available information. Artificial intelligence (AI) has undergone tremendous development since its inception. As presented by Shao, Yuan, Wang, and Xu (2021), its evolution and trends can be analyzed from four dimensions: research, production, influence, and competition.

One of the research dimensions of most significant interest today is its application in education (Barrios, Díaz, & Guerra, 2019; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019; Nalbant, 2021). It can revolutionize how students learn, and AI can automate many tasks previously performed by humans, such as analyzing large data sets and providing personalized feedback to students. It can also create virtual learning environments and provide personalized learning plans considering each student's style.

Despite the many benefits of AI in education, some challenges need to be solved (Luan et al., 2020; Hwang, Xie, Wah, & Gašević, 2021). One of the main ones would be to be able to adapt to changing environments and ensure that their decisions are accurate and reliable. How has the evolution of AI research in education been up to today? This could provide us with valuable information about what has been and is being done in the field of educational research and help us establish the best strategies for integrating this technology in the future.

2. Literature Review

While AIs can be a valuable tool for helping students learn, human interaction is still essential for effective learning. Teachers can provide more detailed and personalized feedback than AIs and can help students develop critical social and emotional skills.

In this context, they were initially used mainly to simplify administrative tasks, such as student records management and course scheduling. Today, however, AIs have a much more significant impact on education. Since their incorporation in the 1970s, with the so-called "intelligent tutoring," there has been a remarkable evolution. At the beginning of the century, they were implemented as course recommendation systems, educational materials and resources, analysis of academic performance data, and later the emergence of educational chatbots and gamification. AIs in education, as advocated by Rouhiainen (2018), can bring positive aspects, such as being used to favor the personalization of learning processes, being able to analyze student data, such as their strengths and weaknesses, to create personalized study plans that adapt to the individual needs they present, which would imply the possibility of adapting to different rhythms and offering specific support and guidance, which would increase their motivation and improve their academic performance.

Analyzing its impact on the different curricular elements, following Moreno (2019), it can be pointed out that its main contributions would be found in the curricular objectives that can help personalize learning and adapt to students' individual needs can improve the effectiveness of teaching. In this way, more specific and personalized objectives can be developed according to the needs of each student. Likewise, its proper use would allow teachers to measure their students' progress more efficiently and provide constant feedback, thus favoring a more effective achievement of objectives. Moreover, in the contents, this is another thrilling application element that could favor creating more interactive materials adapted to individual needs to increase motivation towards learning.

On the other hand, in terms of assessment, AIs can automatically analyze students' work and provide them with real-time feedback, thus eliminating the need for teachers to spend hours reviewing assignments and exams. They can also be used to assess student progress and recommend improvement areas. Among the difficulties that the incorporation of AIs in education may present, it is considered essential to highlight the lack of human interaction, which is necessary for adequate emotional, social, and cultural development, as well as the lack of reliability associated with the fact that although it handles large amounts of information, it is not always reliable and accurate, or that the answers may be biased.

Regarding the repercussions these educational innovations would have on teachers and students, we can point out the effect on their roles and the required competencies. Specifically, regarding the role of teachers (Caballero, 2020), the incorporation of AIs would change significantly from being the primary source of knowledge and the classroom leader to facilitator and guide in the learning process, becoming their main function, supervising and adjusting the use of AIs in the classroom, adopting a more active role in the personalization of learning based on the recommendations of the AIs. On the other hand, from the students' point of view, their incorporation would require them to go from being passive receivers of information to active participants responsible for their learning.

The integration of AI in education is necessary, as well as other current emerging technologies that are not only part of our world today but will be increasingly important in the future (Gómez Galán, 2019 and 2021). In the case of the university, for example, it must adapt to the new intelligent technological trends, especially in the use of artificial intelligence and teacher training in learning ecologies multiple utilities presented by machine learning, big data, Deep learning, AI-based systems to establish predictive models to prevent university dropout, or to encourage healthy study habits in the student body, the implementation of chatbots or AI-based virtual assistants to solve student tasks and doubts, improve personalized learning itineraries, improve evaluation processes in a ubiquitous digital environment (Vázquez-Cano, Mengual and López-Meneses, 2021) and facilitate predictive models for adaptive learning as additional support for personalized tutoring of university students. In short, to improve the curricular competence model of educational ecosystems.

In terms of competencies and skills (Veytia et al., 2019; Bonami et al., 2020; Santamaría et al., 2021), in order to implement AIs in the classroom, teachers need to acquire skills and competencies related to the use of tools and technologies related to these technologies in the classroom, as well as the analysis of data generated by them. Therefore, students would need to learn to use the tools and technologies used in the classroom, such as the online learning platform, and acquire greater autonomy, decision-making capacity, and increased critical thinking and problem-solving skills.

Many existing studies on the application of AI systems in education highlight the issues related to intelligent tutoring to define the most appropriate practices for designing and evaluating student learning (Boden, 1984). Later, in the 1990s, research on using artificial intelligence in the design of collaborative learning environments and the personalization of learning (Joiner, 1994), and the use of data mining techniques for learning data analysis were explored (Roth, 1998). With the entry of the new millennium, the focus was established on artificial intelligence as a resource for adapting learning to the emotional and cognitive characteristics of the

student (Baylor, 2002), as well as on its use in plagiarism detection and the evaluation of the quality of educational content (Reis, Paladini, Khator & Sommer, 2006). While since 2010, the personalization of learning through the use of intelligent tutoring systems is again emphasized in the evaluation of the effectiveness of these systems in student learning and the design of intelligent learning environments (Wang & Wang, 2010) or in the automatic detection of emotions in the classroom (Vahabzadeh et al., 2018).

However, further research in this area can identify best practices and strategies for using artificial intelligence in education, helping educators and educational program designers make more informed decisions about using the technology effectively.

3. Materials and Methods

The present study is based on a hermeneutic approach with a mixed methodology, carrying out a bibliometric analysis of the scientific publications indexed in the Scopus database based on the keywords: *Artificial Intelligence* and *Education*, limiting the results to those publications categorized in the field of Social Sciences.

The search was conducted in English to cover a more significant number of publications. The analysis tools in the database were used: subject, type of publication, subject area, country, author, and year.

Subsequently, the data were subjected to a concurrence study using VosViewer software, delimiting the concepts related to the keywords identified, and a content analysis of the publications in Spanish was carried out, analyzing the approach proposed.

4. Results

The results reflect 3875 indexed documents in Social Sciences, which propose the integration of Artificial Intelligence in Education. As precursors of the subject, Scandura, Durnin, & Wulfeck (1974) already anticipated the implications of using artificial intelligence in education, referring to problem-solving. It is a field that is progressively gaining importance, but it is really with the beginning of this century when it takes off (see figure 1), with exponential growth, since in the three years that we have been in the current decade, it has already exceeded 36.16%, so far this year that has just begun and in 2 months 127 papers have been published in indexed media.

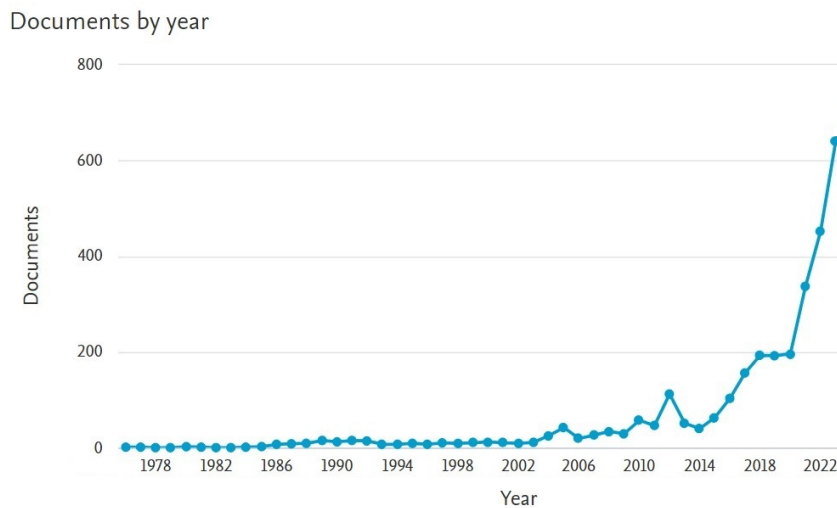


Figure 1. Historical evolution by year of publications in AI and education in Social Sciences. Source: Own elaboration based on Scopus database.

Although today the dissemination of research tends to be mainly through conferences and articles in similar percentages (Figure 2), this has evolved in phases. Although articles were the preferred medium until the year 2000, in the following two decades, papers acquired greater relevance, but in recent years journal articles have once again become the preferred medium (Table 1 and Figure 3).

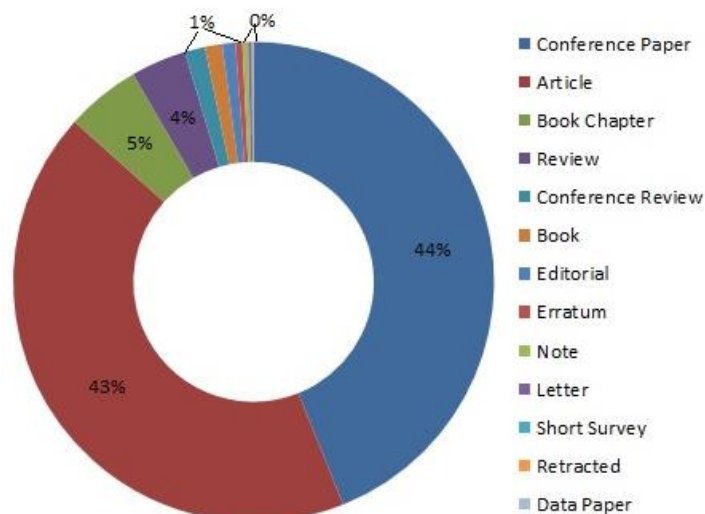


Figure 2. Type of documents of publications in AI and education in Social Sciences. Source: Own elaboration based on Scopus database.

	1974-1999	2000-2009	2010-2019	2020-
<i>Conference Paper</i>	37	171	848	646
<i>Article</i>	119	90	439	1007
<i>Book Chapter</i>		7	74	113
<i>Review</i>	3	18	30	94
<i>Book</i>		1	22	22
<i>Conference Review</i>	9	4	13	27
<i>Editorial</i>		6	8	20
<i>Note</i>			3	11
<i>Erratum</i>			2	16
<i>Letter</i>			2	7
<i>Short Survey</i>		1	1	
<i>Retracted</i>			1	1
<i>Data Paper</i>				1
<i>Other</i>	1			

Table 1. Type of document by stage. Source: Own elaboration based on Scopus database.

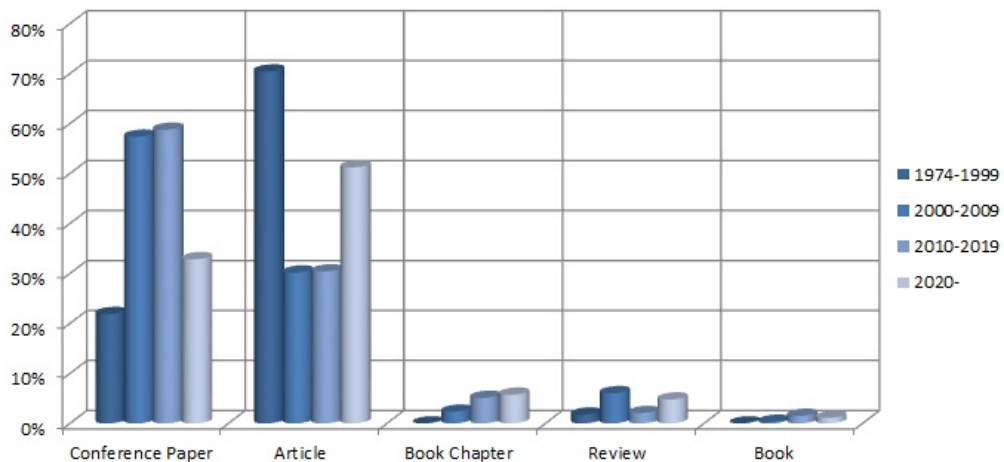


Figure 3. Type of documents of publications in AI and education in Social Sciences by stage. Source: Own elaboration based on Scopus database.

Concerning the origin of their production, eight countries stand out, with more than 100 publications: the USA (863), China (586), United Kingdom (293), Spain (198), Australia (155), Germany (142), India (138), Canada (127), Taiwan (110). In terms of language, 97% of the publications were in English (Figure 4).

5. Discussion and Conclusions

Our work is in line with other reviews of the evolution of AI in education by other authors, which show the growing interest in this crucial technology in this field. Among others, those by Chassignol, Khoroshavin, Klimova, & Bilyatdinova (2018) focused on trends in education, the classic introduction by Cumming (1998) almost two decades ago, announcing the potential of this technology, and the more recent reviews by Penstein et al. (2018), Chen, Chen, & Lin (2020) and Huang, Saleh, & Liu (2021) can be highlighted.

From the results obtained, it is possible to ratify the significant impact of AI in the educational sector. The progressive implementation analysis facilitates innovations in the classroom with its use, whether working on skills and soft skills, developing educational theories, adapting AI systems to specific educational environments, and configuring social values (Barrios et al., 2021). Likewise, scientific production on AI systems in education is increasing, as also corroborated by Chen et al. (2020), although especially since the beginning of the millennium and more specifically since the beginning of the last decade. Moreover, as Chassignol et al. (2018) indicated, AI has been incorporated into the administration, teaching, and learning processes.

AI in education today has novel applications, including student retention and dropout prediction, intelligent tutoring, classroom monitoring, and recommender systems (Ahmad et al., 2020). Intelligent tutoring systems can help students and teachers provide personalized support (Khazanchi and Khazanchi, 2021). AI-related educational assessment, meanwhile, is attracting increasing interest as a means to improve the effectiveness and validity of assessment (Gardner, O'Leary & Yuan, 2020).

Mills, Bosch, Krasich, & D'Mello (2019) determined that teaching and learning activities and practices would evolve with AI. Moreover, Goksel and Bozkurt (2019) considered it a forward-looking component of educational processes. However, as Cope, Kalantzis & Sears (2020) advocate, this novel technology will never be able to take over the role of a teacher altogether.

These aspects are relevant since, as Vázquez-Cano (2021) points out, we must adapt to the new reality and assimilate technologies as an element that can contribute multiple positive aspects to the formation of personal, educational, professional, and social competencies. To this end, it is essential to carry out bibliometric studies to show how we are working to improve the teaching-learning processes.

In conclusion, AI has the potential to revolutionize education by providing personalized learning experiences and enhancing many educational processes. However, it is essential to approach AI in education cautiously and

ensure it is depleted to enhance human interaction, not completely replace it. This underscores the importance of considering the human element in education and ensuring that AI is used to complement and enhance human interaction rather than replace it.

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Teaching Economics at University through Film and Literature

**Miguel Ángel Echarte Fernández^a, Javier Jorge-Vázquez^a,
Sergio Luis Náñez Alonso^a & Ricardo Reier Forradellas^a**

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Abstract: This article analyses the possibility of using film and literature as educational resources in the subject "Introduction to Economics" and proposes planning for the academic year using these teaching resources and the application of active learning methodologies such as cooperative work and the inverted classroom. The proposal includes the planning of the sessions, with the objectives and resources used, and the design of activities and evaluable work. A review of the academic literature will be carried out to find out about different cases of application of these resources and an analysis of different literary and cinematographic works to show the economic contents that can be taught. It is considered that the use of these media will increase the motivation of the students.

Key-Words: literary works; films; teacher planning; motivation; teaching resources.

1. Introduction

Film and literature provide two very interesting tools for teaching economic science at the university level. Economic agents make economic decisions all the time, some of which are of great personal importance, so students need to understand these issues. Moreover, economic theory is a necessary discipline for understanding social reality at the national and international levels.

Film and literature are two media that can help in the teaching-learning process by motivating students to learn more about this discipline. Several

^a Universidad Católica de Ávila (Spain). Correspondence: Javier Jorge-Vázquez, Grupo de Investigación DEKIS, C. de los Canteros, S/N, 05005 Ávila (Spain).  ORCID 0000-0003-3654-7203. javier.jorge@ucavila.es. Coauthor: Miguel Ángel Echarte Fernández  ORCID 0000-0001-6494-6506. Coauthor: Sergio Luis Náñez Alonso  ORCID 0000-0001-5353-2017. Coauthor: Ricardo Reier Forradellas  ORCID 0000-0002-4790-0351.

works reflect the use of these media such as those by Dyl (1991), Belden (1992), Kish-Goodling (1998), and Watts (2002). In the Spanish-speaking world, different contributions are also important, as is the case of those by Gómez Galán (1999), Fernández Aguado (2001 and 2010), Mourão (2005), De Haro (2007), Pinuaga and van der Vaart (2010), Fernández *et al.* (2012), Torres-Dulce (2014), Krause (2017), and De Haro and Blanco (2017). In the field of economics teaching, the most relevant contribution is that of Becker and Watts (1998). They propose alternative methods that, although they do not replace the traditional reading method based on the explanation of graphs and tables with economic data, may be of interest to improve the motivation and quality of student learning.

The objective we are pursuing is to analyze the possibilities of using film and literature for teaching economics. An introductory subject "Introduction to Economics" will be taken as a reference. The methodology, qualitative and based on documentary and didactic analysis of practices and activities, will aim at proposing an academic course in which these didactic resources are included. Active learning methodologies will also be applied.

2. Analysis of the Economy through the Literature

The teaching of economics can be promoted using literature, as many works reflect aspects of family, business, or state economics. Literature is a very ancient art, and its genesis can be traced back to the Homeric texts of Ancient Greece. It is a human construction that requires a fictional component. Like a film, literature does not have to reflect the reality of events. History, on the other hand, does seek the truth of the facts, although as it is based on a narration of past events in which people are the protagonists, the historian's understanding is necessary and there is a margin of subjectivity in the interpretation. Since these artistic manifestations (literature and film) do not have to reflect scientific truth and economics, as a science, does have this obligation, the teacher needs to explain the contents shown in class. In other words, the use of film and literature must be accompanied by an active role of the teacher in the classroom.

Literature is an excellent didactic resource for teaching economics and other areas of knowledge. Mourão, in an article where he analyses economics in Steinbeck's book *The Grapes of Wrath*, points out that: This didactic resource is not new; it has been proposed by many academic authors, such as Kish-Goodling (1998). With this author, we can state that Literary works often reflect our economic life more accurately than today's statistical and economic techniques and mathematical models. I think the idea of using literary works to introduce humanities students to the study of economics is a good idea, and a trend that should be encouraged" (Mourão, 2005, p.68).

Indeed, Kish-Goodling (1998) proposes a methodology for teaching monetary economics through the play *The Merchant of Venice*.

In classical Greece, the word "economics" was used for the first time to reflect efficiency in the administration of finances. Xenophon in the *Economist* states that economics is a knowledge that "enables men to increase their wealth", i.e., the totality of their goods. A theory of the economic cycle can be found in the Bible, for in Genesis it is related that the Pharaoh of Egypt had a dream in which seven famished cows devoured seven plump cows. According to Joseph, son of Jacob, this meant that there would be seven years of bonanza with good harvests followed by seven years of drought. In an agrarian economy, a situation that lasted until the industrial revolution, an agricultural crisis could lead to the starvation of a large part of the population. This incipient theory of the cycle had a real basis, the rhythm of the Nile floods, but other theories of the cycle have a monetary and banking origin. Joseph offered a solution to the pharaoh, that he should save in times of economic expansion and use those resources in times of depression.

In the New Testament, some passages can be interpreted as a defense of charging interest on loans such as the parable of the talents (Matthew 25:14-30). In it, a man calls his three servants and gives five talents to one, two to another, and one to the last. The first one used it profitably and gained five more talents, the second one gained two more and the third one did not invest it but hid it in the ground. The master rewarded the first two and punished the last one by taking away his talent and giving it to the one with ten.

During the Middle Ages, however, the doctrine against usury, i.e., lending at interest, prevailed. This interpretation began at the Council of Nicaea in 325 A.D. and was based on a phrase from Psalm 14: "Lord, who shall tread your tabernacle? He who has not lent his money on usury". Later, another reference was used to condemn usury and appears in the Gospel of Luke: "Lend liberally, expecting nothing in return" (Luke 6:35).

Messages from the *Bible* have tried to be used to justify socialism and the critique of wealth, but also to defend private property. The former was based on the Beatitudes and some Gospel phrases such as the following one addressed by Jesus to his disciples: "I tell you the truth, I tell you, it will be hard for a rich man to enter the kingdom of heaven. Yes, I tell you again, it is easier for a camel to go through the eye of a needle than for a rich man to enter the kingdom of heaven" (Matthew 19, 23-30). The defenders of the market economy and private property often mention another phrase of the gospel: "Pay to Caesar what is Caesar's, and to God what is God's" (Matthew 22: 21).

Miguel Cervantes' *Don Quijote de la Mancha* is a key novel in world literature and is full of economic content. According to Eric Clifford: "Many think of Don Quixote de la Mancha by Miguel de Cervantes as being about a romantic hero struggling to "dream the impossible dream". However, Don

Quixote also contains lessons about freedom as political and economic science, and among them an exhaustive reflection on all kinds of politics related to money. Cervantes understood abstract concepts such as Gresham's Law, inflation, and the subjective theory of value, and he understood the folly and immorality of compulsory exchange rates, price controls, and usury laws. Not only did the Spanish author incorporate these ideas into the casuistic puzzles of Don Quixote, but I daresay he criticized the economic and monetary policy of early seventeenth-century Spain" (Clifford, 2016, p.42).

Don Quixote is a parody of idealism rather than the books of chivalry. Cervantes ridicules the ideal world where justice and human values are exalted in the face of a reality that is full of ruffians and injustice. The conclusion is that idealism leads to failure. We will now consider some of the economic concepts that appear in the novel. Right from the first page, Cervantes describes the hidalgo's eating habits (he ate more cow than mutton, as it was cheaper) and how they consumed three parts of his estate, much of which he loses because he buys a lot of books. Later, more profound theories are put forward, such as the value of goods and those related to the monetary changes of the time.

The theory of value has been the subject of much debate among economists. For the classics, the value of goods was objective, and Marx considered that it was a function of the labor embodied (labor-value theory). However, since the marginalist revolution of the late 19th century, led by Carl Menger, Stanley Jevons, and Léon Walras, value has been subjective and depends on the relative utility and scarcity of goods. The subjective demand for goods may vary from one person to another and even the same person, at different moments in time and depending on his or her life circumstances, may value the same good or service differently. Recall that in Shakespeare's play Richard III, the king was willing to give his kingdom for a horse because he was in battle and needed it to save his life.

When Cervantes describes Rocinante, it is stated that "he had more quarters than a real". The quarter was a disease that affected the hooves of horses. However, it should be borne in mind that the government frequently debased the fleece coinage by removing the silver content, and more and more cuartos had to be handed over to obtain a real. Nevertheless, there were stablecoins during the period of the Hispanic Monarchy, and some survived the independence of some South American territories. In Herman Melville's famous novel *Moby Dick* (1851), it is indicated that the eight escudos' doubloon (minted in what is now Ecuador) would be the prize that Captain Ahab would give to the sailor who discovered the white whale: "The brilliant roundel, therefore, came from a country situated in the heart of the world, under the great equator of which it bears the name. It had been minted in the very center of the Andes".

Cervantes was highly critical of economic interventionism and a great defender of freedom. He was the first to use, in a derogatory way, the concept of arbiters in one of the exemplary novels, *El coloquio de los perros* (1613). Arbiters were authors who sent a memorial to the king proposing a measure of economic intervention in 16th and 17th century Spain and are considered precursors of mercantilism. A discourse extolling the value of freedom can be found in *Don Quixote*. However, some critics have considered the Golden Age discourse to reflect a desire for a prehistoric communist utopia (Pérez de Antón, 2003; Byrne, 2012). However, it has already been pointed out that *Don Quixote* is a parody of those worlds idealized by *Don Quixote*. If we use the approach of the Spanish scholastics of the Golden Age, with authors such as Juan de Mariana who criticized monetary devaluation and defended private property, we can consider that this paragraph reflects *Don Quixote's* ignorance, not Cervantes (Clifford, 2016).

The negative effects of inflation can be analyzed in Walt Disney's cartoon about Uncle Scrooge McDuck, an old miser who is Donald Duck's uncle. Although Scrooge McDuck is a pathological case because economic agents do not have an unlimited demand for money, he is right when he warns his nephews that inflation does not generate wealth but causes a decline in the purchasing power of the currency, which makes prices tend to rise. Monetarist theorists, starting with Irving Fisher (1867-1947), used the famous quantitative equation of money according to which $MV = PT$, where M is the mass of money in circulation, V is the velocity of circulation of money (the number of times the monetary unit changes hands), P is the general price level and T is the total number of transactions. According to this equation, an increase in the quantity of money causes the price level to rise in the same proportion. The injection of money is channeled to certain sectors and prices rise, but not in the same proportion or unison. Inflation, therefore, distorts relative prices and leads to a misallocation of society's scarce resources. In the short run, it benefits debtors at the expense of creditors, but in the long run, the net effect is negative. Central banks are responsible for controlling price stability as they conduct monetary policy in their respective areas of influence.

Charles Dickens' novels reflect 18th and 19th century England and have been used to explain the consequences of the industrial revolution. Although many works recreate this setting, the best known is *A Christmas Carol* (1843). It tells how the protagonist, Ebenezer Scrooge, is a selfish person who is only interested in hoarding money, but who ends up changing his ways after a visit from ghosts on Christmas Eve. A similar case is the tale of *King Midas* who wished for everything to turn to gold until he discovered that gold could not be eaten and ended up repenting and living like a peasant. Although Dickens presents a very negative view of living conditions during the industrial revolution and Marxist authors argued that it was a step backward, the truth is

that compared to pre-industrial conditions, industrialization improved the quality of life of the working class (Hayek et al, 1974).

Daniel Defoe was an English novelist who is considered a pioneer of the economic press. His most important work, *Robinson Crusoe*, is full of economic concepts and for a long time, it was used by economics teachers as a reference to explain concepts such as consumption, savings, investment, direct and indirect exchange, etc. When Robinson arrives on the island, he realizes that if he wants to improve his standard of living, he must make an effort to produce capital goods that increase his productivity. Thus, he may consider making a wooden stick that will allow him to extract more berries from the trees, but to do so he must accumulate some berries and save them (save them) to be able to subsist during the time it takes to make the stick. At first, Robinson has to do all the productive tasks on his own, but when Friday later appears, the way is opened for the division of labor and social cooperation. Adam Smith already pointed out the benefits of the division of labor with the famous example of the pin factory in *The Wealth of Nations* (1776).

Robinson's example can be very useful in explaining individual human action and the advantages of social cooperation. Indeed, human beings are not isolated, but neither is it correct to think that decisions are always taken collectively. In the end, society is made up of billions of people who make individual decisions that of course affect others. The modern economy is highly developed precisely because of the high degree of the international division of labor and knowledge.

If there is an economist who has stood out for his ability to disseminate economic ideas and criticize, in the form of parody, economic sophistry, and fallacies, it is Frédéric Bastiat, a French economist and defender of economic liberalism. Bastiat considers that the difference between a bad economist and a good one is that the former only looks at the immediate consequences of economic events (he only looks at what he sees). At the same time, the latter pays attention to the short-term consequences, but also to the medium and long-term effects of economic policies (he looks at what he sees and what he does not see). In one of his works, he presents a story about the *Fallacy of the Broken Window* (1850) in which a young man breaks the window of a bakery with a brick. At first, the neighbors consider that this, although it may seem unfortunate, has a positive side because some glazier will benefit from the increased demand for windows. However, they do not consider that the baker would have spent that money on other more useful goods and now will not be able to do so.

Bastiat was also very skillful in criticizing economic protectionism in the story *Petition of the Candlemakers* (1845), which tells how candlemakers ask the government to protect them from outside competition from the sun, which naturally illuminates their houses and causes them economic losses

(unfair competition). They, therefore, propose that, for the sake of the national interest to which they contribute so much, the windows of citizens should be closed to boost the national industry.

A well-known story is *I, pencil*, an essay by Leonard Read, first published in 1958, which Milton Friedman took to television in his *Free to Choose* program. It tells the story behind the manufacture of a seemingly simple commodity such as a pencil. However, its production incorporates a great deal of knowledge that is scattered in the minds of hundreds of people. The wood from which it is produced may come from the forests of Washington, the graphite from the mine in South America, the eraser rubber may come from Malaysia, and so on. We have these goods at our disposal without any central planning behind them. This is due to the collaboration of many people who coordinate through the price mechanism and the drive for profit.

In the style of a detective novel, Marshall Jevons, a pseudonym that pays homage to two 19th-century neoclassical economists and behind which are professors William L Breit and Kenneth G. Elzinga, wrote *Murder on the Margin* (1978) in which an economics professor, Henry Spearman, discovers the murderer of a crime through the laws of supply and demand, the theory of capital and game theory. Subsequently, these authors published other books with the same protagonist such as *The Fatal Equilibrium* (1985), *A Deadly Indifference* (1995), and *The Mystery of the Invisible Hand* (2014). The concept of margin is reminiscent of the marginalist revolution of the last third of the 19th century where the value of consumer goods was explained through the concept of marginal utility, resolving the paradox of value posed by the classical economists.

A reference novel for studying economics, finance, and the role of the state in society is Russell Roberts' *The Invisible Heart: A Liberal Romance* (2002), which tells the story of two private high school teachers, Sam Gordon and Laura Silver, in Washington, D.C. He advocates the free market and opposes state intervention while Laura believes that the state should protect workers and consumers from the excesses of capitalism. Love will grow between them, but can love to grow between two people with such opposing ideas? The novel has some very well-crafted dialogues in which the most solid economic theories are shown with good examples and the economic fallacies that are so typical of our discipline are dismantled. While the romance and debates between these professors develop, a parallel plot develops in which Erica Baldwin, who heads a state institution, tries to bring the businessman Charles Krauss to justice.

The most recent novel to be analyzed is William Nicolson's *The Romantic Economist* (2013) which tells how Will, a young student with difficulty in having long-term romantic relationships, applies the economic

theory of supply and demand, types of markets, costs, game theory, and other economic concepts to succeed in love.

As noted, many literary materials deal with economic themes that we cannot elaborate on for reasons of space. Thus, works such as *The Arabian Nights*, Edgar Allan Poe's *The Golden Beetle* (1843), Lewis Carroll's *Alice's Adventures in Wonderland* (1865), or Robin Hood reflects economic concepts. The latter book has been made into animated films with real characters on several occasions. Some consider this outlaw of Sherwood Forest in medieval England to be a prototypical socialist hero because he "takes money from the rich and gives it to the poor", although what he was doing was taking money from the tax collectors and giving it back to the Saxon people, oppressed by the Normans, which is why some liberals have vindicated him. Political and economic references can also be found in works by George Orwell (1903-1950) such as *Animal Farm* (1945) or the dystopian *1984* (1949), which denounce the totalitarianism of 20th century Europe.

The use of this didactic resource can also contribute to improving the reading comprehension results of our students, a subject in which we have fallen back in recent years, as shown by the results of the PISA report.

3. Analyzing the Economy through Film

The first film was *La sortie des usines Lumière* (1895), and over time, cinema was consolidated as the most popular art form of the time. Some studies analyze the proposal to use film to teach economics at university and its results. One example is an article (Fernández et al, 2012) that reflects satisfactory results for the CinEmpresa project, which they developed in two editions, at the University of Santiago de Compostela.

As with literature, cinema may not reflect reality, allowing itself historical licenses. It can also be used as political propaganda or be subject to censorship. This art was used by Soviet socialism with films such as Sergei Eisenstein's *Battleship Potemkin* (1925), which tells the story of a mutiny on a battleship over rotten meat given to sailors by officers in Tsarist times and was commissioned by the regime to commemorate the anniversary of the 1905 revolution. In Nazi Germany, the same was true of documentaries such as *Triumph of the Will* (1935) and *Olympiad* (1938), both directed by filmmaker Leni Riefenstahl. For this reason, the teacher needs to explain the context of artistic productions.

Many films deal with themes related to history, law, and other social sciences. Before discussing the main economic films, it is worth mentioning some legal films such as *12 Angry Men* (1957), *Witness for the Prosecution* (1957), *Anatomy of a Murder* (1959), *To Kill a Mockingbird* (1962), *Final Verdict* (1982), *A Few Good Men* (1992), *In the Name of the Father* (1993), *Philadelphia* (1993), *The Cover-Up* (1993) and *Life Sentence* (1994). Law is

closely related to economics because all economic exchange is based on the transfer of property rights and there must be courts to resolve commercial disputes. Economics, in turn, can be integrated with history in a discipline known as Economic History. Within this genre, we can highlight several films. The slave mode of production in antiquity is reflected in films such as *Quo Vadis* (1951), *Ben-Hur* (1959), and above all *Spartacus* (1960), which tells the story of the rebellion of this slave in the last years of the Roman Republic. *Gladiator* (2000) shows the role of gladiators in the circus. When the Western Roman Empire fell in 476 AD, political power was fragmented and Europe experienced a wave of invasions by barbarian peoples (Suevi, Goths, Visigoths, Vandals, Alans, Huns, etc.). Historians consider this to be the beginning of the Middle Ages, a period that would last approximately a thousand years and end with the capture of Constantinople by the Turks in 1453, or, for others, with the discovery of America in 1492. This period is characterized by feudalism, based on the relationship of dependence between a feudal lord and a vassal or serf. These relationships can be seen in the film *The Warlord* (1965). Another interesting film about this period is *Der Name der Rose* (1986). The most important work to see the effects of the Black Death (1347-1351) in Europe is Ingmar Bergman's *The Seventh Seal* (1957). After the Middle Ages came the Modern Age from the end of the 15th century to the 18th century, when several events took place that initiated the Contemporary Age, such as the French Revolution of 1789 and the independence of the thirteen North American colonies. In economic terms, the Modern Age was characterized by great geographical discoveries, the opening of new trade routes, and mercantilist ideas that considered that wealth depended on the number of precious metals (gold and silver) that a country accumulated. Thus, the great merchants proposed limiting imports of manufactured goods to produce these products domestically and encouraging exports by granting privileges in the form of monopolies for domestic or international trade, such as the East India Companies, which were promoted in England and Holland. The films that best reflect this period are the following: *Aguirre, la cólera de Dios* (1972), *La Misión* (1986), *1492: The Conquest of Paradise* (1992), *A Man for All Seasons* (1966), about the life of Thomas More and Luther (2003).

In the Contemporary Age, in which we find ourselves, there have been many events of great economic relevance, such as the industrial revolution in Great Britain, the spread of these advances to northern Europe and the USA with the Second Industrial Revolution (1850-1914), colonialism, the economic nationalism of the inter-war period (1918-1939), the planned economy for the war effort of the Second World War, and the economic development of the United States. These include the Second Industrial Revolution (1850-1914), colonialism, the economic nationalism of the inter-war period (1918-1939), the planned economy for the war effort of the

Second World War (1939-1945), the Cold War (1945-1989), and the beginning of a new phase of economic globalization after the fall of the Berlin Wall. In between these events, there have been several economic crises such as the Great Depression of 1929, the oil crisis of the 1970s, the Southeast Asian crises of the 1990s, the Argentinean crisis of 2001, the dot.com crisis of the same year, and the Great Recession of 2008. Now the world has been shaken by another crisis of external origin generated by the COVID-19 pandemic, which will have a major economic impact. Later on, we will discuss the films that deal with these temporary crises, but first, we will mention some relevant films in the study of this period. To illustrate the effects of the First Industrial Revolution, we can see works such as *Oliver Twist* (1948), *Daens* (1992), and *Germinal* (1993). There are many versions of the former, and they are adaptations of Dickens' novels. This version is directed by David Lean and tells the story of Oliver, an orphan boy who was abandoned in an orphanage. The director of the center sells him to a businessman, and he works for him in his workshop despite the poor conditions he receives. In the end, he manages to escape and joins a group of thieves. *Daens* tells the story of the revolt of the workers in a factory in a Belgian town, and *Germinal* shows the working conditions in the mines, the strikes, and the workers' movement.

For an analysis of the second Industrial Revolution with the development of the oil industry and the concentration of capital, see Orson Welles' *Citizen Kane* (1941), *Giant* (1956), and *There Will Be Blood* (2007). The First World War (1914-1918) put an end to the process of peace and economic integration, and the consequences were far-reaching: the end of the empires of Central Europe, the Ottoman Empire, and the fall of the Tsars in Russia. With the rise of communism came the nationalist reaction of European fascism. The 1919 Treaty of Versailles imposed very harsh conditions on Germany, which led to hyperinflation in that country and the rise of nationalism. John M. Keynes warned of disaster in his *The Economic Consequences of Peace* (1919). The best films about this war are *Paths of Glory* (1957) and *Gallipoli* (1981). Although it was a turning point in the history of the continent and the world, there are few films about this war, although Sam Mendes' *1917* (2019) is a recent release of great quality. To understand the context of the Bolshevik revolution, see David Lean's *Doctor Zhivago* (1965), based on the novel by Boris Pasternak, who won the Nobel Prize for literature in 1958.

Nazism and World War II have produced many more films than other events of the 20th century. A list of the best must include Cabaret, Visconti's *La Caduta Degli Dei* (1969), *Tora, Tora, Tora* (1970), *Patton* (1970), Steven Spielberg's *Schindler's List* (1993), Roberto Benigni's *La Vita è Bella* (1997), Spielberg's *Saving Private Ryan* (1998), *The Sinking* (2004) and *The Counterfeiters* (2007). After the Second World War, the world was divided

into two large blocs: on the one hand, the US allies, with free-market economies, albeit intervened, and on the other, the countries that were under the orbit of the Soviet Union (USSR) and communism. These two great powers were the protagonists of the Cold War, an indirect conflict through the support of governments or guerrilla groups in other countries and the struggle for hegemony in fields such as the space race, chess, economic growth, etc. The best film to compare these systems, although it caricatures prototypical characters, is Billy Wilder's *One, Two, Three* (1961).

In general, and even though the film industry has been dominated from the beginning by Hollywood and the big American studios, few films have been produced that openly defend the capitalist economic system. A notable exception is a film *The Fountainhead* (1949). It is an adaptation of the novel by Ayn Rand (1905-1982), a Russian philosopher who emigrated to the US and was an advocate of Objectivism, in which an architect, Howard Roark, tries to impose his ideas of construction against other approaches. Some films praise the individualistic entrepreneur who stands up to politicians and big corporations. This is the case of *Tucker, a Man and his Dream* (1988), and *The Aviator* (2004). An example of the possibility of achieving goals through effort is found in *The Pursuit of Happyness* (2006) where the protagonist, who must take care of his son, manages to escape unemployment and poverty.

The following is an analysis of the most important crises and how cinema has dealt with them. *The Grapes of Wrath* (1940) tells the story of a family who loses their land after an eviction in the middle of the Great Depression in the United States and set out on a journey, along with the famous Route 66, to get from Oklahoma to California, where they hope to find a better future that they will not find. Other films recreate the atmosphere of the Great Depression, among which we can highlight: *Sullivan's Travels* (1941), *Bonnie & Clyde* (1967), *They Shoot Horses, Don't They?* (1969), *The Sting* (1973), *The Purple Rose of Cairo* (1985), *O Brother!* (2000), *Road to Perdition* (2002), and *Cinderella Man* (2005). The most iconic are *Bonnie & Clyde* and *The Sting*.

Another film with a strong economic message is *Modern Times* (1936) in which an assembly line worker loses his mind due to the strenuous pace of work. It is a critique of Taylorism and industrial capitalism. It reflects the social discontent of the depression, the influence of mechanization on human activities, poverty, hunger, and the problem of evictions. The practice of fractional reserve banking can be seen in several films. The best known is *It is a Wonderful Life* (1946) where the owner of a small family bank plans to commit suicide when his bank goes bankrupt. In a scene where customers demand their deposits in a bank panic, Bailey explains to them that these resources are invested in different projects: mortgage loans, businesses, etc. In *Mary Poppins* (1964) there is also a scene where the loss of confidence leads to a banking panic. *La Odisea de los Giles* (2019) is an Argentinian comedy

that shows the consequences of the 2001 bank run on a group of people who have lost everything.

The 2008 crisis, known as the Great Recession, has also been made into a film and several documentaries have been produced. The best known is undoubtedly *Inside Job* (2010), which won the Oscar for best documentary of the year and highlights the financial deregulation and immoral behavior of bankers, rating agencies, and politicians who designed or promoted highly complex financial instruments. The best film about the Great Recession is *The Big Short* (2015). It tells the story of young people who bet against the real estate sector by investing short, i.e. speculating that stock prices would fall in the future, something that was not expected in the years leading up to the collapse of Lehman Brothers. The film is based on a book by Michael Lewis. Another interesting film about this crisis is *Margin Call* (2011), which tells the story of the lives of the workers of an investment bank within hours of the outbreak of the crisis in the financial markets. In *Too Big to Fail* (2011), the 2008 crisis is explained by adapting the book by Andrew Ross Sorkin. A film that looks at the crisis from the perspective of a European country is *Adults in the Room* (2019), based on a book by former Greek finance minister Yanis Varoufakis. The most recent work on this episode is *Nomadland* (2020) where a woman who has lost everything in the crisis starts living as a nomad in a caravan and embarks on a journey west.

If we leave the field of economic crises and enter the labor market and the problems of unemployment, we can look at some Spanish films. *Los lunes al sol* (2002) shows the effects of industrial reconversion and the drama of unemployment. *El Método* (2005) shows the competitive climate among the aspirants to an executive position and the lack of scruples of the participants. *Glengarry Glen Ross* (1992) tells the story of real estate agents operating in a highly competitive sector in crisis. In *Full Monty* (1997), a group of steelworkers in Sheffield become unemployed and become strippers, and *The Company Men* (2010) reflects the problem of collective unemployment due to downsizing and the need to readjust to the new situation. Unionism appears in several films such as John Ford's *How Green Was My Valley!* (1941) by John Ford, *On the Waterfront* (1954) by Elia Kazan, and *Novecento* (1976).

The importance of ethics in business and the lack of moral values of many managers or businessmen are also well reflected in films such as *Network* (1976), *Wall Street* (1987), *Pretty Woman* (1990), *The Insider* (1999), *Erin Brockovich* (2000), *Up in the Air* (2009), *Limitless* (2011), *Le Capital* (2012), *The Fraud* (2012) and *The Wolf of Wall Street* (2013) and in documentaries such as *Enron, the Smartest Guys in the Room* (2005).

The sub-genre of heist and con films is well developed, and some have already been mentioned. Notable are *Goodfellas* (1990), *Reservoir Dogs* (1992), *Snatch* (2000), *Nueve Reinas* (2000), *Catch Me If You Can* (2002), and *Public Enemies* (2009).

To analyze the changes that have taken place in the business world with the emergence of the internet and information technologies, see *The Social Network* (2010), which tells the story of the creation of Facebook by Mark Zuckerberg. Another highly relevant topic is business leadership and human capital management, which appears in several films closely linked to sports, such as *Invictus* (2009) and *Moneyball* (2011).

Business negotiation, conflict resolution, and decision-making can be seen in many films, but we can highlight its great quality and importance in the history of cinema *The Godfather* (1972). Several films reflect a future where resources have become very scarce, and humanity is on the brink of the abyss. In *Mad Max* (1979), humans struggle for petrol in an anarchic world, and in *When Fate Catches Up with Us* (1973), the inhabitants of New York suffer from hunger and face Malthusian overpopulation. In conclusion, it may be noted that there are very few films that focus on the lives of great economists. One can mention *A Beautiful Mind* (2001), based on the life of John Nash, and *Le Jeune Karl Marx* (2017).

4. Teaching Proposal for the Subject "Introduction to Economics"

The subject is taught in the first year of the Degree in Business Administration and Management. It will follow the units of the syllabus included in the teaching guide of the subject. There will be units where more literary or audio-visual resources will be used and others where, due to their subject matter, they will not be used or will be used to a lesser extent. The application of this method requires a great deal of involvement on the part of the teacher, as he/she must have an in-depth knowledge of the materials and make an appropriate selection of them according to the subject and the time available. Appendix A shows an example which proposes a lesson plan detailing the objectives of each session, the activities carried out in class and the literary or audio-visual resources used.

In the first class, the evaluation criteria will be explained. We are going to propose that the final exam will account for 50% of the mark and that the remaining 50% will be divided into three parts, 10% of the mark based on the activities carried out in class (Appendix B), another 10% of the mark on a reading control (Appendix C) and 30% based on the compulsory individual work. The activities will be carried out in class after the teacher's explanation and the use of literary material or the viewing of a fragment of the films mentioned. The teaching methodology to be used is cooperative learning, as the activities will be carried out in pairs. It is an active method in which the students take the leading role in the teaching-learning process. For the last two parts, the Flipped Classroom methodology will be used. According to Jorge-Vázquez, et al. (2018), the Flipped Learning model involves a transfer outside the classroom of certain learning processes that require lower-order cognitive

levels and that, therefore, enable more autonomous and independent work by the student. This frees up time in the classroom for the development of other more complex activities of application and consolidation of content that require greater teaching guidance, enabling an interactive and personalized learning experience. In this way, according to the classroom intervention proposal, students do the work at home (in this case, the proposed readings and the viewing of the films) and use part of the class time to progress with the final work and raise any doubts they may have. This is another active learning methodology that is usually associated with the creation of audio-visual content by the teacher (Tourón & Santiago, 2014; Jorge-Vázquez et al, 2020). In this sense, the teacher will create and send videos analyzing these materials to facilitate the students' tasks. On the other hand, as several authors (Martín et al, 2017; Sengel; 2016; Basso-Aránguiz et al, 2018; Jorge-Vázquez, et al, 2020; among others) argue, this pedagogical approach contributes effectively to the students' competence development.

The aim of the final project is for the students to interrelate the contents seen in class with a selection of books and films that they will have to read and watch outside school hours. The selection is as follows: Book (*The Invisible Heart*), Films (*Wall Street*, *Pretty Woman*, *Up in the Air*, *Inside Job*, *The Social Network*, *The Big Bet*, and *Margin Call*). This assignment will consist of a written document of between 15 and 20 pages incorporating the following points: (a) Introduction; (b) Development; (c) Conclusions, and (d) Bibliography

Although during the course students have been taught the importance of classic works of cinema and literature, we think that, for the final assignment, where the student has to write an extensive essay, it is better to focus on light novels or recent films. In the film block, we have chosen modern films with a variety of themes (unemployment, business negotiations, finance, economic crises, etc.). In the case of books, we have chosen *The Invisible Heart* because it shows many economic concepts in a romantic novel in which the main characters are also two teachers at Edward School, Sam, an economics teacher, and Laura, an English literature teacher. Sam is in favor of the free market and Laura thinks that the state should intervene and regulate economic activities.

The assessment of the compulsory work will be based on an analytical rubric which will be given to the students so that they know the most relevant aspects to focus on. It is also considered appropriate for students to read the novels *Murder in the Margin* and *The Romantic Economist* because of the appeal of mystery and love adventure books. The back cover of both books summarises the content very well. Let's look at the back cover of the first book: "Thus, between coral reefs and Caribbean percussion bands, Professor Henry Spearman leads the reader to the murderer by applying the law of supply and demand, opportunity costs, monopoly, capital theory, and even the

famous prisoner's dilemma of game theory. Behind the name Marshall Jevons-comprised of the surnames of two famous 19th-century English economists-are two American economics professors who, with Henry Spearman, create a distinctive and original figure in the tradition of the British mystery novel and, not least, manage to familiarise even the most economically adverse reader with economic principles".

As for the second, he tells us that: "Will, tired of his difficulties and missteps in his relationships with girls, the young student Will decide one day to change his approach and apply the fundamental notions of economic theory to his love life, thus becoming The Romantic Economist. Through this amusing approach, William Nicolson brings together and explains the main concepts and mechanisms that govern the economy in this tale of his protagonist's adventures and misadventures in love. Thus, supply and demand, the efficient market hypothesis, game theory, investments, costs, strategies, etc. Will Will, succeed with his new approach? Probably not as much as anyone who looks to this entertaining book as an opportunity to easily understand the elementary springs of how economics Works".

To check that the student has read these two novels, a reading control is proposed. It is important to know at the end of the course the degree of satisfaction of our students with the method we are developing. To this end, a survey is proposed (Appendix D).

5. Conclusions

We have reviewed the academic literature and found that these media have been used successfully in different contexts. Film and literature could motivate students to understand issues that, although they pertain to people's daily lives, may seem very abstract if explained using only complex mathematical models or graphs and statistics. These literary or audio-visual media do not have to replace traditional teaching methods but can rather act as an educational supplement to motivate our students. Moreover, it will provide them with a good cultural background because we can draw on the classics of literature and cinema. The first part of the paper has shown the theoretical framework necessary for the teacher who wants to follow this course program to understand the capacity that these tools have for the study of economics and other social sciences. Afterward, a proposal for teaching intervention has been put forward, consisting of a class program with the planned objectives, the planning of the sessions, the activities to be carried out and the resources to be used. Ten activities to be carried out in class, a reading control and a compulsory final project have been proposed. Active learning methodologies such as cooperative work and the Flipped Classroom will be used. We cannot yet know the success of this proposal as we have not yet implemented it in the classroom, but we believe that it will be supported by the students and the

teaching staff. To know the degree of satisfaction of our students with this method, we have designed a model survey that can be given to the students at the end of the academic year.

The main advantage of this method is its ability to improve student attention and its adaptability to a virtual teaching environment. A possible drawback of the proposal is that an important part of the assessment consists of autonomous work on the part of the student, especially reading control and individual work so the importance of teamwork in this part is not valued. However, they will be able to do the work in the classroom and raise their doubts. In addition, it has been established that the activities carried out in class are done in pairs so that students learn to cooperate.

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Appendix A: Course planning

Example of a didactic unit (out of the total of 15 that make up the course. All of them can be requested to the corresponding author of this article).

Unit 1: Economic Science

Contents	Objectives	Class planning	Class-room work	Literary and film re-sources
1. Economic science. Human needs.	To know the characteristics of economic science	1. Presentation of the course 2. Explaining the concepts		
2. Goods that satisfy human needs.	To know the difference between consumer goods and capital goods.	1. Explain the concepts 2. Read several excerpts from Robinson Crusoe		Robinson Crusoe
3. Economic activity. (The method of economic science)	To know the main economic activities	3. Explain the concepts	Activity 1	
4. (The insertion of economists in the labor market). Case study: Are needs created or discovered?	Analyze the role of the economist in society and possible career opportunities	1. Reading of cases proposed in the book 2. Activity 3. Time for Flipped Class-room activity		

Appendix B: Proposed course activities

General considerations. The activities can be done in pairs and will be carried out in class after the teacher's explanation and the reading of a text or the viewing of scenes from films commented on by the teacher. All the activities are worth the same for the final grade.

Activity 1. Robinson Crusoe and the foundations of economics

1. Who is the author of the novel?
2. Who is Robinson Crusoe and how did he get to the island?

3. What economic problems does he encounter living alone on the island?
4. What are the advantages and risks of another person appearing as Friday?

Activity 2: Economic history through film

Link the following columns:

Spartacus	Feudalism
William of Baskerville	Slave revolt in Rome
Ben-Hur	The Name of the Rose
Economic system during the Middle Ages	Slavery in galleys
The Warlord	Medieval film.
Quo Vadis?	Nero

Activity 3: Film about economic systems: One, Two, Three by Billy Wilder

1. Where is the film set?
2. What is the historical context of the film?
3. What are the main strengths and weaknesses of the character who represents the capitalist economic system?
4. What are the main strengths and weaknesses of the character representing communism?

Activity 4: Reading the story by Tom Smith

Answer the following questions:

1. Summarise the plot of Tom Smith's story: What causes the rise in the price of bread? How does society react to the rise in the price of bread? How does the government react?
2. Define the concept of monopoly and oligopoly. There are different concepts of monopoly. Describe briefly each of them.
3. What is a cartel? Give some examples

Activity 5: Business cycles.

Answer the following questions:

1. What does the parable of the talents in the Bible teach us?
2. What was the canonical prohibition of usury?
3. Summarise the theory of the Joseph cycle in Genesis.
4. Why did the Great Depression occur and what were its consequences?
5. Why did the Great Recession occur and what were its consequences?

Activity 6: Business cycles. Unemployment and inflation

Answer the following quiz:

Which of the following cycle theories is the oldest?

- a) Mises and Hayek's theory of the monetary cycle.
- b) Joseph's theory of Egypt's Pharaoh shows years of good harvests followed by years of drought.
- c) Kydland and Prescott's theory of real cycles
- d) The Uncle Scrooge McDuck theory

Which film reflects the effects of the 2001 Argentinean bank corralito?

- a) The Grapes of Wrath
- b) Inside Job
- c) The Big Bet
- d) The Odyssey of the Giles

The film *The Grapes of Wrath*?

- a) is based on a novel by Steinbeck
- b) Is set in the American Great Depression
- c) It narrates the journey of a group of farmers on their way to California.
- d) All options are correct.

According to Scrooge McDuck:

- a) Inflation generates very positive effects on economic activity.
- b) Inflation reduces the purchasing power of money and has negative effects.
- c) Inflation does not affect real economic activity.
- d) Government spending stimulates aggregate demand.

In which film is the drama of unemployment depicted?

- a) *The Big Gamble*
- b) *Mondays in the Sun*
- c) *Margin Call*
- d) *Nine Queens*

Which film tells the story of how the Great Recession of 2008 unfolded in the USA?

- a) *Margin Call*
- b) *The Big Bet*
- c) *The Grapes of Wrath*
- d) Both a and b are correct.

What is the most important documentary about the Great Recession?

- a) *Inside Job*
- b) *How to Improve the Standard of Living*
- c) *Bankruptcy*
- d) *In Defence of the Euro*

Which film shows how to better oneself through hard work and refers to a phrase from the US Declaration of Independence?

- a) *Mondays in the Sun*
- b) *In Pursuit of Happiness*
- c) *The Method*
- d) *Up in the air*

In which film is an eviction process depicted?

- a) *Mondays in the Sun*
- b) *The Grapes of Wrath*
- c) *The Merchant of Venice*
- d) *Wall Street*

Activity 7: Money and the financial system

1. Summarise the plot of Shakespeare's *The Merchant of Venice*. What credit operation is depicted in the novel?
2. How did currency devaluation take place in Spain during the Golden Age and what effects did it have? Point out any fragment of *Don Quixote* where this phenomenon is analyzed.
3. What view of financial markets does Gordon Gekko, the main character in the film *Wall Street*, have?
4. What are the differences between stocks and corporate bonds?

Activity 8: The fractional reserve

1. What is the fractional reserve?
2. Why can't George Bailey return all the customer deposits in the film *It's a Wonderful Life*?
3. Why is there a bank panic in the film *Mary Poppins*? What is fiat money?
4. In the film *Contestant* it is stated that money is based on debt. What does this mean?

Activity 9: The Euro and the monetary policy of the European Central Bank (ECB)

After the screening of the documentary *In Defence of the Euro*, fill in the table below:

Positive aspects of the common European currency	Negative aspects of the common European currency

Activity 10: Underdevelopment

After the screening of the video: How to improve living standards, answer the following questions:

1. Identify five developed and five developing countries.
2. What are GDP per capita and the Human Development Index (HDI)?
3. Why are there such differences in levels of wealth?
4. What can a developing country do to get out of this situation?

Appendix C: Reading control

General To be held on the last day of class. Duration: 40 minutes

*Reading test on the book *Murder in the Margin*:*

1. Who is Henry Spearman?
2. Where does the story take place?
3. How many crimes take place?
4. What economic theories appear in the novel?
5. Who is the murderer(s)?
6. How does the economist discover the criminal?

*Reading quiz on the book *The Romantic Economist*:*

1. what economic theory is behind the idea of "begging to be begged"?
2. Why did Will's strategy with Rebecca fail at the beginning of the novel?
3. What is the efficient market hypothesis and when does it appear in the novel?
4. What is signaling and how does the protagonist apply it?
5. How does the protagonist apply financial theory to romantic relationships?
6. How does the protagonist apply game theory to romantic relationships?
7. What does the author mean by Keynesian love?

Appendix D: Satisfaction survey

Please mark the rating that corresponds to the following questions (in order from the lowest to the highest rating)

	1	2	3	4	5
Assessment of classroom activities					
Degree of difficulty of the compulsory work					
A general assessment of the selected films					
Overall assessment of the selected books					
Teacher's performance with resources used					
Final evaluation of the course					

1. What did you like most about this methodology?
2. What aspects of this methodology can be improved for the next course?
3. Which films and books did you like the most?



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