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Utilizing Digital Memes in Teaching Genetics on Grade 11 STEM Students

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Abstract

Digital memes are pieces of amusing or relatable content that are created and widely disseminated online. A meme is usually an altered or combined image, video, or text that aims to convey a specific message or evoke a certain reaction. Internet memes, as a form of user-generated digital media content, can have significant impacts on individuals who come across them. This study attempts to determine the effect of Utilizing Digital Memes in Teaching Genetics to STEM Students. It sought to determine the difference in the pre-test and post-test scores of both the control and experimental group. This research used experimental research design where two sections of Grade 11 senior high school in Integrated Developmental School, Naawan, Misamis Oriental are the respondents of the study. The first section was the experimental group utilizing digital memes, while the second section was the control group using the lecture method. The results showed that utilizing digital memes in teaching genetics has a substantial impact on the student's performance compared to the lecture method. This implies that those respondents who got the intervention achieved better in post-test scores than those who were instructed and taught with the lecture method. Since the t-value is -10.61 which corresponds to the p-value of 0.0001 which is less than 0.05 level of significance. Therefore, the null hypothesis was rejected since there was a significant difference in the scores of the students from the pre-test to the post-test between the two groups but, students got a higher score and improved better using the digital memes compared to the lecture method. This suggests that when the intervention was used, the respondents' performance significantly improved. Moreover, teachers may use appropriate digital memes that will be incorporated into the lesson and choose popular and familiar memes with the students to improve their understanding of the lesson.

Keywords: Digital memes, Performance, STEM, Genetics, Philippines

1. Introduction

Digital technologies appear to be appropriate means to improve basic literacy and numeracy skills, especially in primary settings. The effect sizes are generally similar to other educational interventions that are effective in raising attainment, though the use of digital learning has other benefits. The changes have not only transformed media, they have distributed production of and access to digital resources while altering fundamentally how, when, and for what purposes resources are created and used. Also, the extent of the effect may be dampened by the level of capability of teachers to use digital learning tools and resources effectively to achieve learning outcomes. More effective use of digital teaching to raise attainment includes the ability of teachers to identify how digital tools and resources can be used to achieve learning outcomes and adapting their approach, as well as having knowledge and understanding of the technology. This applies in all schools. Where learners use digital learning at home as well as school for formal and non-formal learning activities these have positive effects on their attainment, because they have extended their learning time. This is particularly important for secondary age learners. (Riaghaltas, 2015).

Digital memes refer to humorous or relatable content that is created and shared widely on the internet. A meme typically consists of an image, video, or piece of text that is altered or combined with other elements to convey a specific message or evoke a particular reaction. Memes often employ humor, sarcasm, irony, or cultural references to resonate with a broad audience (Ariyoga, 2020). Memes, are the utility for understanding digital culture positioning to premises throughout where's the intense emotion and dramatic statement debates need to be turned down. While enthusiastic advocates argue that the meme concept explains everything and their opponents assert that it explains and changes absolutely nothing. The main concept has been enthusiastically pick up by Internet users as search of google trends suggest a sport of interest on the subject since 2011. And a recent google query of the term "internet meme" yielded around 1,900,000 hits. Meaning of the leading to large interactive meme depositories (Kyrpa et.al., 2022; Lopes, 2023; Mallow et.al, 2010).

According to Michele Knobel and Koline Lankshear (2013), Internet users employ the word "meme" to describe the rapid uptake and spread of a "particular idea presented as written text, image, language 'move', or some other unit of cultural 'stuff. This vernacular use of the term the author's submit, differs only from its use in the academic study of memetics if the former tends to describe recent, often short-lasting fads, since successful memes are defined as the ones that survived in the long term. (Shifman, 2013). Teaching through memes may be an empowering way of promoting multi-literacy in the classroom into this very context digital cultures. Using memes, students can learn new information while also enjoying a laugh. Memes gather more attention than traditional teaching methods (Cooper et.al., 2018; Dongqiang et.al., 2020).

Meme requires from a teacher not only perfect mastery of the subject and pedagogical skills but also to develop critical and creative thinking, and awareness of their student's' interests, the realities in which they live, taking into account the rapidity of memes' popularity and their constant updating. It is important to use memes in a long way that is respectful of students' cultures and experiences. The main purpose of this study is to get insights into the benefits of this particular technique and evaluate if there is a significant difference between utilizing digital memes in teaching genetics on academic performance among STEM students.

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2. Methodology

To address the stated problem in this study, the researcher used quantitative in nature and utilized the experimental design to determine the changes in the performance of the students utilizing digital memes as a strategy in teaching Genetics: Inheritance and Variation. Two groups were used as the respondents of this study. Random assignment was used using fishbowl strategy, one section was assigned as the experimental group and the other section as a control group. This study was conducted in Integrated Developmental School, Naawan, Misamis Oriental. There are 80 respondents since every class is composed of 40 students. The two sections belong to the same level of grade 11 STEM students and the heterogeneous group section is not a bases in selecting the respondents. The instrument used in the study was the multiple-choice test questionnaire, which served as both the pre-test and post-test for the respondents. Additionally, a lesson plan for the topic and a table of specifications (TOS) were utilized. The researcher tested the validity of the test by conducting a pilot test. It was composed of twenty questionnaires per respondent using multiple choice test based on the topic of incomplete dominance and sex-linked traits. Prior to the conduct of the study, a letter of permission was sent to school principal to allow the researcher to seek the cooperation of the learners as respondents of the study. An informed consent form was given to the respondents and let them signed following the Republic Act No. 10173 on Data privacy Act allowing them to be part of the research. They were given ample time to review their participation in the study. After consent will be granted, respondents was oriented on the nature of the study, their extent of participation, the risks and conveniences, the participants' rights, benefits, and confidentiality. Statistical tables were constructed according to the problems set of the study. This research study used the following statistical techniques in conjunction with descriptive and relational schemes that were pertinent to the research design that was used and the specific difficulties posed. Percentage, mean, standard deviation, and paired t-test were used to analyze the data.

3. Results and Discussions

Figure 1 showed the percentage distribution of the pre-test score of the students when grouped with the Digital memes and Lecture method. In utilizing Digital memes, the result reveals that 20% of them got a score of 9 and below which means this respondents did not meet the expectation, 7.5% got a score of 10 to 11 which is fairly satisfactory, 22.5% got the score of 12 to 13 which is satisfactory, 27.5% of them got the score of 14 to 15 which is very satisfactory and 22.50% of them got the score of 16 to 20 which is outstanding. In the Lecture method, the result reveals that 20% of them got a score of 9 and below which means this respondents did not meet the expectation, 15% got a score of 10 to 11 which is fairly satisfactory, 25.00% got the score of 12 to 13 which is satisfactory, 27.5% of them got the score of 14 to 15 which is very satisfactory and 12.5% of them got the score of 16 to 20 which is outstanding. Generally, the data reveals that respondents are outstanding, which implies the students are neither didn't not meet the expectation level of the score.

Moreover, students become familiar of the topic science genetics: inheritance and variation because of the Biology topics are difficult because of the vast amount of information required to learn but also involves a lot of unfamiliar concepts and some of which are difficult which requires mastering an unfamiliar vocabulary which is true of any science. Understanding biological systems and processes is also difficult for students. Learning biology is a cumulative process, so before they can understand more complex biological concepts and processes, they must understand the basics. The reason being

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biology makes so much sense when you understand the fundamental principles well enough. (Andrew, 2021).

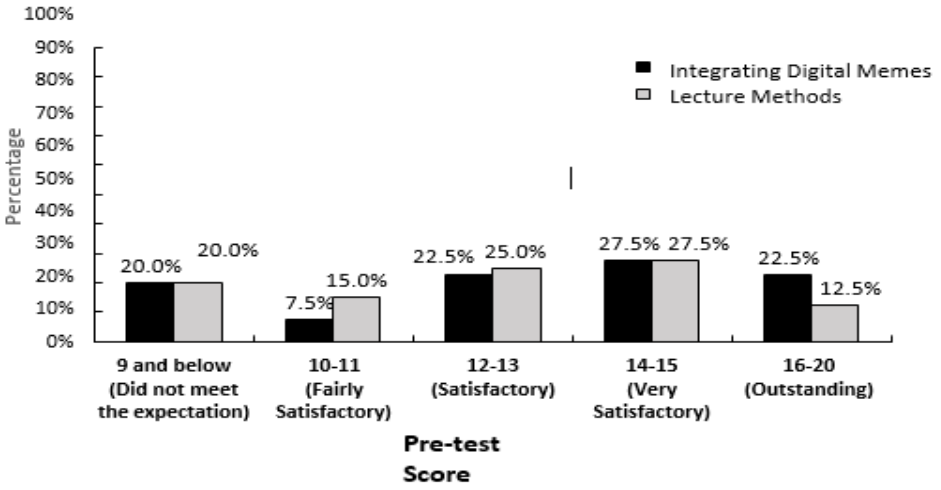

Figure 1. on the percentage distribution of the pre-test score when grouped to utilizing of Digital Memes and Lecture Method

Figure 2 shows the percentage distribution of the post-test score of the students' group to Digital memes and Lecture method. In Digital memes, the result revealed that 2.5% of them got a score of 9 and below which means that these respondents did not meet the expectation, 2.5% got a score of 10 to 11 which is fairly satisfactory, 7.5% got a score of 12 to 13 which is satisfactory, 15% of them got the score of 14 to 15 which is very satisfactory and 72.50% of them got the score of 16 to 20 which is outstanding. In the Lecture method, the result reveals that 17.5% of them got a score of 9 and below which mean tthese respondentsents did not meet expectation, 10% got a score of 10 to 11 which is fairly satisfactory, 7.5%at the score of 12 to 13 which is satisfactory, 25.0% of them got the score of 14 to 15 which is very satisfactory and 40% of them got the score of 16 to 20 which is outstanding.

The highest score which is 72.5% in the Digital memes has a good impact that shows improvement rather than the highest score of Lecture method with has score of 40.0% which implies what Diana K. Riser (2020) promotes compared to the simple teaching of traditional method. It helps students develop critical thinking and scientific literacy, as well as their ability to apply course concepts to everyday life and share those applications with others. Student outcomes from several sections of Lifespan Development those with the scientific digital memes versus those with a traditional ones, were analyzed for differences in quantitative measures of student success. Students' reflections were also assessed for common themes. Findings suggest advantages of social media using memes with regard to students' sense of purpose, experience with scholarly discourse, and student growth, and may inspire creation of additional innovative assignments that promote student learning and application. The lowest extent which is 2.5% with integrating digital memes which has a low impact compared to lecture method with the score of 20.0% did not meet the expectations because most of the students while their observations we have noticed that the laughter resulted can be crucial to tackle barriers of communication for educational purposes especially science literature and Subject which causes a lot of misunderstanding and miscommunications were happened in the learning and teaching of the certain topic. (Budi Eko, P., 2021).

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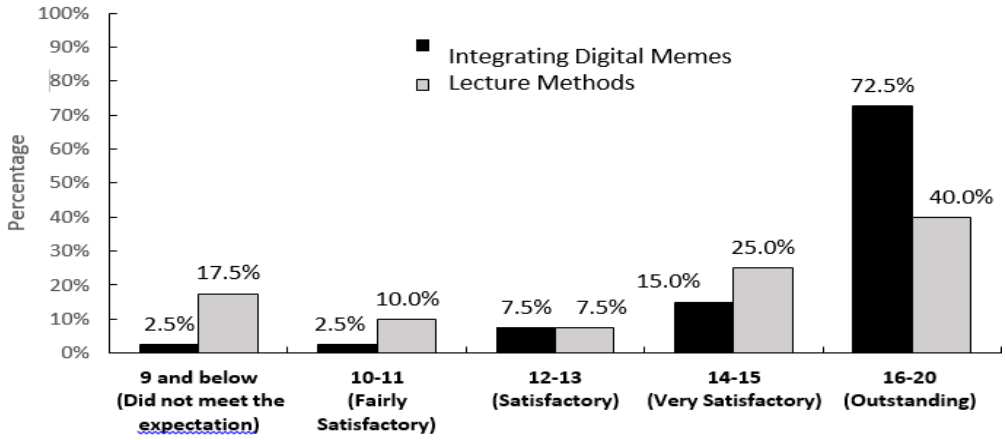

Figure 2. on the percentage distribution of the post-test score when grouped to Integration of Digital Memes and Lecture Method

Table 1 shows the difference between the score on the pre-test and post-test of the students after the Intervention. The result revealed that, in integrating Digital memes there was significant difference between their pre-test and post-test score since the t-value is equals to -10.61 which corresponds to a p-value of 0.0001 which is less than 0.05 level of significance. This implies that there is a significant difference and improvement in the performance of the respondents after the intervention were applied.

In the Lecture method, it also showed that there is a significant difference between their pre-test and post-test scores since the t-value is equals to -3.13 which corresponds a p-value of 0.003 which is less than 0.05 level of significance. This implies that there was a significant improvement in the performance of the respondents after the traditional method of teaching was applied as Harshavardhan, D & Kumar (2019), a study suggests that teaching needs to be creative in order to be successful in the ever-changing classroom dynamics of the twenty-first century. Members of virtual communities interacting mainly through the digital medium are the youth of the present era. The finding inferred that the group of respondents who undergo the intervention had higher results of the post-test compared to those group of respondents who were taught without the intervention.

The result of the comparison of the pre-test result and the post-test result of the experimental group and control group implies that both groups learned and experienced a significant difference in learning Genetics in their post-test results. Therefore, the null hypothesis is rejected. This unveils that Digital memes has highly significant results in terms of learners' performance in Biology. This proves that integrating Digital meme is effective in teaching Genetics. In addition, based on the study of Purnama (2017), the teaching and learning of today faces more challenges because technology continues to upgrade itself. Teachers are expected to incorporate as many technology items as possible to facilitate the participation of students in classroom activity.

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Table 1 Difference between the scores on the pre-test and post-test of the students after the Intervention.

variable	mean	mean difference	t-value	p-value	remarks
Utilizing Digital Memes					
Pre-test	12.83				
		-3.6	-10.61	0.00001	Significant
Post-test	16.43				
Lecture Method					
Pre-test	12.45				
		-1.55	-3.13	0.003	Significant
Post-test	14				
With 0.05 level of significance					

5. Conclusion

The pre-test scores of the students showed that the majority of them obtained low scores in both methods. This implies that the students have little knowledge of the topics. After the intervention, there was an increase in the students' post-test scores on both methods taught. This signifies that students have learned from the teacher's discussion as shown in the increase in their post-test scores. The increase in their scores implies that pupils had processed and understood the science concepts. The results showed that there was a highly significant difference in the pre-test and post-test scores of the students taught using digital memes teaching genetics compared to the lecture method. This implies that integrating digital memes in teaching can improve students' academic performance and it may be used in other disciplines too. Teachers should choose digital memes that are popular and familiar to the students so they can relate to the students and improve their understanding of the content.

Educators may use the power of digital memes to improve teaching effectiveness, enhance student engagement, and foster better learning outcomes. The following recommendations are proposed. 1) Integration of digital memes in teaching, teachers are encouraged to incorporate digital memes as a teaching tool, particularly in subjects like genetics, to enhance student engagement and academic performance. The study has shown that this method significantly improves students' understanding of concepts compared to traditional lecture methods. 2) Selection of relevant memes, educators should carefully select digital memes that are popular and culturally relevant to their students. Familiarity with the content of the memes can help students relate better to the subject matter, thereby improving their comprehension and interest in the topic. 3) Professional development for teachers, training programs should be organized to equip teachers with the skills needed to design or curate effective digital memes for classroom use. These programs can focus on blending humor, creativity, and educational content to ensure that the memes serve their intended purpose. 4) Application across disciplines, the effectiveness of digital memes in teaching genetics suggests potential for broader application. Teachers in other disciplines should explore how memes can be adapted to suit their subject areas and learning objectives, fostering innovation in teaching methodologies. 5) Further research, additional studies should be conducted to explore the long-term effects of using digital memes on students' academic performance and retention of knowledge. Comparative studies across different age groups, subjects, and learning environments could provide deeper insights into the potential of this teaching strategy. 6) Development of educational resources, educational institutions and curriculum developers should consider creating repositories of ready-to-use digital memes aligned with curricular objectives. These

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resources could serve as a reference for teachers and promote the widespread adoption of this innovative teaching method. 7) Focus on student-centered learning, teachers should combine digital memes with other interactive and student-centered teaching strategies to maximize learning outcomes. By engaging students actively, educators can ensure a more dynamic and enjoyable learning environment.

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