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The Effect of Relevant and Irrelevant Humor in Educational Content on the Academic Engagement of Fourth-Grade Male Students

Mehrzad. Tavakolian[1], Hassan. Asadzadeh[2*], Seyed Ali. Hosseini AlMadani[1], Ali. Jalili Shishvan[3]

[1] Department of Psychology, NT.C., Islamic Azad University, Tehran, Iran
[2] Professor, Department of Educational Psychology, Faculty of Psychology and Educational Sciences, Allameh Tabatabaei University, Tehran, Iran
[3] Assistant Professor, Department of Sport Psychology, Institute of Sports and Health Sciences, Allameh Tabatabaei University, Tehran, Iran

*** Corresponding author email address**: Asadzadeh@atu.ac.ir

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A B S T R A C T

Purpose: The objective of this study was to investigate the impact of relevant and irrelevant humor in the science curriculum on the academic engagement of fourth-grade elementary school students.

Methods and Materials: This study employed a quasi-experimental design with a multi-stage cluster sampling method. A total of 88 fourth-grade students from non-public schools in District 5 of Tehran participated in the study. Students were randomly assigned to three groups: the relevant humor intervention group, the irrelevant humor intervention group, and a control group. A humor-infused educational package combining relevant and irrelevant humor with science content was developed and implemented. Academic achievement was measured using a pre- and post-test design, and data were analyzed using analysis of covariance (ANCOVA).

Findings: The findings indicated a significant difference in academic achievement between the relevant humor group and the control group, with the relevant humor group showing greater improvement in academic performance ($p < 0.05$). There was no significant difference between the irrelevant humor group and the control group ($p > 0.05$). The eta squared value of 0.14 indicated that 14% of the variance in academic achievement was explained by the humor interventions.

Conclusion: The study concluded that incorporating relevant humor into the science curriculum can significantly enhance academic achievement by increasing student engagement, motivation, and understanding of the material. In contrast, irrelevant humor did not yield significant academic benefits, suggesting the importance of aligning humor with the curriculum content. Future research is needed to explore the long-term effects and broader impacts of humor interventions in education.

Keywords: *humor, academic achievement, educational content, fourth-grade male students.*

1. Introduction

Academic engagement plays a crucial role in determining students' academic success and overall well-being. It encompasses behavioral, emotional, and cognitive dimensions, each contributing to students' involvement in their learning process (Li et al., 2024). Behavioral engagement refers to participation in academic activities, such as attending classes and completing assignments, while emotional engagement involves feelings of interest and enjoyment in learning. Cognitive engagement focuses on the investment in learning strategies and critical thinking (Fatimah et al., 2024). Research shows that factors such as academic self-efficacy (Fatimah et al., 2024), locus of control (Li et al., 2024), and teacher–student relationships (Liu, 2024) significantly influence students' level of engagement, with supportive environments fostering motivation and resilience. Research has demonstrated that students who are engaged in their learning are more likely to exhibit higher levels of academic achievement, better attendance, and a more positive attitude toward school. A key aspect of academic engagement is the student's motivation to learn (Johansen et al., 2023).

The role of teacher support and academic emotions in shaping engagement has been widely recognized. Shen (2024) found that teacher emotional support enhances academic engagement through positive academic emotions and mastery-approach goals (Shen, 2024). Similarly, teacher–student rapport and perceived social support act as mediators, linking teacher encouragement to increased student participation and enthusiasm (Liu, 2024; Pan & Yao, 2023). Emotional pathways, as highlighted by Sajadifar (2023), suggest that positive emotions like enjoyment and pride can predict higher engagement, while negative emotions may lead to disengagement (Sajadifar, 2023). This is consistent with findings by McKellar and Wang (2023), who emphasized that a sense of school connectedness is vital for sustained engagement across different learning modalities, including remote, hybrid, and in-person settings (McKellar & Wang, 2023).

Self-regulated learning and external influences also shape academic engagement. Masoomi Jahandizi et al. (2023) noted that self-regulated learning strategies and academic emotions are predictors of engagement, particularly among medical students (Masoomi Jahandizi et al., 2023). Furthermore, the integration of modern educational methods, such as blended learning, has been linked to enhanced engagement and academic performance (Najafi, 2023). Social influences, including parental involvement and social media addiction, also play a role; while parental support promotes resilience and engagement (Anierobi et al., 2024), excessive social media use may mediate the relationship between social anxiety and academic performance, potentially hindering engagement (Mou, 2024). Collectively, these studies underscore the importance of fostering supportive, emotionally rich, and strategically designed educational environments to maximize students' academic engagement and success.

Humor and academic engagement are key elements in fostering effective learning environments, as highlighted by various studies. Afshar Kohan et al. (2016) demonstrated the positive impact of a humor-integrated mathematics curriculum on students' mathematical creativity, suggesting that humor can serve as a bridge to deeper cognitive processes in academic contexts (Afshar Kohan et al., 2016). Similarly, Balta (2016) emphasized that teachers' attitudes toward humor significantly influence its implementation in classrooms, underlining the necessity of teacher readiness to use humor as a pedagogical tool (Balta, 2016). Engagement, being a multifaceted construct encompassing affective, behavioral, and cognitive dimensions, has been explored extensively. Ben-Eliyahu et al. (2018) noted that engagement across science activities is critical for sustained student motivation and learning outcomes (Ben-Eliyahu et al., 2018). This is supported by Pashaei et al. (2020), who found that concept mapping strategies could enhance academic progress and engagement in elementary science curricula (Pashaei et al., 2020). Furthermore, Johansen et al. (2023) argued that content relevance is pivotal for increasing student motivation and vitality, reinforcing the need for contextually meaningful learning materials (Johansen et al., 2023). In higher education, Azila-Gbettor et al. (2023) highlighted the role of university support in maintaining student engagement during online learning, particularly during the COVID-19 pandemic (Azila-Gbettor et al., 2023). On a broader scale, Amerstorfer and von Münster-Kistner (2021) explored how student-teacher relationships in problem-based learning environments influence academic engagement, emphasizing the interpersonal dynamics of learning (Amerstorfer & Freiin von Münster-Kistner, 2021). Seif (2015) echoed the importance of psychological factors, including motivation and engagement, in his comprehensive exploration of educational psychology (Seif, 2015). Additionally, Zahed Babolan et al. (2017) identified a direct correlation between students' quality of life at school and

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their academic self-concept, both of which play significant roles in academic engagement (Zahed Babolan et al., 2017).

Providing an engaging, relevant, and appropriately challenging curriculum can help stimulate students' curiosity and interest in learning. Offering opportunities for hands-on and experiential learning can enhance students' motivation and engagement. Encouraging a growth mindset, which emphasizes the belief that intelligence and abilities can be developed through effort and perseverance, can help students adopt a positive attitude toward learning and view challenges as opportunities for growth (Azila-Gbettor et al., 2023). Thus, the objective of this study was to investigate the impact of relevant and irrelevant humor in the science curriculum on the academic engagement of fourth-grade elementary school students.

2. Methods and Materials

The statistical population of this semi-experimental study included all fourth-grade students enrolled in non-profit schools in District 5 of Tehran during the 2023–2024 academic year. The sampling method utilized in this study was multistage cluster sampling. First, three non-profit schools in District 5 of Tehran were randomly selected. Then, in each school, one fourth-grade male class was randomly chosen. Two classes were assigned to the experimental groups, purposefully categorized into relevant and irrelevant humor groups, and one class was designated as the control group.

The first and most crucial step in this study was the design of an educational package incorporating relevant and irrelevant humor centered on the concepts of the fourth-grade science textbook. For designing this package, consultations were held with humorists, followed by discussions with university experts specializing in educational psychology. Ideas for applying humor in the classroom were drawn from the book Using Humor in the Classroom by Ivan Hover. Additionally, educational content was sourced from the fourth-grade science textbook and the Sir to Piyaz series by Gaj Publications.

The research instrument employed was the Academic Engagement Scale developed by Wang et al. (2011) which includes 23 items and use a 5-point Likert scoring. This scale is validated and the reliability is approved in several studies in Iran (Zahed Babolan et al., 2017).

The data analysis for this study was conducted using a combination of descriptive and inferential statistical methods to evaluate the impact of humor interventions on academic achievement. Descriptive statistics, including means and standard deviations, were calculated to summarize the data and provide a clear understanding of the distribution of variables such as academic motivation, interest in the subject, and academic engagement. Inferential statistics, specifically analysis of covariance (ANCOVA), were employed to test the hypotheses while controlling for the pretest scores of academic achievement. The assumptions of normality, homogeneity of variances, and the relationship between dependent and covariate variables were examined before conducting ANCOVA. Levene's test was used to assess the homogeneity of variances, ensuring the appropriateness of the model. The eta squared statistic was calculated to measure the effect size of the interventions, providing insights into the proportion of variance in academic achievement explained by the humor-based interventions. All analyses were conducted using statistical software, and significance levels were set at $p < 0.05$ to determine the meaningfulness of the results.

3. Findings and Results

The findings were divided into descriptive and inferential categories. In the descriptive findings, prior to testing hypotheses using inferential statistics, some descriptive statistical indices, including mean and standard deviation, were presented for research variable.

Table 1

Mean and Standard Deviation of Academic Engagement

Group	Stage	Mean	Standard Deviation
Relevant Humor	Pre-test	68.5	4.3
	Post-test	85.2	5.1
Irrelevant Humor	Pre-test	67.3	4.7
	Post-test	72.1	6.2
Control	Pre-test	66.8	4.5
	Post-test	67.2	4.8

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Given the presence of the pretest covariate for academic achievement in the experimental design, analysis of covariance (ANCOVA) was used to test this hypothesis. Before reporting the ANCOVA results, the assumptions of normality, homogeneity of variances, and sufficient relationships among dependent variables were verified. After confirming normality, Levene's test for homogeneity of variance was conducted. The results of Levene's test for posttest academic achievement indicated that the assumption of homogeneity of variance was met, and there were no obstacles to conducting a univariate ANCOVA.

Table 2

ANCOVA Results for Academic Engagement

Source of Variation	Dependent Variable	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	Observed F	p-Value (Significance)	Eta Squared (η^2)
Pretest	Posttest	2335.907	1	22.907	1.138	0.81	0.015
Group	Posttest	100.570	2	50.285	18.32	0.00	0.30
Error	Posttest	230.534	86	2.744			
Total	Posttest	107400.000	88				

The results in Table 2 indicate that the ANCOVA for academic engagement revealed a significant difference between the intervention groups and the control group. This suggests that the use of both relevant and irrelevant humor had a significant impact on academic engagement. The eta squared value for academic engagement was 0.30, indicating that 30% of the variance in academic engagement was attributable to the humor-based intervention in fourth-grade students. However, the difference between the pretest and posttest for academic engagement was not statistically significant.

4. Discussion and Conclusion

The results of the analysis of covariance (ANCOVA) indicated that there was a significant difference between the intervention groups and the control group in the academic achievement variable. This means that both relevant and irrelevant humor interventions had a significant effect on academic achievement. The eta squared statistic for academic achievement was 0.14, which suggests that 14% of the variance in academic achievement was due to the relevant and irrelevant humor interventions in the fourth-grade students. The comparison of means showed a significant difference between the relevant humor group and the irrelevant humor group, as well as the control group ($p < 0.05$). However, no significant difference was found between the irrelevant humor group and the control group ($p > 0.05$). Therefore, this hypothesis is confirmed.

These findings are consistent with prior studies (Dowling, 2014; Johansen et al., 2023; Pashaei et al., 2020).

Given the impact of relevant and irrelevant humor on academic achievement in science curriculum content, several factors come into play. The use of humor directly related to the science curriculum can have a positive impact on students' academic achievement. By incorporating jokes, examples, or activities that are connected to the material being taught, educators can create a more engaging and memorable learning experience for students. This, in turn, may enhance students' understanding and retention of the subject matter, ultimately supporting their academic progress in science.

Humor unrelated to the science curriculum may not have a significant impact on students' academic achievement. While irrelevant humor can create a fun and enjoyable classroom atmosphere, it may not directly enhance students' understanding of the material or support their academic progress in science. Such humor may distract students from the educational content and potentially hinder their ability to master the curriculum (Afshar Kohan et al., 2016).

In general, using humor that is relevant to the science curriculum can potentially enhance students' academic achievement by increasing engagement, motivation, and understanding of the material. On the other hand, irrelevant humor may not directly contribute to students' academic progress and may potentially cause distraction (Banas et al., 2011; Hellman, 2007).

When humor is directly related to the science curriculum, it can act as a powerful tool to increase student engagement, motivation, and understanding of the material. By incorporating jokes, examples, and activities that are relevant to the subject being taught, educators can create a more engaging and memorable learning experience for students. This, in turn, may support academic progress by

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helping students better understand and retain the scientific content being presented.

On the other hand, humor unrelated to the science curriculum may not have a significant effect on students' academic achievement. While irrelevant humor can create an enjoyable and fun classroom atmosphere, it may not directly support students' understanding of the content or their academic progress in science. In fact, irrelevant humor may act as a distraction and potentially hinder students' ability to master the science curriculum.

In comparison to relevant and irrelevant humor, maintaining a control group without humor in the science curriculum may also provide valuable insight into the effects of humor on academic achievement. By comparing the academic outcomes of students exposed to relevant humor, irrelevant humor, and the control group, educators and researchers can better understand the specific impacts of humor on learning and academic progress in science.

One of the main limitations of this study is its reliance on a relatively small and homogenous sample of fourth-grade students from non-public schools in a specific district of Tehran, which limits the generalizability of the findings to broader populations. Additionally, the study focused only on academic achievement in the science curriculum, excluding other potential outcomes such as emotional or social development that may also be impacted by humor interventions. The short duration of the intervention and the absence of long-term follow-up data prevent an assessment of the lasting effects of humor on academic progress. Furthermore, the study did not account for individual differences such as prior knowledge, cognitive styles, or personal preferences for humor, which may have influenced the results. Finally, the use of self-reported measures for assessing academic engagement and achievement may introduce bias, as students may have provided socially desirable responses.

In conclusion, using humor related to the science curriculum can have a positive impact on the academic achievement of elementary school students by enhancing engagement, motivation, and understanding of the material. However, it is essential for educators to strike a balance between incorporating humor and ensuring that it supports, rather than detracts from, students' learning and academic progress. Further research and experiments are needed to explore the specific effects of humor in science education and to identify best practices for effectively integrating humor into the curriculum to maximize students' academic achievement.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Each participant received an informed consent form to understand the study's objectives.

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