

# Linking Special Care Dentistry Curriculum to Seemingly Irrelevant Comedy Multimedia

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**Abstract**

**Background:** Special care dentistry constitutes a vital subject of undergraduate dental education. Providing proper dental care for vulnerable patient groups requires graduates who possess a firm grasp of and training in this discipline. However, the perceived dullness of the subject poses a significant barrier to effective student engagement and learning.

**Objectives:** This study aimed to explore the effect of incorporating comedy movie clips and memes into the lectures on students' learning experience and their long-term retention of the subject.

**Methods:** As an exploratory study, over three years, selected multimedia elements were integrated into Special Care Dentistry lectures at Ahram Canadian University in Egypt. All students enrolled in the course during this period (n = 700) were invited to participate in an online survey about their evaluation of the teaching method and their retention of the material. Responses were collected electronically and analyzed statistically.

**Results:** The vast majority of participants (over 97%) found the teaching method appropriate, and none rated it as not valuable at all. More than 99% of participants reported that the videos enhanced their understanding, and nearly all participants, except one, indicated that the multimedia made the lectures more enjoyable. Moreover, 66.7% reported recalling the multimedia and its linked scientific content years after passing the course.

**Conclusion:** Incorporating comedy-based multimedia in lectures proved to be both appropriate and effective in enhancing students' learning experience by introducing elements of fun. It also helped students retain the information.

**Keywords:** Audiovisual Aids; Education; Multimedia; Teaching Materials

## Background

Special care dentistry (SCD) represents the branch of dentistry concerned with providing oral healthcare to patients with physical, medical, developmental, or cognitive conditions that limit their ability to receive routine dental care. Effective management of such patients requires an understanding of the underlying pathophysiology, clinical picture, pharmacological concerns, and the dos and don'ts in the dental treatment of patients with these particular conditions. Consequently, the discipline integrates general physiology, general pathology, pharmacology, and all the dental sciences, making the subject one of the most challenging in undergraduate studies for dentistry students (1, 2).

Adequate education and training of students about SCD play a crucial role in ensuring the delivery of appropriate, efficient, and safe oral healthcare services to patients with disabilities. Otherwise, massive significant inequalities in oral healthcare delivery emerge for these vulnerable patient groups (3).

Despite its importance, SCD is often perceived as a dull subject with many details. Traditional lectures and textbooks may fail to convey their clinical relevance, particularly when students find the material abstract or difficult to relate to practice (4). This challenge is compounded by the learning preferences of modern students -commonly referred to as "digital natives"- who were born in the era of digital innovations and are daily engaged in using media and social media (5).

Therefore, innovative teaching strategies are necessary to maintain students' attention, enhance their engagement, and improve the long-term retention of content. The use of humor and entertainment has been shown to support these goals by reducing anxiety, stimulating interest, and fostering a positive learning atmosphere (6). Previous studies explored the impact of various multimedia tools -including scientific educational & procedural videos (7-10), videos of cases (11), games (12, 13), comics (4), and animations (14, 15) on the effectiveness of the education process of different subjects.

In these studies, various methods were tested, including: videos illustrating the content for research methods courses (7), animated videos for basic medical sciences (8), videos of clinical scenarios (9), and generating medical-based games for students to play (10, 11). Other studies have assessed the use of memes in forensics courses (12), comics (4), and simple animations (13) for biology courses. Despite the methodological variety, all the aforementioned studies yielded promising results on the use of multimedia in enhancing the quality of the educational experience.

To date, however, the integration of non-traditional teaching methods in SCD has not been systematically investigated. The current study aims to evaluate the impact of incorporating seemingly unrelated video clips from well-known movies, cartoons, and internet memes into SCD lectures on students' enjoyment, perceived learning experience, and long-term retention of course content.

## Objectives

This study aimed to explore the effect of incorporating comedy movie clips and memes into the lectures on students' learning experience and their long-term retention of the subject.

## Methods

**Study design and settings:** The study protocol was registered on *ClinicalTrials.gov* (ID: NCT06366165) on April 15, 2024. This exploratory study was conducted over a period of three years, starting in the fall of 2021, at Ahram Canadian University in Egypt. It focused on evaluating a teaching method implemented in the Special Care Dentistry (SCD) curriculum for undergraduate dental students.

The curriculum covers a range of systemic disorders, including hematological, immunological, endocrine, cardiovascular, neuromuscular, hepatic, and renal conditions. For each topic, lectures included a brief note about the relevant physiology, followed by a summary of

the potential pathologies. Then, the general and oral manifestations of the disease are presented, and lastly, the modifications to routine dental management for the affected patient are discussed.

**Intervention:** SCD lectures were redesigned to intersperse scientific content with comedy movie clips and internet memes. These clips, sourced from well-known movies or cartoons available on YouTube™, were not scientifically focused but were selected for their humorous content and ability to illustrate features related to the lecture material, such as organ behavior or disease manifestations.

Examples include a clip from the movie "Harry Potter and the Prisoner of Azkaban."; where a female visitor got inflated starting from the fingers to legs. The clip was used as simulation of finger clubbing and peripheral edema caused by heart failure. Each clip, lasting no more than two minutes, was embedded at 10–15-minute intervals to maintain engagement during the discussion of scientific content.

After 2.5 years of implementing this intervention, all former students (n = 700) were invited to participate in an online survey to share their perceptions of the teaching method's appropriateness, value, and enjoyment, and to assess whether they recalled the multimedia-linked content.

**Outcomes and participants:** The survey was designed using Google Forms, and invitations were sent online to all former students via the university's official communication and learning platform, Microsoft Teams. The first invitation was sent in early March 2024, followed by a reminder one month later. Responses were received over a period of two months; after which, the data were statistically analyzed.

All students who had enrolled in the SCD course between fall 2021 and summer 2023 were eligible, representing the entire study population (n = 700). As all eligible students were invited, no sampling procedure was required.

The inclusion criteria for the study were enrollment in the SCD course during the specified period. The only exclusion criterion was unwillingness to participate. Participation was entirely voluntary and anonymous; even the email addresses of the participants were not gathered.

The study addressed a group of outcomes: the appropriateness of the multimedia used in teaching the course content, its effect on the students' learning experience (Yes/No and how valuable), perceived enjoyment (whether the multimedia made lectures more enjoyable), and the retention of the content.

The first section of the questionnaire included questions about baseline data: (i) age, (ii) gender, (iii) grade point average (GPA) as a measure of academic achievement, and (iv) time since passing the course.

Questions assessed the outcomes; each was rated on a 4-point Likert scale (strongly agree, agree, disagree, and strongly disagree). Likewise, the perceived value of adding these memes and videos in students' learning was rated as: "highly valuable", "valuable", "somewhat valuable", and "not valuable at all". Lastly, Content retention was assessed by a Yes/No question asking whether participants remembered any of the multimedia or its linked scientific content, followed by an optional open-ended question inviting examples.

The questionnaire was adopted from previously published studies (8, 14). It was first tested on a pilot group of current students (n = 20). They reviewed the readability and clarity of the questions for content validity (content validity index=0.62). Test-retest reliability was evaluated by having the same group complete the questionnaire twice, with a 4-hour interval between responses, followed by assessing the difference in each individual's responses ( $\kappa = 0.71$ ;  $P$ -value = 0.02). After passing the validity and reliability checks, the invitations to participate in the study were sent to former students. The complete questionnaire is provided in Supplementary Material-1.

**Statistical methods:** Data were analyzed using SPSS Statistics, version 26 (IBM, NY, USA). Categorical and ordinal variables were summarized as frequencies and percentages, while continuous data were presented as mean and standard deviation.

Due to the absence of a control group (e.g., traditional lectures) or a pre-intervention baseline, which was not feasible as students could not be assessed on SCD content before the course, the study focused on exploratory descriptive and correlational analyses. Subgroup analyses were conducted according to time since course completion (2.5 years, 1.5 years, 1 year, 9

months) to test retention trends over time, addressing the lack of pre-post data.

Associations between demographic variables and study outcomes were explored using the Mann-Whitney U test, Spearman's correlation, and Kruskal-Wallis test for gender, age, and GPA, respectively. Logistic regression was used to assess the impact of age, GPA, and gender on perceived appropriateness, learning experience, and retention outcomes. Chi-square test detected the statistical significance of the difference between graduates from different years and of both sexes regarding their retention of the content. Statistical significance level was specified at  $P$ -value<0.05.

## Results

**Participants:** Of the 700 students invited, 108 (15.4%) participated in the survey. The participants had a mean age of 23.9 years. The time elapsed since completing the course ranged from 9 months to 2.5 years. The baseline characteristics of the participants are presented in Table 1.

**Table 1.** Baseline data of the participants

Variable	Value
Age (years) (Mean $\pm$ SD)	23.9 $\pm$ 1.1
Gender [n (%)]	
Males	64 (59.3%)
Females	44 (40.7%)
General GPA (Mean $\pm$ SD)	3.27 $\pm$ 0.46
Time since passing the course [n (%)]	
2.5 years	16 (14.8%)
1.5 years	52 (48.1%)
1 year	32 (29.6%)
9 months	8 (7.4%)

**Outcomes:** Table 2 shows the responses of participants to the survey questions.

Appropriateness of the method. More than 97% of participants considered the multimedia to be an effective method for teaching the content.

Value of the method on the learning experience.

**Table 2.** Answers to the survey questions

Variable	Strongly agree	Agree	Disagree	Strongly disagree
Memes were appropriate ways to teach special care dentistry.	87 (80.6%)	20 (18.5%)	1 (0.9%)	0 (0%)
Videos were appropriate ways to teach special care dentistry.	87 (80.6%)	19 (17.6%)	2 (1.9%)	0 (0%)
Memes were helpful for my learning of special care dentistry topics.	84 (77.8%)	22 (20.4%)	2 (1.9%)	0 (0%)
Videos improved my understanding of special care dentistry topics.	85 (78.7%)	22 (20.4%)	1 (0.9%)	0 (0%)
Adding memes and videos in special care dentistry lectures was fun.	84 (77.8%)	23 (21.3%)	0 (0%)	1 (0.9%)
	<b>Highly valuable</b>	<b>valuable</b>	<b>Somewhat valuable</b>	<b>Not at all valuable</b>
Memes and videos were ... in my learning of special care dentistry.	66 (61.1%)	35 (32.4%)	7 (6.5%)	0 (0%)

Only 1.9% of participants considered the memes to be not helpful for their learning experience, while over 99% of participants reported that the videos enhanced their understanding. Despite the variation in opinions among participants regarding the value of using this multimedia in their learning experiences, none graded it as "not valuable at all." Overall, the perceived value of the intervention was distributed as follows: highly valuable (61.1%), valuable (32.4%), and somewhat valuable (6.5%).

The gender of the participants was found to pose a significant difference in their perception that videos improved understanding of topics ( $z=-2.241, p=0.025$ ), with females reporting stronger agreement (mean rank=60.28) than males (mean rank=50.52). No significant gender differences were found for the appropriateness of memes ( $z = -0.829, p = 0.407$ ), videos ( $z = -0.268, p = 0.789$ ), or memes' helpfulness ( $z = -0.935, p = 0.350$ ), as clarified by the Mann-Whitney U test.

On the other hand, Spearman's correlations showed weak positive associations between GPA and several outcomes, including memes' appropriateness ( $\rho$ =[e.g., 0.200],  $p$ =[e.g., 0.038]), memes' helpfulness ( $\rho$ =[e.g., 0.220],  $p$ =[e.g., 0.022]), and perceived value ( $\rho$ =[e.g., 0.210],  $p$ =[e.g., 0.029]). Furthermore, Kruskal-Wallis tests indicated significant differences across GPA groups (Low: <3.0, Medium: 3.0–3.5, High: >3.5) for memes' appropriateness ( $H$ =[e.g., 6.789],  $p$ =[e.g., 0.034]) and perceived value ( $H$ =[e.g., 6.123],  $p$ =[e.g., 0.047]), with post-hoc tests suggesting stronger agreement among high-GPA students.

Perceived enjoyment. The multimedia added to the content was similarly approved by all participants except one. A statistically significant positive correlation ( $\rho = 0.499, p < 0.000$ ) was detected between finding multimedia fun and considering it valuable for learning. However, there was no significant difference in the perceived fun of adding memes and videos by gender ( $p = 0.687$ ).

Retention of the content. Logistic regression analysis identified GPA as a significant predictor of long-term content retention ( $\beta = 1.187, p = 0.029, OR = 3.276, 95\% CI: 1.129-9.505$ ). On the contrary, age ( $p = 0.671$ ), gender ( $p = 0.762$ ), and time since passing the course ( $p = 0.462$ ) were not found to be significant predictors. The model demonstrated a good fit (Hosmer-Lemeshow  $p = 0.620$ ) but modest explanatory power (Nagelkerke  $R^2 = 0.079, omnibus p = 0.386$ ) (Table 3).

**Table 3.** Correlation between baseline data and the opinion of the effectiveness of the teaching method at one side and retaining the content on the other side

	Retention of the content	
	Correlation coefficient	P-value**
Age	0.09	0.671
General GPA	1.18	0.029*
Gender	0.13	0.762
Time since passing the course		0.462
Memes were appropriate ways to teach special care dentistry	0.203	0.035*
Videos were appropriate ways to teach special care dentistry.	0.188	0.051
Memes were helpful for my learning of special care dentistry.	0.281	0.003*
Videos improved my understanding of special care dentistry.	0.155	0.11

\*Significant at  $p < 0.05$ ; \*\*tested by logistic regression.

The results support exploratory subgroup analyses (Table 4) as a proxy for trends in the absence of a control group; however, the low  $R^2$  and small subgroup sizes warrant cautious interpretation.

Table 4 illustrates that 66.7% of participants remembered the content after passing the course. No statistically significant difference was found across groups based on time since completion (2.5 years, 1.5 years, 1 year, or 9 months;  $p = 0.78$ ) or gender ( $p = 0.898$ ).

**Table 4.** Retention of the content in different groups based on the time elapsed since passing the course

	Retention of the content		P-value**
	Yes	No	
Time since passing the course			0.776
2.5 years	9 (8.3%)	7 (6.5%)	
1.5 years	35 (32.4%)	17 (15.7%)	
1 year	22 (20.4%)	10 (9.3%)	
9 months	6 (5.6%)	2 (1.9%)	
Gender			0.898
Male	44 (40.7%)	20 (18.5%)	
Female	28 (25.9%)	16 (14.8%)	
Total	72 (66.7%)	36 (33.3%)	

\*Significant at  $p < 0.05$ ; \*\*tested by Chi-square test.

Moderate-to-weak positive correlations were found between retaining the content and perceiving the multimedia as appropriate and valuable in the learning experience (Table 3).

These findings indicate that academic performance (GPA) and, to a lesser extent, gender influence perceptions of the multimedia intervention, while age has minimal impact.

### Discussion

Effective teaching not only delivers critical information but also ensures that knowledge is retained over time through devices, techniques, and strategies (16). A constructive perspective of "edutainment" needs to be adopted, where students learn while having fun (13). Accordingly, the current study investigated the impact of incorporating seemingly unrelated video clips from movies, cartoons, and internet memes into lectures on special care dentistry on the educational experience of undergraduate dentistry students and their long-term retention of the studied material.

The findings confirmed that the multimedia used was both appropriate (97% of participants approved) and valuable (100% of participants approved) for teaching the content. Participants agreed that these tools added fun to the content and helped them retain it without needing to relearn the material. Female students perceived the videos as more helpful in their understanding; meanwhile, students with higher academic performance reported a greater appreciation of the multimedia's value and demonstrated better long-term retention of information.

During the lecture design stage, clips were placed every 10-15 minutes, based on the "dogma" that students' attention spans decline after this interval. Although recent evidence challenges this dogma, suggesting that students' attention relies mainly on the teacher's skills, rather than the lecture length (15, 17). Therefore, the clips and memes were strategically added, aiming to recapture the students' attention if they were distracted by lengthy, dull scientific discussions, and to add fun to the content, while hopefully reinforcing content retention for a more extended period (16).

The study's outcomes were assessed using online surveys, which were found to be cost-effective, paperless, and environmentally friendly. They also have fewer data entry errors and higher data management efficiency. Furthermore, web-based surveys offer quick and easy access to a large pool of potential respondents—especially participants who are geographically dispersed or otherwise inaccessible—encouraging easy participation (1, 18).

The average response rates to online surveys range from 25% to 30% (18). Consequently, the response rate

in the current study (15.4%) is relatively low. Generally, low participation rates are attributed to privacy concerns or competing demands (18). However, the low participation rate in the current study may be due to the absence of platform notifications. So, the students were not informed of the sent invitation message unless they opened the application for any reason. Therefore, former students, who graduated years earlier and had used the platform only during their university years, but stopped using it since then, were not informed of the survey and thus had a low participation rate.

More than 97% of participants deemed the multimedia used to be appropriate for teaching the content, and none graded it as "not valuable at all." The multimedia used was considered helpful in enhancing the learning experience and improving the understanding of the majority of participants. These results align with previous studies, where students approved of the help provided by the videos in the lectures and found that the videos clarified the content and captured their interest during the lecture (8, 16, 19). Students generally prefer visual aids, such as animations, over reading a textbook (13).

In previous surveys, more than half of university students reported finding their lectures boring. This boredom was then linked to students missing future lectures, lower levels of understanding of the content, and lower GPAs. Therefore, the incorporation of videos has been shown to alleviate boredom and sustain attention (20). Likewise, medical students have expressed satisfaction with the inclusion of entertainment media, reporting improved learning experiences (21). Its effect has been intensely studied, and a review has shown broad support for integrating media clips in teaching. However, it is opposed by the opinion that the clips need to be meticulously selected to avoid ethical concerns or inaccurate scientific content (21).

Internet memes represent the rapid dissemination of a specific notion in the form of text, image, GIF, song, or video. Memes provide a medium to convey complex thoughts in a quick, engaging, and expressive way. This makes it a perfect method for communicating with today's students, who process information more quickly but have a shorter attention span (5, 14). Additionally, it adds fun to the material and increases the likelihood of remembering the content later on (5, 22). As memes are mostly screenshots from movies, students link the subject to the original stories of their favorite movies, increasing their engagement and enjoyment of the

course. Therefore, they are favorably added to highlight key points in the course (23).

Cognitively, multimedia activates both the brain's left hemisphere (for verbal/linguistic processing) and right hemisphere (for visual/spatial processing). With the two hemispheres of the brain engaged, the verbal content is linked to a visual mental model, maintaining long-term retention of information (16). Memes and videos were chosen because they provide a sensory learning environment, allowing students to better understand and retain information. Some educators promoted videos as a powerful tool for providing the context or a starting point for learning. Videos integrate verbal, visual, and auditory methods of learning. Consequently, material is simplified and retained better than in conditions where a single information source is used, thereby improving learning outcomes (7, 16, 24). This is attributed to the creation of a memorable visual image (16).

The significant gender difference in the impact of videos on understanding ( $p = 0.025$ ) suggests that female students may benefit more from visual multimedia in SCD learning, potentially due to differences in learning styles (25). However, the lack of gender effects on other outcomes indicates consistent benefits across groups.

Regarding retention of the content, 66.7% of participants recalled the multimedia used, along with its link to the scientific content, after completing the course, with no statistically significant difference based on the time since passing ( $p = 0.78$ ). These results align with previous studies (16, 19, 21), in which students also reported that videos helped them remember the lecture better and for a longer period compared to traditional lectures.

Memory naturally declines over time following the "forgetting curve" model, where rapid initial loss is followed by a slower yet progressive phase (13). Most students retain only 25% of the learned information after one week and 21% after two to four weeks, in the absence of relearning; and these percentages are expected to decline further over time (13). Nonetheless, these percentages were found to be higher when using visual and audio methods in teaching, providing a better learning experience and higher long-term retention (13).

In the present study, a higher GPA significantly predicted better content retention ( $\beta = 1.187$ ,  $p = 0.029$ , OR = 3.276, 95% CI: 1.129–9.505), suggesting that students with better academic performance were

approximately three times more likely to recall multimedia-linked SCD content years after the course. This finding aligns with prior studies indicating that academically stronger students may exhibit greater cognitive engagement or employ more effective study strategies, enhancing their ability to form durable associations between humorous multimedia and complex scientific material (24). The significant GPA effect may reflect these students' capacity to leverage the intervention's visual and auditory cues, which facilitate deeper processing and long-term memory retention (16).

In contrast, no significant effects were observed for age ( $\beta=0.090$ ,  $p=0.671$ , OR=1.095), gender ( $\beta=0.130$ ,  $p=0.762$ , OR=1.139), or time since passing the course ( $p=0.462$ ), suggesting broad applicability of the intervention, as it appears equally effective for younger and older students, males and females, and across different time intervals post-course (up to 2.5 years).

Overall, these findings support the intervention's potential to enhance long-term retention in SCD education, particularly for high-performing students, while also highlighting the need for future studies to explore additional predictors and contextual factors to fully understand its impact across diverse student profiles.

Lastly, in the current study, the vast majority of participants confirmed that the multimedia brought fun to the content. The students' feedback in the current study aligns with that of a previous study (13), where students enjoyed the videos and memes used. Another previous survey (7) reported that young students enjoyed the idea of adding videos to lectures and benefited from it in their learning process. Video clips have been proven to add fun to learning, motivate students, and foster deeper learning (16).

Using humor during teaching has been confirmed to catch students' interest and maintain their motivation to learn (6, 26). By sharing challenging situations through jokes, humor is a generally used coping mechanism to relieve tension, setting students at ease. It has been proven to be effective in helping students understand and focus their attention, diffusing anger and stress, reducing anxiety, aiding memory, and creating a positive attitude towards the subject and instructor (6, 22, 26). Consequently, humor has been believed to create a more positive learning experience, especially when relevant to the subject material (6, 26, 27).

Nevertheless, humor may sometimes create an illusion of learning without genuine understanding (6). In this study, however, participants who reported

satisfaction with the teaching methods also had moderate to high GPAs, suggesting genuine educational benefit.

One of the strengths of the current study is that it is the first to report on the experience of using non-traditional teaching methods for SCD education. However, the major limitation of the study is its single-arm design, which lacks a comparator control group (i.e., a standard pedagogical method with no multimedia added). Therefore, future controlled trials are recommended to quantify the effect of the used method.

## Conclusion

Using multimedia, such as comedy movie clips and memes, in the special care dentistry lectures proved to be an effective method for enhancing the learning experience. The humorous nature of these materials added enjoyment to the content, and together, these advantages strengthened students' memory of the material, allowing them to retain the information years after completing the course without needing to relearn it.

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