

Laughing and Learning: Exploring the Impact of Humour in Enhancing Biology Learning Outcomes

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Abstract

Biology, with its terminology, complex processes and extensive memorisation requirements poses a hurdle for many students which necessitate a more comprehensive and interactive learning approach. The objective of this study was to examine the potency of humour-based teaching approach to enhance the performance of secondary school students in biology. The study was a quasi-experimental design of a non-equivalent pretest-posttest control group design. The sample comprised 104 SS2 students from the intact classes of two purposively selected schools in Lagos State. These schools were randomly assigned as experimental and control groups. Achievement data were collected through a micro-organism achievement test (MAT) with a reliability value of 0.76. For four weeks, students in the experimental group received instruction on micro-organisms with the incorporation of general and content-specific humour while students in the control group received the same learning experience without elements of general and specific humour. Since one

dependent variable (achievement) was of interest in this study, the data collected were analysed using ANCOVA. Results from the analysis of covariance showed a statistically significant difference in the achievement of students $F(1, 101) = 304.71; p < .05$. This implied that the technique was potent in enhancing the performance of students. Thus, this study recommends the incorporation of a variety of humour that will appeal to different age group and cultural background of students, ensure that the humour is relevant to the biology content being taught, and foster a positive and inclusive classroom environment.

Keywords: Humour, Innovative teaching, Learning outcomes, Biology

Introduction

The field of biology education holds significance as it profoundly influences the development of students' scientific literacy and critical thinking skills on a scale. According to Onowugbeda (2020), teaching biology presents a challenge because students often perceive it as complex and difficult to understand. Biology, with its terminology, complex processes and extensive memorization requirements poses a hurdle for many students which necessitate a more comprehensive and interactive learning approach. Although the traditional approach to teaching biology characterized by a one-way flow of information has long been an aspect of education providing a framework, for conveying essential biological principles (Ademola et al., 2022; Onowugbeda et al., 2023). This may fall short in effectively addressing the unique challenges posed by biology. The sheer volume of information that students need to memorize often requires more engaging and participatory methods to ensure better comprehension and retention.

While it is important to acknowledge the benefits of this approach in facilitating the acquisition of knowledge, it must also be recognised by its limitations when it comes to promoting active participation, cultivating critical thinking abilities, and adapting to the ever-changing landscape of the biological sciences (Adam et al., 2023; Agbanimu et al., 2021;2022; Ajayi et al., 2023). To address these concerns educators and researchers have begun exploring methods for teaching biology to resolve these challenges and enhance the learning experience. One major issue faced by biology educators is finding ways to bridge the gap between the complexity and significance of the subject matter and ensuring that it remains relatable engaging and easily comprehensible, for students.

According to Gbeleyi (2022) and Okebukola et al., (2021), implementing effective teaching strategies is crucial for engaging students and facilitating knowledge acquisition. However, it should be acknowledged that the traditional instructional approach often fails to

promote student engagement, particularly in subjects that are commonly perceived as being difficult and intimidating, such as biology. If instructional practices fail to yield desired outcomes, the prevalence and severity of learning challenges are likely to endure and potentially escalate. The presence of learning difficulties is associated with several negative outcomes which include shallow understanding, reliance on rote learning and memorization, and limited applicability of acquired knowledge. Empirical studies conducted by Ademola et al., (2023); Agbanimu (2020); Onowugbeda et al., (2022); and Samson et al., (2022) have identified poor performance in examinations as one of the primary manifestations of these difficulties.

The pedagogical approach commonly employed for the instruction of biology at the secondary school level in Nigeria predominantly involves the use of traditional teaching methods, specifically the talk and chalk method. In this pedagogical approach, the students assume a passive role in the learning process, exhibiting limited or negligible engagement in activities. In this context, it is essential for educators to effectively organize and deliver their instructional materials, subject matter, or educational opportunities in a way that holds significance for the learner in the present moment as well as in the long term. Humour, as a pedagogical approach, possesses the capacity to reconfigure the educational milieu through the infusion of amusement and light-heartedness within the instructional setting. The cultivation and incorporation of humour within the educational setting can be strategically employed to cultivate an environment that promotes a sense of inclusivity and mutual regard among both students and educators.

The incorporation of humour into pedagogy has roots in ancient educational philosophies, with the term "humour" itself deriving from the Latin word "umor," associated with bodily fluids. In ancient Greece, thinkers like Aristotle recognized the pedagogical benefits of humour, emphasising its role in engaging learners and enhancing communication. Throughout history, educators such as Erasmus and Thomas More in the Renaissance acknowledged humour's ability to make learning enjoyable and memorable. The 20th century saw a shift towards student-centered education, with figures like John Dewey and Lev Vygotsky emphasizing the importance of emotions and engagement in learning. This paradigm shift contributed to the broader acceptance of humour as a legitimate and effective tool in pedagogy.

Contemporary education research supports the use of humour in pedagogy, highlighting its potential to create positive and inclusive learning environments. Incorporating humour in teaching practices is viewed as a means to increase student motivation, foster a more relaxed atmosphere,

and improve information retention. Educators today often employ various forms of humour, including jokes, anecdotes, and interactive activities, to enhance the overall learning experience and promote a dynamic and engaging classroom environment. According to the research of de Guzman and Arceo (2022), incorporating humour in the educational setting can greatly contribute to creating a positive and inclusive space for learning. By using humour strategically and appropriately, educators can break down barriers and foster a relaxing and comfortable atmosphere between themselves and their students, ultimately leading to a conducive learning environment. This aligns with the findings of Lazarides et al., (2020) that a positive classroom climate greatly impacts the effectiveness of learning. When students feel supported and welcomed, they are more likely to actively participate in the learning process. In the student body, humour plays a vital role in fostering social interaction and promoting a shared camaraderie. Allowing students and teachers to connect through light-hearted moments, and facilitates positive relationships.

Shahid and Ghazal (2019) acknowledged that the use of humour in the classroom offers a multitude of benefits, with one of its primary advantages being the ability to increase student's engagement. By strategically incorporating humour, educators can effectively enhance the overall learning experience for students, making it more enjoyable and memorable. Humour has been recognized as a valuable tool for educators to establish a personal connection with students, creating a relatable and informal atmosphere that goes beyond traditional teaching methods (Shahid and Ghazal 2019). Incorporating humour in educational materials can create a lively and captivating learning environment that promotes active participation and the growth of critical thinking abilities.

The use of humour as a pedagogical tool is an effective way to ease tension in the classroom, according to de Guzman and Arceo (2022). This is especially important when students face difficulties or high levels of stress during the learning process. Taking part in short breaks and engaging in light-hearted activities serves as a temporary escape from the mental strain of academic tasks, potentially alleviating feelings of anxiety and apprehension towards challenging subjects. As reported by Ogunyemi (2020), creating opportunities for emotional release in the classroom can have a positive impact on the overall learning environment. By providing a safe space for students to express and process their emotions, they can develop resilience. Creating a safe learning environment is crucial for students to fully engage in the learning process and form positive social relationships with their peers. The use of humour to approach difficult topics

demonstrates a high level of empathy and understanding, resulting in a nurturing atmosphere for students to thrive in.

When incorporating a humour approach in teaching, it's essential to consider both general and specific techniques to effectively engage students. In a general sense, knowing your audience is crucial. Understand their backgrounds, interests, and cultural sensitivities to tailor your humour appropriately. Authenticity is key; embrace a style of humour that aligns with your personality and teaching style to create a genuine connection with your students. Timing plays a crucial role, so choose moments that enhance rather than disrupt the learning flow. Begin with icebreakers to set a positive tone and consider incorporating relatable examples from everyday life or popular culture. Encourage student participation by inviting them to share their own humorous experiences, fostering a collaborative and enjoyable learning environment. Lastly, self-deprecating humour can make you more approachable, breaking down barriers between you and your students.

For specific humour approaches, consider incorporating wordplay, puns, or clever jokes related to the subject matter. Visual humour, such as memes or cartoons, can add a playful element to your teaching materials. Be cautious with sarcasm, using it sparingly and ensuring clarity to avoid potential misunderstandings. Share humorous anecdotes or stories tied to the lesson, making the content more relatable. Incorporate games or challenges to infuse an element of fun and competition into the learning process. Integrate humorous videos or clips that illustrate complex concepts in an entertaining way. Even assessments can be designed with a touch of humour, helping to alleviate stress and create a positive assessment experience. Through the integration of these general and specific humour strategies, educators can create an engaging and enjoyable learning environment that enhances student understanding and retention.

This study seeks to understand the impact of incorporating humour into biology learning materials on cognitive processing and learning outcomes. By purposefully injecting playful and unexpected elements, this research delves into whether these incongruities can enhance students' retention and grasp of intricate biological concepts. The hypothesis is based on the notion that the mental exertion needed to reconcile these incongruities may foster a deeper understanding of the subject matter, potentially leading to improved learning outcomes. In this study, the methodology focused on creating instructional material that effectively incorporates humour and evaluating its impact on students' motivation, interest, and retention of information. The study also explored the dynamic between educators and students, specifically looking at how humour can foster interaction

and create a more immersive and captivating learning environment. Incorporating the principles of incongruity theory, this research aimed to uncover the underlying mechanisms behind how humour serves as a cognitive stimulant, ultimately enhancing the experience of learning biology and resulting in improved educational outcomes. To sum up, this study applies incongruity theory as a conceptual lens to explore the impact of humour in biology education. Through this investigation, we aim to uncover the cognitive mechanisms activated by incongruities, presenting invaluable perspectives on how educators can effectively incorporate humour to enhance learning in the realm of biology.

Purpose of the Study

The purpose of this study was to explore the potency of humour-based teaching on students' achievement in Biology.

Research Questions

Does humour-based teaching effectively enhance the achievement of students in Biology?

Research Hypothesis

There is no statistically significant difference in the achievement of students taught Biology using humour strategy and the conventional lecture method.

Methodology

The study was a quasi-experimental design that employed a quantitative method of data-gathering technique involving experimental and control groups. The sample comprised 104 senior secondary biology students from the intact classes of two senior secondary schools in Ojo Local Government Area of Lagos State, Nigeria. These schools were chosen randomly among schools suitable for the convenience of location. There were 53 students in the experimental class (humour) and 51 students in the control (lecture). The students were chosen from SS2, as the content of the school's educational programme at that stage was consistent with the kind of content the testing situation needed. Achievement data were collected through a micro-organism achievement test (MAT). This instrument comprised 25 multiple-choice items on micro-organisms based on three cognitive levels: knowledge; understanding; and application with a reliability of 0.76. A lesson plan was developed for the experimental class on micro-organisms to reflect the approach of the timely use of humour. The lesson plan for the control class was without the humour approach.

Both experimental and control classes were subjected to pretest and posttest (after two weeks of the treatment) using the same achievement measures. The learning experience of the experimental and control classes was on "micro-organisms" for four weeks. In the experimental class, the teaching and learning of the concept were with the appropriate and timely use of general and specific humour to present the contents in the form of a PowerPoint presentation. In the experimental class session, general humour was presented to the students before introducing them to the learning activities of the day. The general humour aimed to make the student feel relaxed from pressures at home or anywhere. Hence, at the introduction of the content to be learned, specific humour relating to the learning experience was presented to the students. As the lesson progressed, the teacher discussed the topic and used timely specific humour with relevant examples relating to the topic. The students were advised not to cause disarray for the duration of the presentation and were encouraged to pay keen attention to the presentation made by the teacher. The written content on each slide was read out and explained by the teacher in a clear and audible voice. All slides were exposed for a significant time interval enough for the teacher to read out the contents on the slide and explain. The content on the slides differed across the two classes with the experimental class showing a presentation of the learning experience presented and explained entertainingly, such as using general and specific humour narratives. The control group was presented with the identical learning material experience in a regular lecture and, in a non-humorous way. Both experimental and control classes had identical slides in features such as the size of the font, colours used, line spacing, and the number of characters present.

The control class had the same learning experience as the experimental class but without any element of humour. During the treatment, students in the control group were taught by the researcher without the timely use of instruction coupled with instruction. On the other hand, the students in the experimental group were taught the same topic but with the appropriate and timely use of humour coupled with the instruction for the same number of periods. All experimental and control group students were post-tested using the same instrument. After the treatment in both groups, the participants were given the same achievement measure as the pre-test and were asked to answer them. Instructions were identical to the pre-test.

Quantitative data generated in the study were analysed using IBM-SPSS Version 23. Since one dependent variable was of interest in the study; students' achievement and random assignment to experimental and control groups was not achieved, so the suitable analysis tool was the analysis

of covariance (ANCOVA). The pretest and posttest achievement scores from the experimental and control classes were inserted into the ANCOVA equation with the pre-test scores as the covariate.

Results

The main objective of this study was to explore if humour-based teaching will effectively enhance the achievement of students in biology. The quantitative data was subjected to descriptive statistics and the result in presented in Table 1.

Table 1: Means and SD on the Pre-test Achievement Scores of Students in the Experimental and Control Groups

Group	N	Mean	SD
Experimental	53	4.28	1.60
Control	51	3.45	0.88
Total	104	3.88	1.36

The findings derived from the descriptive analysis indicate that the average scores of students in both the experimental and control classes were similar before the implementation of the intervention. Specifically, the mean score for the experimental class was 4.28, while the mean score for the control class was 3.45.

Table 2: Means and SD on the Post-test Achievement Scores of Students in the Experimental and Control Groups

Group	N	Mean	SD
Experimental	53	16.72	2.71
Control	51	8.04	1.96
Total	104	3.88	4.96

Following the implementation of the intervention, it is noteworthy that the experimental group students exhibited a higher mean achievement score of 16.72 on the post-test measure. This score is twice as high as the mean score of 8.04 observed among the control group students, as indicated in Table 2. The data indicates that the students in the experimental group exhibited greater improvement in their scores when compared to their peers in the control group. Therefore,

to determine the presence of a significant difference, the achievement data was subjected to analysis of covariance, with the pre-test achievement scores serving as the covariate.

Table 3: Analysis of Covariance on the Post-test Achievement Scores of Students in the Experimental and Control Group with Pre-test Achievement Scores as the Covariate

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Class	1723.300	1	1723.300	304.705	.000
Error	571.219	101	5.656		

The result of the ANCOVA test on the post-test achievement scores showed that the difference in the performance between the students in the experimental class and control class was significant $F(1, 101) = 304.71$; $p < .05$. This implies that the difference observed between performance in the experimental and control class is statistically significant, thus, the observed improvement in the academic achievement of students in the experimental class can be associated with the treatment given which was the appropriate and timely use of humour incorporated in the presentation of the biology concept.

Discussion of Findings

The finding of this study confirmed that the humour-based teaching effectively enhanced the achievement of students in biology. This is similar to works of Bakar and Kumar, (2019); Jakonen and Evnitskaya (2020); Masek et al. (2019); Szentes et al. (2020); Weisi and Mohammadi (2023) that humour as an instructional tool has often been shown to increase the amount of material understanding. One plausible explanation for this outcome could be that the inclusion of humour in the experimental group served as a catalyst for improved cognitive function among students. Humorous material typically demands extra mental exertion for comprehension, as it involves grasping and appreciating the underlying jokes or cleverness. This heightened mental involvement may have encouraged students to delve deeper into the biological concepts, leading to a stronger grasp and greater retention of the material in comparison to traditional lecture-style teaching.

The use of humour can have a powerful impact on motivation and engagement with the material. Being in the experimental group, students may have found themselves excited and eager to actively engage in the learning process due to the captivating and amusing instructional materials. This heightened motivation often leads to increased effort, determination, and a positive mindset towards learning, ultimately resulting in improved academic performance.

This innovative classroom approach, incorporating humour, likely fostered a welcoming and encouraging atmosphere for students to learn. Notably, the emotional tone of the learning environment had a significant impact on student achievement. When students found joy in their learning, they were able to relax and alleviate any stress or anxiety they may have had. This positive atmosphere translated into improved focus, cognition, and ultimately, enhanced academic success.

Moreover, injecting humour into the learning material has the potential to foster deep emotional connections and improve memory retention. By infusing humorous elements into their lessons, the experimental group demonstrated a higher degree of recall, as the act of laughing stimulated the formation of strong neuronal connections related to the subject matter. This enhanced emotional link may be responsible for the improved long-term retention and recall seen in the experimental group, as compared to the traditional lecture method where emotional engagement may be lacking.

Another distinction between the experimental and control classes can be attributed to the greater calibre of learning observed in the experimental class, which was exposed to humorous content. The disparity can primarily be attributed to the impact of humour, given that both the experimental and control groups were matched in terms of visual imagery and content. The kids held a favourable opinion of humour in the classroom. This holds especially true when incorporating suitable and timely humour that aligns with the student's level of maturity.

Students can readily comprehend the language employed and the significance of humour, as previous scholars assert that acceptable humour should be pertinent to the subject matter (Machlev and Karlin, 2017) and suitable for the age group and academic level (Ivy, 2013). These findings corroborate the incongruity theory, which suggests that a teacher can employ amusing teaching aids, such as cartoons, hilarious photos, humorous experiments, and other comedic content, to enhance students' engagement throughout the lecture.

Although the study offers valuable insights on the benefits of using humour in Biology education, it is crucial to consider some limitations that may impact the applicability of its findings. To start with, the size and makeup of the sample used in the study may restrict the ability to extend the results to a wider population. For instance, if the majority of participants are from a particular age group or educational background, the study's relevance to diverse learners may be questionable. Additionally, the length of the intervention and the methods used to measure learning

outcomes may present difficulties in accurately capturing the long-term effects of humour on Biology learning.

In the future, it is worth exploring the most effective dosage and timing for incorporating humour in biology education. While this study did not specifically address the balance between serious content delivery and humour integration, there is room for further investigation into the ideal frequency and timing of injecting humour to optimize learning results. Moreover, considering the potential transferability of humour's impact on learning to other STEM subjects and educational levels could greatly expand the practical implications of this study's findings. As educators and researchers continue to enhance pedagogical techniques, a deeper understanding of humour's nuanced role in various educational contexts will undoubtedly contribute to the ongoing evolution of effective teaching methods.

Conclusion

Incorporating humour into Biology instruction has been found to have numerous benefits, as revealed by this study. The findings support the idea that the strategic use of humour can increase student engagement, motivation, and understanding. However, it is important for educators to carefully assess the appropriateness of humour in different biological topics and to employ a variety of comedic elements to cater to various preferences. Teachers can also enhance their ability to integrate humour into their curriculum by taking part in workshops and training sessions. Moving forward, continuous research is necessary to further our understanding of how humour impacts learning outcomes, ensuring that education continues to progress.

Recommendations

Based on the results of this research, there are numerous suggestions for educators and curriculum designers who wish to use humour in biology instruction.

Tailor humour to the age group and cultural background of students. Different students may respond to different types of humour, so it's essential to gauge their preferences and comfort levels.

Ensure that the humour is relevant to the biology content being taught and is appropriate for the classroom setting. Avoid jokes or references that may be offensive or distracting. The goal is to engage students and enhance learning, not to create discomfort

Integrate humorous visuals, cartoons, or short videos related to biology concepts. Visual humour can be a powerful tool to reinforce learning and make the material more memorable. Be mindful of the multimedia's appropriateness and alignment with educational goals.

Foster a positive and inclusive classroom environment where students feel comfortable sharing their biology-related jokes or anecdotes. Encourage humour as a tool for collaborative learning, allowing students to connect with the material on a personal level.

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