The use of memes as an educational tool to evaluate reflection levels in an evidence-based practice course for nutrition graduate students

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Abstract

Background: Memes are a popular online communication tool that are participatory, playful and contextual in nature. While the use of meme creation as an education tool in higher education has been limited, meme creation requires students to reflect on material presented in the classroom, synthesize new content from learned concepts, and present it in a contextualized manner.

Objective: The objective of this study was to examine the outcomes of a meme creation assignment introduced into a master's level nutrition course which covered systemic and ethical issues related to nutrition, research, and clinical practice. Additionally, we explored the topics students chose to engage with in the meme assignment and how they aligned with course objectives.

Methods: Participants were graduate-level dietetic students (n=55) enrolled in the Evidence Based Practice course in the Master of Science/Dietetic Internship Program offered by the Department of Nutrition Sciences and Health Behavior in the School of Health Professions at the University of Texas Medical Branch. The team conducted a two-phase analysis of the memes. First, we assessed each meme for depth of reflection using an existing quantitative framework ranging from 0 (description) to 4 (critical reflection). In the second phase, we conducted a hybrid thematic analysis using inductive codes and deductive codes associated with the learning objectives of the class.

Results: Most students enrolled in the class were female (92.7%) and non-Hispanic white (63%) with an average age of 23.8 y. Of the 82 memes submitted, 9 (11%) were rated as reflection level 0 (description), 11 (13.4%) as level 1 (reflective description), 26 (31.7% as level 2 (dialogic reflection), 15 (18.3%) as level 3 (transformative reflection) and 21 (25.6%) as level 4 (critical reflection). Four primary themes, Ethics, Philosophy of Science, Art of Science and Science and the Public were identified, which aligned the learning objectives of the class, namely for students to develop a wider perspective of the philosophy of science and research paradigms, as well as ethical issues and scientific communication.

Conclusions: Our findings confirm that the use of a meme creation assignment is a feasible and acceptable education tool to promote student reflection in the context of an evidence-based practice class for graduate students. Students displayed a higher-than-expected level of transformative or critical reflection which may be due to the playful, visual format of memes. Future work is needed to investigate if our results are generalizable to other student populations or courses.

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Keywords: dietetic students; reflective thinking; knowledge synthesis; thematic analysis

Introduction

The use of reflection, i.e., reflective thinking, reflective learning, or reflective practice, is a valuable activity within education and professional practice [1-3]. As defined by Mezirow, critical self-reflection involves reassessing the way one poses problems and reassessing one's own orientation to perceiving, knowing, believing, feeling, and acting [3]. Self-reflection is positively associated with learning outcomes, including enhanced self-confidence, professional identity and profestonal development [1]. Within the educational setting, the use of self-reflection can be operationalized to encourage student reflection and reflective thinking in several different approaches including, but not limited to, reflection as part of journaling [4], journaling with small group discussion [5], collective class blogging requiring reflective style posts [6], and online collective reflection [7]. Despite the theoretical value of implementing self-reflective activities in the classroom, many studies in education have shown written reflection assignments producing mostly superficial reflection [8-10].

Memes are a genre of online communication that are inherently participatory, characterized by the agency of consumer/producers [11]. Identification of memes as an artifact underscores the six common features of memes including: visual format, intertextual nature, cultural component, stance, virality, and imitation. Memes comprise various visual formats and include text and/or audio that enhance meaning and reflect the social and cultural environment. Often, the creation of meme is as simple as superimposing metaphorical descriptions onto publicly available images to relay a message or tell a story. The rapid spread of memes across digital spaces and ability to alter or remix messages demonstrate the participatory and accessibility of this communication. Memetic content is highly dependent upon the context for creation (i.e., social media sites such as TikTok vs meme image creator) and distributed, but ultimately are all some kind of multimodal cultural artefact that is created, shared, and remixed online [12]. Additionally, the content is reflective of the participatory culture and, as such, has been identified as a form of contemporary folklore [13]. This shared portrayal of present-day culture can provide individuals with a sense of belonging and enhance social cohesion [14].

Beyond the meme content, the activities of meme creation and sharing are playful experiences that can involve humor and self-expression/creativity [15]. Meme creation and sharing are reflective of social and collaborative interactions, features consistent with online video games. When asked to use memes as a medium for daily journaling users reported that they felt the meme journaling to be fun, self-expressive, and promoted reflection by requiring them to pay close attention to details [16]. Though meme creation and sharing lack established rules for play, the rise in popularity of internet and social media memes may reflect the interest of playing a game that allows for individual creation and connection with others that possess similar interests [17].

The inclusion of student creations such as memes is an emerging classroom tool in the education system. In contrast to assignments that are created solely for the instructor to evaluate, memes offer students the opportunity to create content for a broader audience. Additionally, use of a meme as a tool to reflect on a class content facilitates students exploring their thinking, learning, and assessment of the material at the personal, interpersonal, contextual, and critical levels as described by Smith [18]. College students enrolled in child development and psychology courses were tasked with creating scientific memes and randomly assigned to share the meme within the course or publicly. Students reported the unique learning opportunity and development of communication skills tied to the assignment were useful while those students randomized to publicly share their memes reported higher levels of perceived learning [19]. Unlike standard reflection assignments that may promote low levels of reflection [8-10], meme creation requires students to synthesize new content from learned concepts, encouraging higher order thinking consistent with the fifth level of Bloom's

taxonomy [20]. While memes do not explicitly state their premise, construction and understanding instead rely on collective knowledge, the interplay between text and images, embedded references and connections, and use of cultural references and satire. The benefits of including memes as a teaching tool are applicable across the education system as middle school students tasked with creating memes about data literacy demonstrated several types of reasoning including contexts, implications, and relevant experiences [21]. In addition, students report high satisfaction with meme creation and learning gains from both the creation and sharing of memes. First year medical students that participated in a team project-based learning meme assignment reported a positive attitude toward the meme, emphasizing they felt both inspired and challenged by the assignment, delighted to share the memes with colleagues, and demonstrated learning benefits from the activity and shared experience [22].

The purpose of this study was to examine the outcomes of a meme creation assignment introduced into a master's level nutrition course which covered systemic and ethical issues related to nutrition, research, and clinical practice. The authors aimed to characterize if a meme creation assignment could facilitate a high level of reflection among nutrition graduate students. Additionally, we wanted to explore the topics that students chose to explore in the meme assignment and how they aligned with course objectives.

Methods

This present work was designed as a retrospective observational study to assess educational assignments completed by students enrolled in a graduate nutrition program.

Participants

All participants were graduate-level dietetic students enrolled in a face-to-face Evidence Based Practice course in the Master of Science/Dietetic Internship Program offered by the Department of Nutrition Sciences and Health Behavior in the School of Health Professions at the University of Texas Medical Branch (UTMB). Our present analysis included three cohorts of students enrolled in the Evidence Based Practice class from 2021 to 2023 for a total sample size of 55 students. EAJL, EJL and CM were instructors for the Evidence Based Practice course; EJL was the course instructor in 2021, EAJL, EJL and CM co-taught the class in 2022 and EAJL and CM we co-instructors in 2023. CCD was an instructor in the class prior to 2021 and is familiar with the topics covered in the class but did not utilize the meme assignment. This study was approved by the UTMB Institutional Review Board (#24-0065) and performed in accordance with relevant guidelines and regulatory requirements.

Educational Setting

The learning objectives of the Evidence-Based Practice class were as follows:

1. Evaluate the arguments surrounding the appropriateness of evidence-based practice
2. Demonstrate critical thinking regarding current hot topics in nutrition research
3. Discuss controversies related to research quality and measurement in nutrition research
4. Discover and evaluate nutrition-related scientific literature
5. Distill complex information about nutrition research into effective, easy-to-understand scientific communication

These objectives were designed to promote transformative and critical reflection among students through classroom discussions of a range of topics including the philosophy of science and research paradigms, the quality of research and measurement in nutrition science, ethical issues, and scientific communication. To evaluate student learning and integration of these complex topics, course

instructors developed an assignment for students to submit a meme at the end of the semester that communicated a significant concept that they learned during the course of the class. The assignment was introduced in class toward the end of the semester and made available online in the student learning management system shortly thereafter. The instructions for the assignment are found in **Figure 1S** in **Multimedia Appendix 1**. The students presented their memes in class to their cohort of peers as part of the final assessment and submitted an electronic version of the meme to the course instructors.

Reflection Framework used to evaluate student work

The reflection framework presented by Fleck and Fitzpatrick provided the basis to analyze the level of reflection in the student-generated memes [23]. The framework defines five levels of reflection to serve as a resource for thinking about and designing a reflection with level 0 being the lowest score and a reflection level of 4 being the highest. Some students chose to submit more than one meme and coders elected to code all submitted memes.

Reflection level descriptions

The following are brief descriptions of each reflection level score.

Reflection level 0 (Description: Revisiting)
Memes rated as reflection level 0 were judged not to be reflective due to a description or statement without further information. Memes with a score of 0 often repeated or paraphrased information presented during the class. If the coders were unable to interpret the meaning of a meme, the meme received a score of 0.

Reflection level 1 (Reflective Description: Revisiting with Explanation)
Memes rated reflection level 1 were judged to provide more justification than reflection level 0 memes but were still generally reportive or descriptive in nature and did not demonstrate a deeper change in student perspective.

Reflection level 2 (Dialogic Reflection: Exploring Relationships)
Memes rated reflection level 2 were judged to exhibit reflection on more complex relationships and often provided a value judgement accompanied by a nuanced consideration of the topic, a change in perspective, consideration of the implications of a topic, and/or an application to student's own life.

Reflection level 3 (Transformative Reflection: Fundamental Change)
Memes rated reflection level 3 were judged to exhibit reflection on a complex concept that the student was able to apply in a broader cultural/societal/ethical context, ask a fundamental question, demonstrate how their personal assumptions were challenged and/or a significant shift in perspective or understanding due to personal insight.

Reflection level 4 (Critical reflection: Wider Implications)
Memes rated reflection level 4 were judged to incorporate aspects of both a reflection level 2 and 3 where the student exhibited reflection on a complex topic and/or change in perspective/application to their own life as well as reflect on the topic in a broader cultural/societal/ethical context.

Qualitative Data Analysis

CCD, CM, EJL and EJAL conducted a two-phase analysis on students' memes addressing both the depth of reflection (quantitative) and aspects of evidence based practice being addressed (qualitative). First, the coders independently rated the reflection level of each individual meme by evaluating the response against the reflection levels presented by Fleck and Fitzpatrick [24] and additional criteria outlined in Robertson et al [25]. Descriptors to apply definitions of student reflection level were generated throughout the process. The memes were coded independently and then the team met to resolve discrepancies. For the second phase of analysis, EAJL sorted memes by reflection level and CCD, CM, EJL and EJAL used a hybrid thematic analysis [26] to code the memes using inductive codes and deductive codes that were associated with the learning objectives of the Evidence Based Practice class.

Results

Participant characteristics

A total of 55 students submitted memes that were included in this present analysis. The majority were female (92.7%) and non-Hispanic white (63%) with an average age of 23.8 y (**Table 1**).

Table 1: Demographics of graduate nutrition students enrolled in a class on evidence-based practice.

Attribute (n=55)	
Sex (M/F, %)	4 (7.3) M / 51 (92.7) F
Age (y; mean ± SD)	23.8 ± 2.07
Race; n (%)	43 (78) White
	3 (5) Black or African American
	2 (4) Asian
	5 (9) More than 1 race reported
	2 (4) Unknown/not reported
Ethnicity n (%)	8 (15) Hispanic or Latino
	47 (85) Not Hispanic or Latino

Overall meme reflection scores

Out of the 55 students across the 3 cohorts, 38 students submitted 1 meme and 16 students chose to submit more than 1 meme for a total of 82 memes that were included in this analysis. One student chose to submit five memes. Of the 82 memes submitted, 9 (11%) were rated as reflection level 0 (i.e., *Description*), 11 (13.4%) as level 1 (i.e. *Reflective Description*), 26 (31.7% as level 2 (i.e. *Dialogic Reflection*), 15 (18.3%) as level 3 (i.e.. *Transformative Reflection*) and 21 (25.6%) as level 4 (i.e. *Critical Reflection*) (**Table 2**). There was some variation in level of reflection across the cohort years with the 2021 and 2022 cohorts having a relatively higher proportion of memes scored as reflective level 3 or reflective level 4 and a smaller proportion of memes with a score of 3 or 4 in the cohort from 2023.

Table 2: Frequency of reflection level scores presented as an aggregate of all student cohorts as well as by cohort year.

Score	0	1	2	3	4
All cohorts; n(%)	9 (11.1)	11 (13.4)	26 (31.7)	15 (18.3)	21 (25.6)
2021; n(%)	0 (0)	3 (11.1)	11 (40.7)	4 (14.8)	9 (33.3)
2022; n(%)	1 (3.2)	5 (16.1)	9 (29.0)	8 (25.8)	8 (25.8)
2023; n(%)	8 (33.3)	3 (12.5)	6 (25.0)	3 (12.5)	4 (16.7)

Thematic analysis

A thematic analysis of the content or topics that were incorporated in the student-generated memes identified four primary themes: Ethics, Philosophy of Science, Art of Science and Science and the Public, each with emerging subthemes (**Table 3**). These themes align with the learning objectives of the class; i.e. for students to develop a wider perspective of the philosophy of science and research paradigms, as well as ethical issues and scientific communication.

Table 3: Primary themes and emerging sub-themes of memes with representative memes. Higher resolution images of the memes are available in **Figures 2S-5S** in **Multimedia Appendix 2.**

Primary theme	Emerging sub-themes	Example meme
Ethics	- Ethical dilemma - Ethics - Research ethics	
Philosophy of Science	- The struggle is real - Existence and philosophy	
Art of Science	- Observation - Quality - Research process - Bureaucracy - Efficacy	

Science and the Public	- Science mistrust - Social/cultural attitudes	

Frequently used meme formats

Interestingly, when we examined commonly used meme formats, there were six meme formats that were utilized by three or more students (*Drake Hotline Bling, This is Fine, Math Lady/Confused Lady, Man Looking at Other Woman/Couple in bed, Two Buttons*). These meme format names are from the imgflip.com, a widely used meme generator as of June 2024[27]. The meme formats that were used most frequently aligned with the topical themes that were identified in the thematic analysis. The *Drake Hotline Bling* meme was used to convey a judgment based on knowledge or experience around a topic (Art of Science). The *Two Buttons Meme* also conveyed a judgement and builds in a layer of the difficulty or ethical dilemma surrounding the judgment/decision (Ethics, Art of Science). Similarly, *Man Looking at Other Woman/Couple in bed* was used to metaphorically portray a moral or ethical dilemma (Ethics). Both the *Math Lady/Confused Lady* and *This is Fine* meme formats were used to convey the struggle of understanding complex topics or navigating challenging situations (Philosophy of Science, Art of Science, Ethics). Each of the commonly used meme formats were implemented at various levels of reflection. (**Figure 1)** provides an example of a commonly used meme format (*Drake Hotline Bling*) evaluated at each reflection level (*Revisiting, Reflective Description, Dialogic Reflection, Transformative Reflection* and *Critical Reflection*).

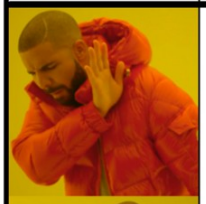
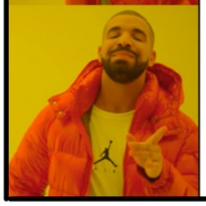
Student:	A	B	C	D	E
Reflection level:	0	1	2	3	4
	Juice Cleanses	Dealing with inflammation & pain from rheumatoid arthritis	Using AI for evidence-based resources	Researchers that are incapable of communicating with the public because they believe they are among the exclusive intellectual elites	Doing dozens of hours of research to find a universally agreed upon answer to your question and strong evidence to back it up
	Normal Healthy Diet	Taking omega-3 supplements to reduce inflammation & pain	Asking our research librarian for guidance in finding evidence-based resources	Researchers that communicate to the public, clarify/translate basic science, and are respectful because they understand that everyone has the right to knowledge	Doing dozens of hours of research to find that no one has any idea what is happening and a bunch of academics fight about the answer daily

Figure 1: Five students (Student A, Student B, Student C, Student D and Student E) chose to submit the Drake Hotline Bling meme format which were rated independently by the reflective levels 0-4. They are presented here as a representation of how the same meme format was utilized with increasing levels of reflection. The contextual/collective interpretation of the Drake Hotline Bling

meme is the singer, Drake, indicating gestures of things that are “not liked” (top image) in contrast to the gesture in the bottom image which is something that is “liked”. It is such a common meme that, according to Meming Wiki, the use of it is called “Drakeposting” [28].

Discussion

Use of memes in the context of an evidence-based practice class appeared to be feasible and acceptable, with all students submitting a reflective meme and more than half submitting more than one. Low reflection levels were relatively rare, with only 11% and 13% rated as description (Level 0) or reflective description (Level 1). Levels of transformative (Level 3, 18%) and critical (Level 4, 26%) reflection were unexpectedly high. Most memes used commonly available formats, and several very popular formats such as *This is Fine* were used multiple times. The memes were grouped into four themes: Ethics, Philosophy of Science, Art of Science, and Science and the Public.

This study adds to a small but growing literature investigating the potential utility of memes as a creative method of encouraging student reflection in higher education. Their playful, creative, and social nature may help make reflection activities appear more appealing to students as compared to more standard reflective writing activities. Memes are inherently reconstructive, “remixing” content and concepts into something new. One of the purposes of reflection is to reconstruct understanding into new interpretations and new forms of knowledge [29], meaning that memes may be inherently well-suited to facilitate the reflection process.

In fact, a major barrier to reflection is students’ lack of understanding of how to engage in it [1, 29]. Reflective writing requires advanced linguistic and rhetorical skills, whereas meme formats can provide clear scaffolding to ease communication. For example, using the Drake Hotline Bling meme format automatically provides information that two concepts will be contrasted, with one shown as positive while the other is shown as negative. Many of the formats students chose for these assignments involved progression through various states (Zooey Deschanel making different faces, finding and rejecting the scroll of truth, etc.) or a clear conflict (Aladdin speaking to the Oracle, Anakin and Padme speaking back and forth, two choices on a sign, etc.).

The relational nature of these memes may partially explain the unexpectedly large amount of deeper reflection (transformative and critical) shown in these assignments. Most studies in education have shown reflection assignments producing mostly superficial reflection at levels 0 and 1[8-10]. A major difference between shallower versus deeper reflection lies in attention to context and relationships. It may be that meme format scaffolding requiring conflict and/or progression could nudge students towards thinking more about different perspectives or how things change over time. Educators have used reflection rubrics to encourage deeper reflection, showing students the difference in focus and change across routine, dialogic, and transformative reflection [30]. The rubric uses words to facilitate student synthesis and reframing, whereas memes may use visual formatting to guide students into engaging in these activities.

Several limitations should be considered when interpreting these results. The sample size was relatively small and restricted to students in a combined Master of Science/Dietetic Internship program who were enrolled in an Evidence-Based Practice course. It is unclear whether these results are generalizable to other student populations or other courses. The nature of course content and/or students engaging in concurrent clinical rotations may have influenced the levels of reflection found in the meme assignments.

Additionally, coding reflection levels is relatively novel and not yet widely implemented. Our

interpretations of reflection levels may differ from interpretations in other work. Exact definitions of reflection, deep reflection, and transformative/critical reflection remain controversial [31].

Coding levels of reflection, including transformative and critical reflection, in student assignments is feasible and can be applied to memes. We found unexpectedly high amounts of transformative and critical reflection in our analyses of memes created in an evidence-based practice graduate course, suggesting that memes may be an effective method of encouraging students to think at a more macro level in their reflections.

Acknowledgments

EJL, EAJL, CM and CCD participated in thematic analysis and reflection scoring, and manuscript preparation. All authors read and approved the final manuscript. We sincerely thank the students for their herculean effort and creativity that made this analysis possible.

Conflicts of Interest:

CCD, EJL and CM report no conflicts of interest. During the time this research was conducted, EJAL received funding for travel or honoraria for scientific presentations, or consulting services from the following organizations: The Pork Checkoff and the U.S. Dairy Export Council.

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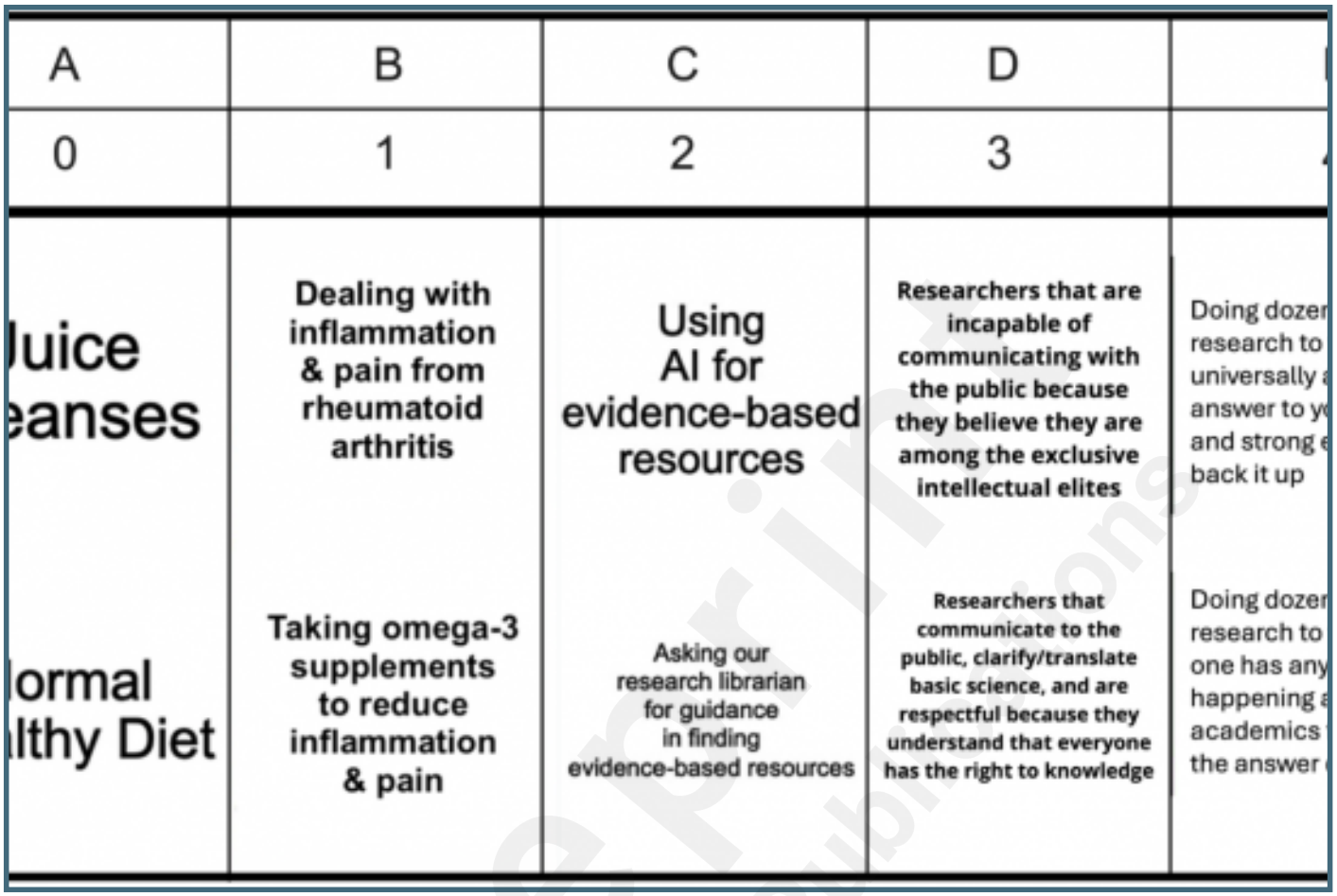
Supplementary Files

Figures

Drake hotline bling meme format.



Multimedia Appendixes

Instructions for nutrition dilemma final presentation.
URL: http://asset.jmir.pub/assets/33cbe5f8aea5d491013c2b98f259c67e.docx

Representative meme for "ethics" theme.
URL: http://asset.jmir.pub/assets/415f62faed5eeac45e656fb775a193c2.png

Representative meme for the "philosophy of science" theme.
URL: http://asset.jmir.pub/assets/9b579e794cb4d783a2ed9372cdd6f6f9.png

Representative meme for the "art of science" theme.
URL: http://asset.jmir.pub/assets/894915642b5b4101305807489b9760b3.png

Representative meme for the "science and the public" theme.
URL: http://asset.jmir.pub/assets/48b2970bdbd03f736995c8026346c437.png