

Potential use of memes in teaching and learning processes: the students perceptions

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Abstract: Memes have spread in school and university as innovative mediator in teaching/learning processes thanks to their communicative power: with an image and a few lines of text they summarize a concept in an ironic way. The meme conveys a concentration of meaning and to be decoded correctly requires a considerable cognitive effort which involves the knowledge of a set of key elements in a specific disciplinary domain, for example math or literature. Precisely this semiotic characteristic reveals its potential in teaching as a tool for cognitive activation and support for formative assessment: the teacher can in fact propose memes himself or have them made by students: in both cases he will have to verify their correct interpretation by providing immediate feedback about the meanings associated with the meme. This research conducted on 35 university students confirms the popularity of memes both as a tool for summarizing the concepts covered in lessons and as an interesting new formative assessment tool that can be used by teachers. However, memes must be used with care since they can also generate cognitive overload and convey cognitive or cultural stereotypes and are to be considered not substitutes but a useful complement to traditional active teaching strategies.

Keywords: memes; teaching strategies; formative assessment, cognitive activation;

Introduction

From a semiotic point of view, memes are real units of information concentrated in an image with a short text superimposed on it that can be immediately understood. However, it is possible to understand the meaning of a meme only according to the precise context to which it refers (Cannizzaro, 2016) (Vacca et al., 2022) and only if one has all the information needed to decode it. Because of these characteristics, memes can be an interesting educational tool. Several researches have been carried out in this regard in the teaching of individual teaching subject such as Mathematics (Friske, 2018; Bini, 2021;) Languages (Purnama, 2017), the development of Critical Thinking (Wells, 2018; Matias, 2020), Engineering (Reddy, 2020), Natural Sciences (Byosiere et al., 2021), Medicine (Brown, 2020) and Psychology (Kath et al., 2022), in many cases with interesting learning results.

From an educational point of view, we can think of a meme as a multi-modal artifact (van Leeuwen, 2015) (Yus, 2019): that is, it is expressed through a set, in addition to images, of texts and symbols, which help to limit the risk of misinterpretation. The meme seems to be cognitively processed much

more effectively than mono-modal artifacts (Cohn, 2016) and would not violate Mayer's (2019) principles of multimedia communication, particularly the one about the co-presence of text and images, the one about spatial contiguity, and the one about coherence between the various elements that compose it.

Memes in education

Many memes that refer to different disciplinary contents, but mathematical ones are very frequent (Bini & Robutti & Montagnani, 2021) (Kayali & Altuntas, 2021) probably because the semiotics of mathematical signs are extremely synthetic with precise and unambiguous meanings. The famous meme "Distracted Boyfriend" is an effective example (fig.1).



Fig. 1 The "Distracted Boyfriend" meme (on the left) used to point out a classic error of sums of fractions in mathematics and its implicit meaning explained (on the right).

In the meme in Fig. 1 (left image), the text consists only of mathematical notation that does not explain why the correct result is 5/6, thus leaving it up to the student to come up with a hypothetical calculation to justify it. The meme represents an emotionally engaging scene related to a critical situation in the relationships between a young couple and helps us introduce an important element of analysis, namely, the emotional value of the images used as backgrounds for memes. Clark and Lyons (2010), in their taxonomy of the use of images in teaching, define some of their functionalities, including those of knowledge activation, minimization of cognitive load and transfer of learning, but especially also functionalities supporting the important processes such as attention and motivation.

These very ones can be stimulated by funny images that arouse pleasant emotions. Thus, it is interesting to note that in our case the interpretation of the meme is simultaneously based on two planes: one cognitive and one emotional. The cognitive plane conveys the correct mathematical meaning of the sum of fractions and highlights the error. The emotional plane, on the other hand, alludes to a funny situation that conveys a moral: in our case that it is better not to be tempted by a choice that seems attractive but is actually wrong, according to a system of norms and values commonly accepted in the cultural context of reference.

Many studies show that humor is a facilitator of learning processes as it increases student engagement and motivation (Byosiére, 2021) (Harshavardhan, Wilson & Kumar, 2019) by decreasing the level of stress to which memory is sensitive (McGinty, Radin & Kaminski: 2013) (Badli & Dzulkifli, 2019) (Garner, 2006): funny memes in fact at the neurophysiological level stimulate the release of pleasant

substances such as dopamine and serotonin that facilitate memorization (Antón-Sancho et al., 2022) and promote the establishment of a pleasant climate (McCabe, Sprute & Underdown, 2017).

Research questions and methods

This exploratory study seeks to understand students' perceptions of memes as a teaching tool, and thus to answer the following research questions:

1. What is the perception of memes in the informal contexts of Social Networks?
2. What is the perception of memes in formal teaching/learning contexts?
3. What is the perception of memes as a tool for summarizing and summarizing lessons?
4. What is the perception of memes as a formative assessment tool?

A questionnaire on a Likert scale of 1 to 5, consisting of 15 questions (Tab. 1), (of which 2 were open-ended) was created to answer the research questions. The questionnaire was administered online to 35 undergraduate students (F=28, M=7) with an average age of 24, of a second cycle Degree in Development and Management of Education Services. Statistical analyses were carried out using JAMOVI software.

Findings

The results (Tab. 1) show the high frequency (more than 90%) with which students come into contact with memes and the high liking they give them (more than 96%). The majority (65%) often share them on social networks and as many as 92% say they have created a meme at least once, demonstrating active involvement.

Table 1. Students' perceptions of memes in informal contexts.

	1 not at all	2 little	3 some	4 much	5 very much	Median	Std.dev
How much do you like memes?	0%	2.9%	14.3%	54.3%	28.6%	4	0.74
Have you ever created a meme?	0%	14.4%	38%	40.1%	6.4%	2	1.13
How often do you come across a meme on social media or on the web?	0%	2.9%	5.7%	17.1%	74.3%	5	0.84
How often do you share a meme you liked on social media?	17.1%	17.1%	40%	11.4%	14.3%	3	1.25

Regarding students' perceptions of the potential of memes in classroom teaching (Tab. 2), as many as 74 percent (much and very much) consider them generically very useful and only 17 percent a possible form of distraction (some, much and very much) demonstrating considerable confidence in memes as a tool to support concentration in the classroom.

Table 2. Students' perceptions of memes in teaching.

	1 not at all	2 little	3 some	4 much	5 very much	Median	Std.dev
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Memes can be a useful teaching tool	0%	5.7%	20%	60%	14%	2	0.74
Using Memes in class is a distraction	22.9%	60%	14.3%	0%	2.9%	2	0.80

Tab.3, on the other hand, summarizes the responses to the questions on the potential of memes as the ability to summarize and synthesize the most important and complex concepts presented during the lecture: here the majority of students give a positive or very positive response 68% (summary) and 77% (synthesis) respectively. Interesting to note that the greatest preference is expressed for *summarizing the* most complex concepts than for simply summarizing the lecture topics.

Also notable is the response on the motivating potential of memes as a stimulus to learning the concepts they represent: 85 percent (much and very much) give this question a very positive feedback.

Table 3. Students' perceptions of memes as motivation stimulus, a useful tool for the synthesis of lessons and complex concepts

	1 not at all	2 little	3 some	4 much	5 very much	Median	Std.dev
Memes can be used by the teacher to summarize important lesson topics	2.9%	5.7%	22.9%	45.7%	22.9%	4	0.96
Memes can synthesize complex lesson concepts	2.9%	0%	20%	37.1%	40%	4	0.93
Memes stimulate the motivation to learn the concepts represented	0%	5.7%	8.6%	37.1%	48.6%	4	0.86

Finally, responses to specific questions about the use of memes as a possible assessment tool provide a clear indication of liking. Particularly when thinking about memes created by the teacher (fig. 2) using them by asking students to explain their meaning within a specific topic of their teaching (60% much and very much). Interesting is the figure expressed in the responses (54%) when thinking of memes as an artifact created **not by the teacher but directly by the students themselves**, (fig. 3) i.e., as a task capable of demonstrating their understanding of study topics. Here students seem less confident in their abilities to create effective memes.

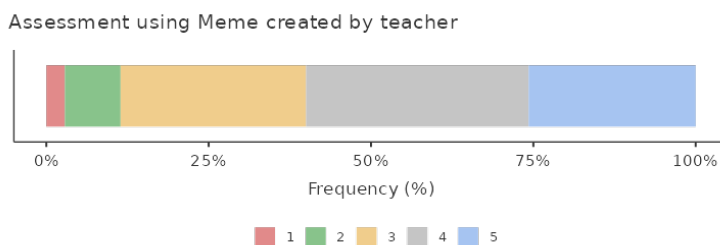


Fig. 2 The students perception of the use of memes assessment tool, created by teacher. Likert scale: 1=not at all, 5=very much.

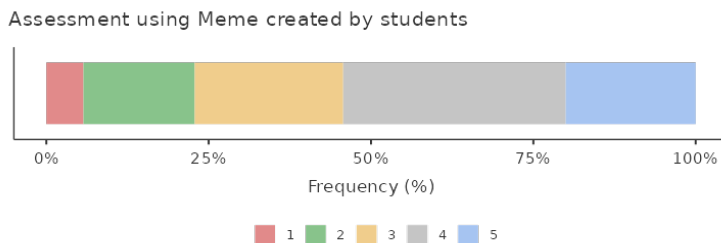


Fig. 3 The students perception of the use of memes assessment tool, created by the students themselves.

Likert scale: 1=not at all, 5=very much.

Discussion

Can we therefore say that memes are a real mediating tool that facilitates teaching/learning processes? Students' responses to all questions were overall very positive in this regard. We can then say that by its very nature a meme is synthetic, it is a real "concentrate of meaning" waiting to be explained, and herein lies its promising teaching value: in fact, it is known that in students open-ended tests promote deep and meaningful processing (Kang, Pashler, Cepeda, Rohrer, & Carpenter, 2011) i.e., they memorize and organize knowledge better when they perform tasks in which they have to recall a lot of information from a few available elements (Zaromb, Karpicke & Roediger, 2010). From this point of view, a meme can be thought of as a tool capable of stimulating cognitive activation (Merril, 2002) i.e., the learner's retrieval and use of his or her own cognitive resources to attribute meaning to what he or she is acquiring in his or her learning process (Burge, Lenkeit & Sizmur, 2015). From this point of view, the reworking activity that leads to the creation of a meme lends itself well to highlighting each teaching subject for example:

- references to more important concepts or elements;
- The most common misconceptions or conceptual errors;
- exceptions to rules or apparent contradictions;

We can therefore think of memes as a teaching activity in which:

- 1) the meme is created/provided by the teacher (meme explanation) who can use it for:
 - introduce/resume the important content of the lesson and thus as an advance organizer;
 - explain and discuss a "critical" concept that is, that is, easily subject to misconceptions;
- 2) the meme is created by the student (meme generation) who will use it to:
 - synthesize effectively a concept that has been covered in lectures.

In the first case, the teacher can use it as an initial stimulus and then leave it up to the student to interpret it by explicitly relating the meme to the teaching subject content covered (Ryoo & Linn, 2014) thus promoting generative learning (Fiorella & Mayer, 2016). If the meme is purposefully crafted by the teacher, it forces the student to activate his or her own resources to assign meaning to it (cognitive activation) and this operation is valuable for two reasons: first, because having to recall knowledge reinforces its memorization and second because the effort of verbalizing the reconstructed meanings and the process of reasoning performed by the student can highlight any misunderstandings that can be

corrected immediately by the teacher.

In the second case, on the other hand, it is the student himself who must adequately master the concept that belongs to specific teaching subject content and must be converted into a meme (Kath et al., 2022). However, the creation of a meme involves a cognitive effort of much greater complexity than that required of those who only have to decode it. It is known that an activity of reprocessing and transforming the materials being studied can result in a high Effect Size on learning performance that can range from an ES of 0.75 up to an ES of 0.85, for example (Donoghue & Hattie, 2016).

Conclusions

We have seen from the responses to the questionnaire that the use of memes in teaching has obtained a very high level of approval from students. It must be said, however, that memes also have significant critical issues: for example, it can generate distracting effects and cognitive overload by shifting the focus of attention too much to the aesthetic/emotional plane and to lesser extent to the iconic/symbolic plane (Maloy et al., 2020). It can also be a vehicle, even unintended, of stereotypes and cognitive or cultural biases (Nasiri & Mafakheri, 2015) and rely too much on the prevailing cultural context making it difficult or impossible for students of other nationalities to decode it. Memes can thus be thought of as a complementary, but certainly not an alternative, tool to traditional forms of educational communication and assessment.

Its use should therefore be dosed and calibrated on a case-by-case basis according to the needs and goals to be achieved: in particular, it seems indicated in the definition of concepts that are most prone to misunderstanding or that are considered fundamental to the understanding of the teaching subject. It can therefore be a useful support for "deep" processing (Anderson, 2009) of the content being learned: in fact, here the teacher can establish a formative dialogue by providing immediate feedback on the meanings associated with the meme, and the richer, more articulate and shared with the whole class, the greater the opportunities for learning.

Limitation of the Study

Only student perceptions were examined in this study, and no field tests were conducted on the actual effectiveness of memes in classroom teaching.

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