International Journal of Evaluation and Research in Education (IJERE)
Vol. 14, No. 3, June 2025, pp. 2167~2182
ISSN: 2252-8822, DOI: 10.11591/ijere.v14i3.31589

The impact of meme integration on university students' active learning

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Article Info

Article history:

Received Jun 12, 2024
Revised Feb 17, 2025
Accepted Feb 21, 2025

Keywords:

Digital culture
Digital learning
Gen-z
Memes
Teaching innovation

ABSTRACT

This study investigates the application of memes as a didactic tool in university-level social sciences education to address the learning needs of generation Z students. In the present study, the problem of the reduction in the academic performance of students is presented to us. With this research we have sought to contrast if the meme tool can help to give an answer to this problem. The methodology was implemented in business administration, economics, and law courses. Students were tasked with designing memes related to course content. A total of 110 memes were submitted by students, and 45 participants completed an evaluation questionnaire. Correlations and a linear regression model were used mainly for data analysis. Regarding the analysis of the results obtained in specific business subjects, where 68 students were evaluated, it should be noted that the meme variable is the second most significant variable in the final grade obtained. This data seems to indicate that, if the students have been able to synthesize part of the contents in memes, this has helped them in a better assimilation of the subject, and to pass it successfully. We certainly know that young people spend a lot of their time on platforms, and the language of memes is familiar to them. These findings suggest that memes can be an effective and engaging educational tool, offering valuable benefits in the digital age for both students and educators.

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1. INTRODUCTION

Memes are units of cultural information, typically shared in the form of images, videos, or text, that spread rapidly across the internet [1], [2]. Often incorporating humor, satire, or pointed commentary, memes evolve as they are adapted and remixed by various users [1]–[3]. In the context of digital culture, memes serve not only as a form of entertainment but also as tools for social commentary and communication, reflecting and shaping public opinions and trends [3], [4]. Their ability to convey complex ideas and emotions quickly and effectively allows them to engage and resonate with a broad audience, leveraging the power of visual and textual elements [2], [4]. In recent years, the use of memes has expanded beyond popular culture, entering more formal contexts like education, particularly in the social sciences. Research has shown that using memes as a teaching resource can offer numerous benefits for both teachers and students, such as increasing engagement, facilitating the understanding of abstract concepts, fostering creativity, enhancing

information retention, and connecting course content to current cultural trends [5], [6]. However, despite these promising findings, it is crucial to ensure that memes are used in a balanced and relevant manner, aligned with the learning objectives of the course [7], [8]. Existing studies have predominantly focused on the general advantages of using digital tools, including memes, in education, but there is a lack of comprehensive research on how student-generated memes can be employed as a didactic tool to promote creativity, critical thinking, and a deeper understanding of complex subjects [9]. This gap in the literature points to the need for more in-depth exploration of the specific educational impacts of meme creation, particularly in relation to generation Z students, who are considered digital natives due to their lifelong exposure to digital technologies and social media [10].

The purpose of this study is to investigate the use of memes, not only as tools for content delivery, but also as methods that actively engage students in creating their own educational materials. By focusing on student-generated memes, this research aims to demonstrate how the process of meme creation can make learning more enjoyable, enhance understanding of difficult topics, stimulate critical thinking, facilitate the explanation of abstract concepts, encourage participation, and connect teaching with contemporary culture [9], [11]. The specific objective is to evaluate the effectiveness and impact of this methodology in university-level education, particularly among generation Z students, who are known for their affinity with digital communication and visual media. The expected benefits of meme usage in the classroom include increased student engagement due to the humorous and visually stimulating nature of memes [6], [11], [12] improved understanding of complex and abstract concepts through simplification [10], enhanced creativity among both teachers and students [13]; and better retention of information due to the memorable nature of memes. Furthermore, involving students in meme creation promotes active participation and teamwork [14], encouraging dynamic teaching methods [15]. Additionally, memes offer a unique opportunity for connecting academic concepts with current cultural and societal issues, as they reflect contemporary trends and popular culture [15], [16]. For students, the use of memes can make learning more enjoyable and less intimidating, motivating them to engage actively in class discussions and meme-related tasks [6]–[9]. Memes also facilitate the understanding of complex concepts, allowing students to grasp topics that might otherwise seem overwhelming [6], [17], [18]. Moreover, meme creation encourages critical thinking and creativity, enabling students to develop skills in problem-solving and creative expression [15]. Memes can improve long-term retention of information, helping students recall important content more effectively [18]. Student-generated memes foster collaboration and active participation in the classroom, contributing to the development of digital skills as students learn to use various online tools to design and share their memes [19].

Finally, memes can foster critical thinking through humor, satire, and layered meanings, a competence essential in contemporary education [18], [20], [21]. As educational dynamics evolve with each generational cohort, teaching strategies must adapt to the needs of modern students. While baby boomers experienced the transition from analog to digital, and generation X witnessed the rise of personal computers, millennials had to navigate the internet era [21]–[23]. Today's university students belong predominantly to generation Z—a cohort of digital natives who have grown up in an environment of smartphones, social media, and instant access to information [10]. This context poses unique challenges for educators, particularly in higher education.

Given this, the inclusion of memes as a pedagogical resource presents an opportunity to enhance the teaching-learning process for generation Z students, aligning their preference for visual communication and immediacy of information with innovative educational approaches. Memes not only facilitate the understanding of abstract concepts but also encourage students to exploit their creativity while engaging with course content. The use of memes by teachers could enable the creation of more dynamic and participatory learning experiences, adapted to the profile of today's students and promoting more meaningful learning [24], [25]. In light of these considerations, this study proposes the integration of memes as a didactic tool for teaching in undergraduate programs such as business administration, economics, and law. This approach aims to maintain teaching quality while addressing the needs of a new generation of students, necessitating the adoption of innovative perspectives and the adaptation of teaching methods to align more closely with digital culture [26]. Year after year we witness a continuous growth in the use of digital content, explained both by the increase in the population that uses it, as well as by the greater frequency of its use [27]. This significant growth in the demand for digital content has played an important influence on the COVID-19 pandemic that began in 2020, especially in the demand for educational and training content; movies, videos, and music, as shown in Figure 1.

As might be expected, the levels of digital content consumption, although high for the Spanish population as a whole, decrease substantially as the age bracket increases, as presented in Table 1. While young people between 14 and 24 years of age have percentages of no less than 60%, reaching 95% for several digital contents, in the case of the older age group, in the best of cases, it barely reaches 40%.

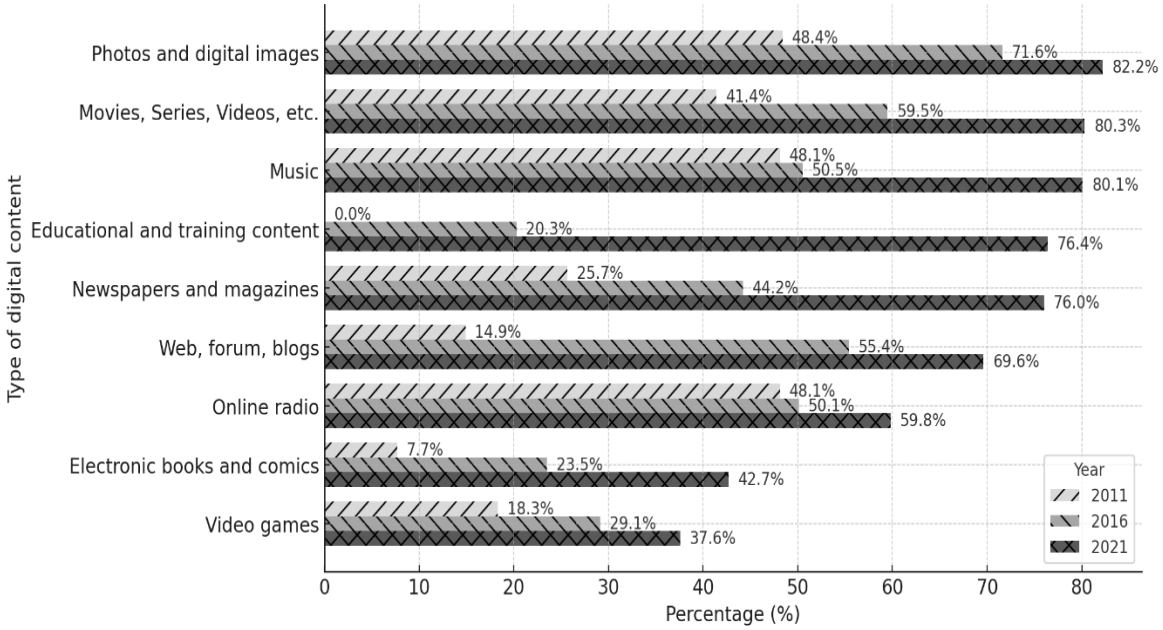

Figure 1. Use and consumption of digital content [27]

Table 1. Consumption of digital content by gender and age [27]

Type of digital content	Total	Gender		Age			
		Man	Woman	14-24	25-34	55-74	75 or more
Photos and digital images	77.60%	77.60%	77.60%	95.60%	83.60%	72.90%	40.60%
Movies, series, videos, documentaries	75.90%	78.50%	73.50%	95.40%	83%	68.10%	39.80%
Music	75.50%	78.30%	72.90%	97.10%	82.80%	67.10%	37.70%
Newspapers and magazines	71.90%	76.30%	67.80%	76.20%	77.40%	72.40%	40.80%
Educational and training content	71.80%	74.40%	69.40%	92.60%	80.40%	61.40%	33.70%
Web, forums, blogs	65.10%	69.70%	60.70%	84.10%	74.60%	53.70%	27.20%
Live online radio or podcast	47.20%	53.00%	41.70%	58.30%	51.80%	44.20%	20.90%
E-books and e-comics	40.00%	40.50%	39.60%	60.20%	42.70%	34.90%	17.30%
Videogames	27.10%	33.00%	21.60%	60.60%	29.10%	14.50%	9.90%
None of these/Ns	6.70%	4.90%	8.40%	0.50%	1.70%	6.80%	36.00%
Base	3,304	1,590	1714	385	1,670	878	371

In the last decade, the use of electronic devices in the world has increased substantially, with the smartphone standing out, used worldwide by 92.3% of internet users aged between 16 and 64 [28]; a percentage that is slightly lower than that of Spain, 90.7% [29], a difference that can be explained by the greater penetration of fiber optics, a characteristic of most developed countries. In turn, this high use of smartphones has favored the massive use of social networks in the last decade. Thus, in 2021, around 84% of young Americans aged 18 to 29 years claimed to use some social network [30]. In the case of Spain, 85% of internet users aged 12 to 74 use social networks, representing 30.2 million people. The percentage rises to 94% if we consider 18–24-year-olds [29]. However, the data seems to point to the fact that the penetration of social networks in Spain may have reached the stage of maturity [29], since that percentage has remained unchanged since 2018 (with the exception of 2020 which reached 87%, due to the exceptional nature of the COVID-19 pandemic). The study conducted by Deutrom *et al.* [28] shows that 85.7 % of the total population are active users on social networks (although users need not represent unique individuals). Finally, the most recent data available on the use of social networks in Spain are those provided by Máñez *et al.* [31], according to which 90% of the population aged 16 to 24 years had participated in social networks during the three months prior to the survey, as shown in Figure 2.

One aspect of great interest with respect to the role played by social networks is the disparate importance attributed by the different generations to direct personal contact. Thus, the importance attributed by young people belonging to generation Z and millennials is as high as 50%, compared to a maximum of 20% in the case of previous generations, as presented in Figure 3.

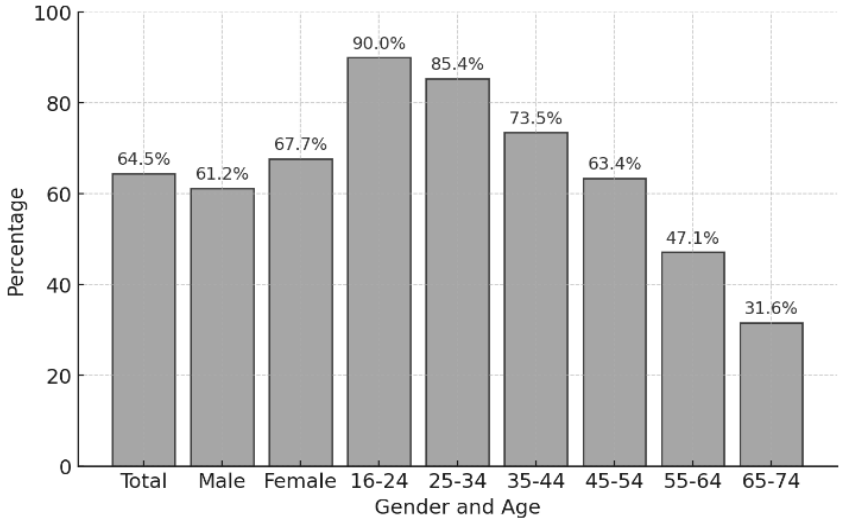

Figure 2. Percentage of the Spanish population that participated in social networks in 2023, by gender and age groups [32]

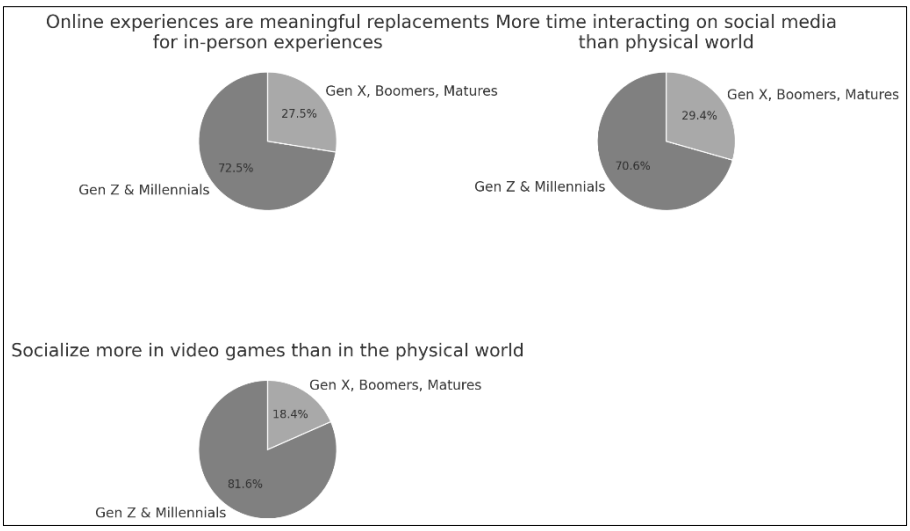

Figure 3. Generations and importance of online experiences [33]

In the midst of this great dynamism in social networks, one of the contents that has acquired in recent years a dazzling prominence has been memes. These are used for a variety of purposes, from portraying political, sports or social news in a critical or amusing way, to being used as a business marketing tool. Thus, according to Mack *et al.* [30], 75% of the US population aged 13 to 36 share memes, a percentage that reaches 79% in the case of the youngest (13 to 17 years old) [34] compiled relevant data from several demoscopic studies showing the impact of memes in digital communication, especially among young people. A study by visual objects reveals that 44% of US internet users aged 18-34 regularly share memes on their social networks. Similarly, a 2021 morning consult survey indicates that 63% of US internet users aged 18-29 have shared memes online. The pew research center survey, also from 2021, indicates that 64% of US adults aged 18-29 use memes. Similar figures were reported in a 2022 study by polling firm YouGov in the UK, France, and Germany. Similarly, a survey by marketing firm MRY highlights how memes have become a common mode of communication among generation Z youth, with 77% of respondents saying they use memes to interact with their peers. In 2021, Instagram also reported that its users were sharing more than one million memes per day, evidence of the huge popularity of this form of digital expression. Therefore, we can conclude that the data presented corroborates the importance that the use of memes is playing in social networks. Likewise, the use of memes, particularly among the younger population, is acquiring great importance as a communication format. As a result and after a thorough literature review, we observed how

other teachers have used this methodology in the field of teaching in medicine [12], in the field of education [35], or in the field of mathematics [36]. It has been used at the university level [6] and also at lower levels of education, especially in secondary education [37].

In our teaching innovation experience, we have applied it to university teaching in the area of social sciences, specifically in the area of business administration and management, law and economics. The teacher explained the methodology in the first days of class: the student or group of students should create a meme, related to the subject of the course and deliver it to the teacher the meme itself, as well as the reason why, its link with the subject. The meme is evaluated by the teacher. Subsequently, all the memes produced have been uploaded to a virtual repository available in open access so that these memes can be used again by any teacher when he/she wants to innovate in his/her classroom. Therefore, the result is twofold: on the one hand, benefits and improvements are achieved in the students (greater attachment to the subject, critical thinking, and digital skills), and on the other hand, an open repository is generated so that other teachers can reuse these memes in their teaching.

The incorporation of the meme in higher education as a tool in the learning process has been relatively recent. In fact, a significant number of teaching experiences using the meme [38], [39] were initiated in the wake of the COVID-19 pandemic, as a way of dealing with the stress generated and the lack of social interaction of students, which hindered learning and study. Thus, Ortiz *et al.* [40] analyzed the way in which the use of memes was used to mitigate this stressful situation generated by the pandemic.

In the field of higher education there are some precedents in the use of the meme, although with different approaches to ours and different ways of measuring the impact and results. Thus, according to Tidy *et al.* [6], "in education, any meme can be used to measure learning progress both in an evaluated activity (formal) or as a didactic tool (informal)." This didactic resource can be used with people of different ages and educational levels, providing good results [37], and it is also possible to measure the impact and results through questionnaires or rubrics [7]. All this can turn the use of the meme in the classroom into a great didactic aid for the acquisition and improvement of content [36]. Thus, it can help to improve comprehension thanks to the visual impact it generates [41], or it can also help to improve competencies through digital creative writing [15] or also teamwork [14].

Another skill that can be improved thanks to the use of memes as a teaching resource is critical thinking [20], and critical writing [13], [18]. There is even evidence of improved student performance when the meme is used as a didactic resource in the teaching of a foreign language, as collected by previous studies [12], [42] highlight the difficulty of engaging generation Z in online education during the pandemic. They implemented an unusual assignment where students created memes to explain immunology topics. The response was positive, with 64 memes created by 45 students. These memes demonstrated understanding of immunological concepts and their connection to popular culture. Although online teaching presents challenges, leveraging digital tools, such as memes, can be effective in engaging students. Meanwhile, Matias [20] explores the integration of internet memes as a tool to develop critical thinking skills in social studies students. It is concluded that there are direct relationships between the use of memes and the development of these skills, suggesting a meme-based learning method to improve students' adaptation to the digital age. In conclusion, despite the humor, memes and their use in teaching is something very serious, since there are several studies that show the path of this element, its usefulness and its value in the classroom [42], [43]; although its impact will depend on the area of knowledge [5], [35].

We list the main experiences that have been carried out in the different areas of knowledge in the field of higher education. In the field of health sciences, in medicine, there are the studies of [21], [38], [44]. In the area of sciences, in chemistry [45], [46], biology [47], mathematics [36]; also in the area of engineering [48]–[50]. In the area of arts and humanities, it is worth mentioning the works of [39], [51] in history; interpersonal communication [52]. As for the experiences carried out in degrees related to the field of education, we can mention in pedagogy the work of Suárez-Guerrero *et al.* [53], in educational sciences [41], or teaching [54]. One of the disciplines where the literature is more prolific is the teaching of English as a second or foreign language [55]–[60]; as well as in content and language integrated learning (CLIL). After conducting a systematic review of the literature on the use of the meme as a resource in language teaching, concludes that it has a positive impact in terms of motivation, concept assimilation and social interaction [61], [62]. However, in the field that concerns us, the social and legal sciences, experiences are scarce (not counting those already mentioned in the area of education). Precisely, in the field of economics is where one of the pioneering experiences is documented, the one carried out by Engel *et al.* [63], in which they propose the use of memes as a support for the understanding of complex economic concepts. To this end, they created a meme repository on the economicsmemes.com website (https://economicsmemes.wordpress.com). These authors consider that the use of memes allows students to connect the concepts studied with reality in a fun way. In the field of political science and international relations, it is worth mentioning Martin [64]. The ease of use of memes (and other humorous resources) in virtual learning environments is analyzed in the work of Antón-Sancho *et al.* [5].

Based on a survey in which 401 university professors from 19 Latin American countries and from different areas of knowledge participated, a high valuation of their use was observed, although with an intermediate valuation in terms of ease of use, probably due to the fact that a relevant percentage of teachers do not use them spontaneously in the classroom. Another noteworthy aspect is the use of the meme as a learning assessment tool. Suárez-Guerrero *et al.* [53] consider it as a valid complementary tool, although complex, but necessary to explore, given the importance of information and communications technology (ICT) and digital content in today's learning environment. The studies we have just listed mostly share the following conclusions when analyzing the use of the meme as a learning tool: it facilitates the understanding of complex concepts and the reminder of relevant concepts; it makes it necessary to review classes and even search for additional documentation; it allows for a relaxed class; it facilitates interaction among students and also with the teacher; and, finally, it should not be the main source of learning.

This allows us to propose the following hypothesis: the use of the meme has a positive impact on the student's academic performance. This is due to the fact that current generations use social networks more and more, which means that the methodological tool of the meme helps them to better understand the subject, since "teachers speak to them in their own language".

The article is structured as: in the introduction, it defines and culturally contextualizes what memes are, in addition to justifying their use in education, especially for generation Z, known for their affinity with digital culture and visual media. The introduction also shows the comprehensive theoretical basis that analyzes the consumption of digital content by young people and its relationship with social networks and memes. In addition, the impact that the COVID-19 pandemic has had on the use and demand for digital content. The methodology section of the study goes into detail describing the sampling process and the participants involved. Details of the questionnaire used to collect data are provided and the statistical model proposed to assess the impact of meme use on students' academic performance is explained. In the results and discussion section, the results obtained from the statistical model are presented, the correlations and significance of the variables are analyzed. In addition, the effectiveness of memes as an educational tool is discussed. The conclusions summarize the findings and benefits of the use of memes in university education, reflecting on the applicability of this methodology and suggesting lines for future research.

2. METHOD

The participants in our research were selected through a non-probabilistic convenience sampling process [5], [65]. This process has been widely used in the field of teaching innovation. We can cite as an example the studies of Canizales *et al.* [66] with the aim of evaluating pedagogical innovation in sports students; or also Palos-Sanchez *et al.* [67] to measure student motivation after using a game-based system. The study involved the participation of 68 university students in subjects in the areas of knowledge of the social and legal sciences: economics, law, and business administration and management. After the execution of the methodology, they were sent a survey in the form of a Google Forms, which they answered freely, voluntarily, and anonymously. All responses were considered valid. The instrument used in this study consisted of a structured questionnaire with a total of 45 closed questions, most of which used a 5-point Likert scale. In addition, a final open-ended question was included that allowed students to express their opinions freely. The questionnaire was organized into three main blocks. The first block contained five questions related to the academic degree of the participants. The second block focused on the sociological profile of the students, addressing aspects such as gender, age, area of knowledge, hours spent using social networks and frequency of use of each particular network. Finally, the third block included 23 questions aimed at evaluating the meme-based methodology, exploring its impact on the development of skills, critical thinking, creativity, among other aspects. Of these questions, four were dichotomous, while the remaining ones followed the Likert scale format. The questionnaire is available for consultation as additional material. The questionnaire collected demographic data such as gender, age, and area of knowledge [68]. In addition, the use of social networks was assessed, including the hours spent on these platforms, which is relevant to contextualize the impact of memes on learning.

In this paper, we present the results obtained in the subjects of business organization, business administration and business economics, in which a total of 68 students were enrolled. Specifically, 26 of these students did send memes (a total of 110 memes, so between 3-5 memes per student) and 42 did not. This has allowed us to contrast the effect of those who did carry out the activity of synthesizing concepts through images with those who did not participate. It should also be noted that of these 68, 45 did answer the questionnaire, since the memes and the activity were shared in class. On the other hand, we present some of the correlations, as shown in Tables 2-4, in relation to the survey carried out, which will allow us to draw better conclusions. Thus, in order to test our hypothesis (H1): “the use of the meme has a positive impact on the student's academic performance,” we have proposed the following model in (1):

$$\text{Grade} = \beta o + \beta 1\ \text{Exam} + \beta 2\ \text{Memes} + \beta 3\ \text{Attendance} + \beta 4\ \text{TO} + \beta 5\ \text{Exercises} + \varepsilon t \quad (1)$$

Where, the dependent variable is the final grade obtained in the subject, and the independent variables are the different evaluable criteria. Note=final grade obtained in the subject of business, in the February 2024 call. Exam=grade obtained in the exam, with a range of scores from 0 to 10. Passing the exam was a prerequisite for averaging the rest of the continuous evaluation. The exam was valued at 60% of the final grade, and 40% of the continuous evaluation, which consisted of compulsory work, class attendance and exercises delivered mainly. However, if the exam was not passed, the final grade obtained in the evaluation was the exam grade, without weighting the rest of the grades. Memes=the number of memes sent by the students varied from 0 (no memes were sent) to 5 (5 memes were the maximum that could be submitted). Attendance, days that the student attended class, ranging from 0 to 27 days. TO=compulsory work of the subject, consisting of the realization of a business plan. With a range of scores from 0 to 10. Exercises, they were asked to submit a set of exercises. It is important to note that many of the exercises they were asked to do were model exams. With a range of scores from 0 to 10 points. So, in order to contrast whether "the use of the meme has a positive impact on the student's academic performance"; a cross-sectional analysis is performed. For this purpose, a descriptive and correlation analysis is performed, and a linear regression model is presented to contrast the effect of each of the variables, including the object of analysis, the meme, on the final grade obtained. In this way, firstly we will be able to contrast if there is an influence on the grade of the memes and secondly, with respect to the other evaluation criteria, what effect it has.

Table 2. Spearman Rho

Spearman Rho	Level of complexity of the subject	
	Correlation coefficient	Significance (bilateral)
To what degree has the methodology in the use of the meme contributed to the achievement of more meaningful learning? (Choices: 1=a little, 2=somewhat, 3=the same, 4=quite a lot, and 5=a lot)	-0.001	0.996
Evaluate the general degree of acquisition of the basic competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	-0.046	0.729
Evaluate the general degree of acquisition of the general competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	-0.070	0.596
Evaluate the general degree of acquisition of the specific competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot)	-0.054	0.687
Evaluate the general degree of acquisition of the learning outcomes of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	-0.051	0.702
Rate the degree to which the methodology based on the use of the meme has contributed to improve the perception of reality.	-0.063	0.634
Rate the degree to which the methodology based on the use of the meme has contributed to improve personal critical reflection.	-0.081	0.540
Evaluate the degree to which the methodology based on the use of the meme has contributed to improve collaborative work.	-0.179	0.175
What is the degree of suitability of the methodology based on the use of the meme for university training in legal and economic contents? (Option: 1=not at all agree, 2=somewhat agree, 3=neither agree nor disagree, 4=agree, and 5=a lot)	-0.068	0.609
To what extent does the application of the methodology based on the use of the meme contribute to arouse greater interest and motivation for the study of the subject? (Choices: 1=not at all, 2=a little, 3=somewhat, 4=quite a lot, and 5=a lot).	-0.006	0.964
Indicate the degree of effort and dedication that the teaching methodology based on the use of the meme has generated for you? (Being option: 1=not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot)	-0.029	0.826

Table 3. Spearman's Rho correlation between age and perceived impact of meme-based methodology on collaboration and effort

Rho of Spearman	Age	
	Correlation coefficient	Significance (bilateral)
Evaluate the degree to which the methodology based on the use of the meme has contributed to improve collaborative work.	-0.008	0.953
Indicate the degree of effort and dedication that the teaching methodology based on the use of the meme has generated for you.	-0.007	0.957

Table 4. Correlation between social media use and perceived learning benefits

Rho of Spearman	Indicate the number of hours you spend daily on your social networks.	
	Correlation coefficient	Significance (bilateral)
To what degree has the methodology based on the use of the meme contributed to the achievement of a more significant learning? (Option: 1=being a little, 2=a little, 3=the same, 4=quite a lot, and 5=a lot)	0.335**	0.010
Rate the general degree of acquisition of the basic competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	0.332*	0.010
Evaluate the general degree of acquisition of the general competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	0.277*	0.034
Evaluate the general degree of acquisition of the specific competences of the subject thanks to the methodology based on the use of the meme. (Option: 1=not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot)	0.314*	0.015
Evaluate the general degree of acquisition of the learning outcomes of the subject thanks to the methodology based on the use of the meme. (Option: 1=being not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot).	0.369**	0.004
Rate the degree to which the methodology based on the use of the meme has contributed to improve the perception of reality.	0.436**	0.001
Rate the degree to which the methodology based on the use of the meme has contributed to improve personal critical reflection.	0.382**	0.003
Evaluate the degree to which the methodology based on the use of the meme has contributed to improve collaborative work.	0.333**	0.010
What do you consider to be the contribution of the methodology based on the use of the meme to the improvement of your academic performance? (Option: 1=being none, 2=a little, 3=somewhat, 4=quite a lot, and 5=a lot).	0.325*	0.012
Indicate the degree of effort and dedication that the teaching methodology based on the use of the meme has generated for you. (Option: 1=being none, 2=a little, 3=the same, 4=quite a lot, and 5 = lot).	0.276*	0.034
Rate the degree to which the teaching methodology based on the use of the meme has contributed to the preparation of the subject. (Option: 1=not at all, 2=a little, 3=the same, 4=quite a lot, and 5=a lot)	0.314*	0.016

3. RESULTS AND DISCUSSION

The questionnaire used in this study collected relevant demographic information from the participants, including data on their gender, age, and area of knowledge. In addition, it inquired about the use of social networks, specifying the hours spent on these platforms, which is crucial to understand the context and potential impact of memes in the learning process. The reliability of the questionnaire was evaluated by calculating Cronbach's alpha coefficient, which yielded a value of 0.944, indicating excellent internal consistency of the responses. The annex shows the results in relation to the questions and correlations shown on the 45-question Likert-scale questionnaire; this section shows the most significant correlations found in this regard. This questionnaire shows a Cronbach's alpha of 0.944, indicating good internal consistency and reliability, as shown in Table 5.

Table 5. Internal consistency

Cronbach's alpha	Number of items
0.944	23

On the other hand, in the study conducted to see the effect of meme use on the final evaluation of the students, although no specific analyses were performed to validate the instrument, the use of correlations and regression models suggests that the validity of the instrument was sought through statistical analysis of the data obtained. The data analysis included a descriptive approach to the variables, the use of Pearson's correlation to examine the relationships between them, and the application of a linear regression model to evaluate the impact of various variables (the exam, meme creation, class attendance, compulsory work, and exercises) on the students' final grade. The results showed that the variable "memes" was the second most influential variable on the final grade, second only to the exam score. First, Table 6 shows the descriptive statistics of the variables subject to analysis. As indicated in the previous section, 0 is the lowest score that can be obtained and 10 the highest, in the evaluation criteria. While in the memes from 0 to 5.

Table 6. Descriptive statistics

Academic activities	N	Minimum	Maximum	Media	Standard deviation
Grade	68	0	9.14	3.984	2.581
Memes	68	0	5	1.62	2.22
Exam	68	0	9	3.804	2.518
TO	68	0	9.4875	6.52592	2.55668
Exercises	68	0	9.8	5.937	4.181
Attendance	68	0	10	6.9015	3.10231

These are the results obtained once the proposed model was contracted, of the 68 students evaluated in the February 2024 call in (2):

$$\text{Final Qualification} = \beta o + \beta 1\,\text{Exam} + \beta 2\,\text{Memes} + \beta 3\,\text{Attendance} + \beta 4\,\text{TO} + \beta 5\,\text{Exercises} + \varepsilon t \quad (2)$$

Table 7 shows the explanatory capacity of the model, which reaches 0.98. It is high and this is coherent since the variables included are those that are the subject of the subject's assessment. Table 8, analysis of variance (ANOVA), tells us about the significance of the model as a whole, which indicates that the complete model with all the variables included is a statistically significant model.

Table 7. Model summary

Model	R	R square	Adjusted R-square	Standard error of estimation
1	0.991[a]	0.983	0.981	0.35274

a. Predictors: (constant), exercises, memes, exam, to, attendance

Table 8. ANOVA[a]

	Model	Sum of squares	Df[c]	Root mean square	F	Sig.
1	Regression	438.686	5	87.737	705.143	<0.001[b]
	Residual	7.714	62	0.124		
	Total	446.401	67			

a. Dependent variable: final qualification
b. Predictors: (constant), exercises, memes, exam, to, attendance
c. Degrees of freedom

In the linear regression model that had been proposed, Table 9, the variables exam, memes, exercises and attendance are significant, but not the variable mandatory work, and which also presents a sign opposite to what would be expected. As expected, the variable with the most weight is the exam, but what is interesting is that the second is the variable memes, followed by the variable exercises and attendance.

Table 9. Coefficients

Model	Non-standardized coefficients		Standardized coefficients	t	Sig.	Correlations			Collinearity statistics	
	B	Desv. Error	Beta			Zero order	Partial	Part	Tolerance	VIF[a]
Constant	-0.035	0.122		-0.284	0.777					
Exam	0.981	0.022	0.923	45.470	0.000	0.98	0.985	0.759	0.676	1.479
Memes	0.068	0.022	0.058	3.020	0.004	0.42	0.358	0.050	0.748	1.337
Class attendance	0.013	0.006	0.048	2.123	0.038	0.51	0.260	0.035	0.540	1.852
TO	-0.016	0.022	-0.016	-0.735	0.465	0.49	-0.093	-0.01	0.579	1.726
Exercises	0.035	0.014	0.057	2.526	0.014	0.53	0.306	0.042	0.546	1.832

Dependent variable: final qualifications; a. Variance inflation factor

Given these results, and in order to refine and simplify the model, the dependent variable TO is removed. Despite this adjustment, the model's significance is preserved, with an adjusted R-squared value remaining high at 0.981, indicating that the model continues to explain a substantial portion of the variance in dependent variable. Additionally, the ANOVA results confirm the model's robustness post-adjustment, ensuring that the explanatory power is not compromised. The updated coefficients for the variables are presented in Table 10, which reflects only the changes in the numerical results due to the extraction of TO, without affecting the overall explanatory significance of the model. This approach not only enhances the model's clarity but also contributes to a more concise and focused interpretation of significant predictors.

Table 10. Modified coefficients

Model	Non-standardized coefficients		Standardized coefficients	t	Sig.	Correlations			Collinearity statistics	
	B	Desv. Error[b]	Beta			Zero order	Partial	Part	Tolerance	VIF[a]
Constant	-0.091	0.095		-0.95	0.342					
Exam	0.978	0.021	0.920	46.47	<0.001	0.986	0.986	0.773	0.706	1.417
Memes	0.067	0.022	0.058	3.00	0.004	0.429	0.354	0.050	0.749	1.334
Class attendance	0.012	0.006	0.044	2.01	0.048	0.518	0.246	0.034	0.570	1.755
Exercises	0.032	0.013	0.052	2.42	0.018	0.536	0.292	0.040	0.610	1.640

Dependent variable: final qualification; a. Variance inflation factor; b. Standard deviation of regression coefficients

In this way the model would be defined in (3):

$$Final\ Qualification = -0.091 + 0.978\,Exam + 0.067\,Memes + 0.012\,Attendance + 0.032\,Exercises + \varepsilon t \quad (3)$$

The results obtained, in the linear regression model, show that after the exam the variable that had the greatest effect on the final grade was the memes variable. Certainly, the fact that a student has sent or submitted one or more memes usually implies a greater involvement and dedication to the preparation of the subject. However, not all students who regularly attended class sent the memes.

As expected, the main variable explaining the final grade is the exam. Firstly, because it is the component with the highest weighting in the final grade, 60%, and secondly because it was a necessary requirement for passing the subject. Other variables that appear as significant are attendance, valued at 5% of the final grade, which is directly related to passing the course. It is understood that if the student has attended class regularly, he/she has been able to assimilate the contents better and, therefore, to reflect them in the final evaluation. On the other hand, the exercises to be handed in, valued with another 5% of the final grade, also appear as significant, ahead of the attendance variable. The exercises were a reinforcement for the preparation of the exam, since they were exercises from past exams and therefore their correct completion allows a better assimilation of contents. It should be noted that not all the students handed in the exercises, which is why it may have been a significant variable in the final result. On the other hand, the variable compulsory work (Table 8, TO), being the component of the continuous evaluation with more weight, not only was not significant, but the value of beta was negative. This could be explained by the fact that the content of the work was not especially exam material, but a concrete application to a business idea. Thus, while the compulsory work was handed in by most of the students, since it represented the highest percentage of the continuous evaluation, the exercises and attendance were not.

Thus, these results provide an answer to the hypothesis "the use of the meme has a positive impact on the student's academic performance". Therefore, this study contributes to reinforce the studies that propose the use of the meme as a tool that can help teachers in their classes. However, the novelty of this study is that the meme variable appears as the second most significant variable in the final result of the students. In relation to the correlations between the variables, Figure 4 and Table 11, the exam is also the variable that has the highest correlation with the final grade. As expected, and since they are all components of the evaluation, all the variables analyzed are related.

Previous studies support the effectiveness of innovative teaching strategies, and the use of memes is no exception. Previous research has explored the positive impact of unconventional methods on knowledge retention and comprehension. Comparative studies in the specific field of social science education, such as that of previous studies [20], [21] has highlighted the importance of pedagogical strategies focused on active student participation. The implementation of visual and contextualized resources, such as memes, has been associated with increased student interest and motivation. Hence, to the first research question proposed, with the analysis of the narratives obtained from the undertakers of the CLIL course, the answer is that memes have proved a suitable and enjoyable means for providing feedback of a subject or course. Memes can be used at any moment of a session (beginning, development and closing), thematic content and generate interest in learning; and that a well-designed, organized meme with a clear objective can facilitate the understanding of a subject regardless of its complexity [5], [69]. Despite the fact that most experiences highlight the positive aspects of the use of the meme as a didactic learning resource, some authors have also found that this method is not entirely optimal because "unfortunately, the interest in the task was very low, being done in any way and close to the deadline to comply with the procedure" [42], [43]. On the other hand, the use of digital media can generate an addiction in students that has a negative impact on academic results, as pointed out by some studies [70], [71].

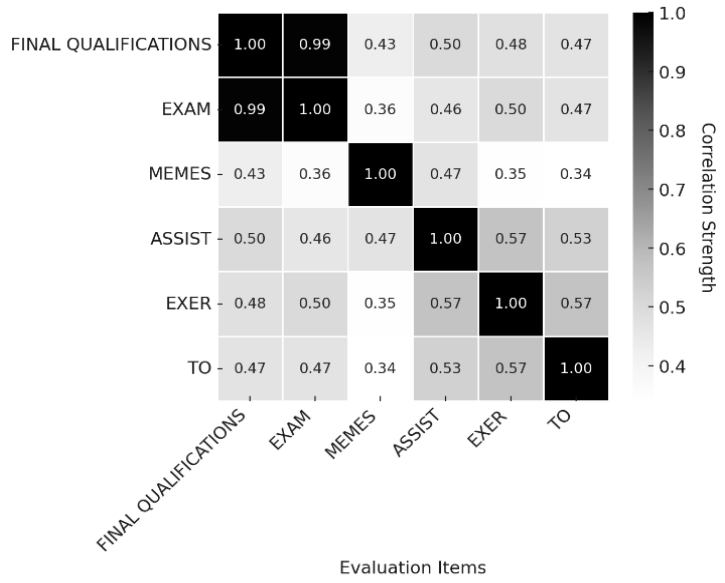

Figure 4. Correlation matrix

Table 11. Pearson correlation

Academic activities		Final qualifications	Exam	Memes	Asist	EX	TO
Final qualifications	Pearson	1	0.986**	0.429**	0.518**	0.536**	0.497**
	Sig. (bilateral)		0.000	0.000	0.000	0.000	0.000
	N		68	68	68	68	68
Exam	Pearson		1	0.361**	0.454**	0.476**	0.471**
	Sig. (bilateral)			0.002	0.000	0.000	0.000
	N			68	68	68	68
Memes	Pearson			1	0.469**	0.354**	0.337**
	Sig. (bilateral)				0.000	0.003	0.005
	N				68	68	68
Asist	Pearson				1	0.574**	0.533**
	Sig. (bilateral)					0.000	0.000
	N					68	68
EX	Pearson					1	0.574**
	Sig. (bilateral)						0.000
	N						68
TO	Pearson						1

**. The correlation is significant at the 0.01 level (bilateral). EX=exercises

Our study on the use of memes as a didactic resource in social science subjects reveals significant results. With the participation of more than 68 university students in subjects in areas of knowledge of the social and legal sciences: economics, law and business administration and management. Regarding the analysis of the results obtained in subjects specifically related to business, where 68 students were evaluated, it should be noted that the meme variable is the second most significant variable in the final grade obtained. This result is shared with previous studies such as that of memes [11], [12], [15]. What is relevant in this study is the second position obtained by the meme as a relevant factor in the evaluation. However, we are aware of the limitations of the study, which focuses on a specific area, and the sample is small. For this reason, it is considered important to continue to study these issues in greater depth.

This study contributes theoretically to the debate on new pedagogical tools, demonstrating that memes are not only a form of entertainment, but can also be an effective resource to enhance learning, particularly in younger generations such as generation Z. The evaluation reflected a generalized positive perception among students, highlighting the increase in commitment and the facilitation in the understanding of concepts. It was to be expected that the variable memes would help the understanding of the knowledge imparted in the course and reflected in the final exam. This result agrees with previous studies [5], [7], [19] among others. Therefore, this data seems to indicate that, if students have been able to synthesize part of the contents in memes, this has helped them in a better assimilation of the subject. We certainly know that young people spend a lot of their time on platforms, and the language of memes is familiar to them. The correlations have also shown a relationship between the use of networks and the perception that they have achieved more significant learning with this methodology, among other variables indicated. This result is consistent with

that obtained by other studies [16], [35]. Therefore, given this experience, it seems advisable to use memes by students to summarize concepts that they assimilate in a more meaningful way.

One could perhaps raise the idea that memes are a new way of outlining or synthesizing content for better understanding, especially for generation Z [12]. We can conclude that the idea of elaborating memes as a didactic resource is presented as an attractive tool that is giving good results. However, these results have a limitation, since they have been given in a general subject such as the subject of business, taught in the first year of the degree course, and only for a sample of 110 memes elaborated by 68 students. Another possible limitation of the study is the lack of geographical and cultural diversity in the participants. Having been conducted in a specific academic context, the results may not be fully generalizable to other regions or cultures where access to digital platforms, use of memes or attitudes towards memes may vary significantly. As a future line of research, we suggest extending the methodology to other areas of knowledge and students of other courses and ages. These results suggest that the implementation of memes in teaching is not only well received by students but can also have positive impacts on various aspects of learning. The ability of memes to connect with contemporary culture and their effectiveness in conveying complex concepts indicate their potential as a valuable tool in today's educational environment, providing an engaging and effective avenue for knowledge transmission.

4. CONCLUSION

This study highlights the potential of memes as an educational tool to facilitate learning among generation Z college students. Results suggest that the use of memes enhances understanding of complex concepts and encourages active participation. Students showed positive perceptions of this methodology, indicating an increase in their engagement and greater ease in assimilating academic content. In addition, the meme variable was found to be the second most significant factor in final grades, after exams. This suggests that synthesizing content into memes allows for better retention and comprehension of material, presenting this strategy as a promising avenue for meaningful learning in digital contexts.

ACKNOWLEDGMENTS

We would like to thank the Catholic University of Avila, the MAANT.gid Teaching Innovation Group for their support and collaboration in the development of this work, whose contribution has been fundamental for the progress of our research. We also thank all the students who have participated in the pilot test of this methodology whose results are now published.

FUNDING INFORMATION

Authors state no funding involved.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
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Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

We have obtained informed consent from all students who have participated in this research.

ETHICAL APPROVAL

The research related to human use has been complied with all the relevant national regulations and institutional policies in accordance with the tenets of the Helsinki Declaration and has been approved by the authors' institutional review board; with institutional approval code E2023_003.

DATA AVAILABILITY

The data that supports the findings of this study are available from the corresponding author [SLNA], upon reasonable request.

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