




Impact of web-based learning platforms on primary school students' academic performance in the UAE: Exploring the digital frontier

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Abstract

The three-month quasi-experimental study examined the impact of Purple Mash, an educational website, on grade four students' academic achievement and perception. The study involved 28 participants, divided into control and experimental groups. Initial assessment scores were similar between the groups, but after the intervention, the experimental group showed a significant increase in post-test scores compared to the control group. The experimental group achieved an average score of 89.9, while the control group scored 77.2. Additionally, the students reported high levels of satisfaction with the interactive learning experiences provided by Purple Mash. Based on these findings, the study recommends the development of dedicated websites for each lesson to enhance accessibility and improve academic achievement and student perception in information and communication technology (ICT) courses. The integration of various data sources, such as pre- and post-test scores, classroom observations, and interviews, supported the credibility and dependability of the research findings. This thorough approach allowed for a deeper understanding of ICT class dynamics and the establishment of robust conclusions. The findings of this study provide compelling evidence of the positive impact of Purple Mash, a web-based mathematics learning platform, on primary school students' mathematics achievement.

Keywords: educational website, academic achievement, primary education, UAE

INTRODUCTION

Educational websites are one of the most important tools for students to learn and improve their academic performance. They are used by students to get information that they need like homework assignments, learning resources, and assessment data. They also make it possible for teachers to communicate with students and parents in real-time through text or video chat. Teachers can also post important announcements about upcoming events or exams on website so that everyone is aware of them at all times. For example, if a teacher wants to share an assignment with their students and they do not have access to school's computer lab, they can post it on school's website. This way all students have access even if they do not have computers at home.

Purpose of the Study

The goal of the current study is to determine how Purple Mash website affects student involvement and

academic results in primary educational settings. The educational landscape has undergone a substantial transformation in recent years as a result of technological improvements, with online learning environments and digital tools playing a crucial role in instructional tactics.

In the middle of this change, Purple Mash website has become well-known as a flexible educational tool that provides interactive learning opportunities and streamlines interaction between professors and students. As it fills a gap in the body of knowledge, this research is crucial to the larger academic landscape. Although there is a growing collection of research on the use of technology in education, there are still few thorough studies that concentrate explicitly on the effects of Purple Mash website.

By examining the website's impact on student engagement and learning outcomes, this study aims to close the knowledge gap by advancing our understanding of technology's use in primary education.

Contribution to the literature

- This study contributes to the understanding of the Impact of web-based learning platforms on academic performance of primary school student.
- This is one of very few empirical studies in the UAE that investigates web-based learning platforms in UAE.
- As an Arab country, the findings of this study have implications not only for the UAE but other Arab countries that are keen to integrate technology in their classrooms.

Why Purple Mash?

The researchers selected Purple Mash website as the focus of our analysis for several reasons.

Firstly, it is a highly popular educational platform used in various schools and institutions, providing interactive learning resources and tools for different age groups of students.

Secondly, its comprehensive features incorporating creative tools, writing activities, mathematics games, and collaborative projects make it a central point for investigating the effectiveness and usability to improve the student learning experience.

Thirdly, Purple Mash aligns with current educational trends and digital learning initiatives, making it a relevant subject of analysis. With technology's importance in education, understanding the strengths and weaknesses of Purple Mash as an educational platform could impact more effective learning tools development.

Therefore, this study aimed to detect the effect of using educational websites on primary students' academic performance. Primary education is a key pillar in the education system and plays a vital role in shaping children's behavior and lives. It is also one of the most important stages in a child's development. Therefore, it is essential to ensure that students have access to quality education at this stage.

Study Background

In today's world, where access to information is just a click away, education websites have become very popular among all age groups. They allow users to access information on any topic they want to know more about without having to look for it from other sources such as books or libraries. They are also very useful for teachers who can use them as resource material when preparing lessons for their students. This makes it easier for them because all they need is an internet connection, which most people have nowadays.

The importance of school websites has been well-documented in previous research. This is because these sites allow students to access resources they need to succeed outside of school, including the ability to do their homework and communicate with teachers. Some schools have even begun offering virtual classes, where students can learn from home at their own pace.

Schools with more advanced websites tend to have higher academic performance among students, which makes sense when you consider that these sites provide a wide variety of resources for students who may not be able to go to the library or talk with their teachers about certain topics.

School websites are an important tool for students, teachers, and parents alike. They allow students to access information about their schools and classes in a convenient format. They also provide parents with an opportunity to stay up-to-date on their children's progress and performance in school. Teachers can use school websites to communicate with students and parents alike and post assignments and other important information.

School websites have become so popular that some studies have shown that more than 90% of K-12 schools have at least one online resource for their students (Huerta et al., 2015). These resources include class schedules, homework assignments and quizzes, student progress reports, teacher contact information, parent-teacher conference schedules, and even extracurricular activities such as sports teams or clubs.

RELATED WORK

Previous researchers have examined the effects of using technology in schools, but there is little data on the impact of educational websites on student learning. This study will document previous research on the topic and explore how educational websites can be used to enhance primary student learning and increase academic performance.

Moreover, e-learning triggered more interest in educators after the recent COVID-19 pandemic and now education cannot exist without e-learning (Beladiya, 2022). E-learning is another form of education that uses technologies to facilitate effective and efficient learning anywhere and time. E-learning can also be defined as any learning system, which uses electronic resources for formalized teaching. The main components of e-learning are computers and the internet regardless of where the teaching and learning happens (Beladiya, 2022; Kumar Basak et al., 2018).

There are several types of e-learning that include these main three classifications: text-driven, interactive, and simulations. While teachers use a combination of e-

learning types, they mostly use interactive applications and simulations (Billington, 2022; Ferriman, 2013). The interactive applications give more focus on visual effects and student system interaction components to enhance learning. Simulations are interactive and give a real-life experience to the learners by using different techniques such as virtual reality (Billington, 2022).

Purple Mash educational website is a combination of interactive learning and simulations. It is a multi-curricular website for students of age three to 12, which allows acquiring knowledge in an interesting, fun, and creative way. It allows the students to explore various topics and various open-ended tools that allow the students to create stories, design multimedia, and develop their own games. It also gives a creative online space for each student and teacher who is registered in the system (Purple Mash, n. d.).

Despite the availability of plenty of e-resources or educational websites, educators and students are confused regarding the selection of the most suitable e-resources and whether these educational websites will help in students' academic achievement. Reviewing the literature concerning e-learning, the researchers found despite the purpose of deploying e-learning being to enhance student's learning experience, it is not helping with the student's academic achievement in many cases. Therefore, the researchers decided to conduct research regarding the effect of using educational websites on students' academic achievement to contribute to resolving this gap.

The researchers' hypothesis is if educational websites such as Purple Mash are incorporated into classroom teaching, then there will be no significant change in the student's academic achievement. This research is aimed to answer the following research question:

RQ. What is the effect of using educational websites in classroom teaching on the academic achievement of primary students in the United Arab Emirates (UAE)?

UAE is one of the fastest-growing and rapidly changing economies in the world. Hence, the education system in UAE has been required to meet the needs of the fast-evolving society. In response to this fact, the Ministry of Education in UAE has given high priority to using technology in education since 2001. Adding to this, educational institutions all around UAE embraced e-learning with this educational reform. A new stream labeled STEM was introduced into the curriculum, where science and technology is given uttermost importance (Iran, 2011). Saleem and Rasheed (2014) found that using e-learning supports managing workload, saving time, and reducing the burden of work.

Once technology became an inevitable part of education, different types of educational technologies came into existence. According to Bruce and Levin (1997), educational technology can be classified into the

taxonomy of inquiry, communication, construction, and expression. This taxonomy helped the educators to choose the right types of educational technology like drill and practice software, educational websites, and basic tools, which include word processing or power points and others.

Taylor (1980) suggested a framework for understanding the application of computing in education. This framework is used to classify the function of a computer into three roles: a tutor, a tool, and a tutee. As a tutor the computer will give or present information to students just like a teacher and later students will be assessed based on the information, which was delivered by the computer. From the time computers came into existence computers were used as a tool to perform calculations or other functions in a variety of subject areas. One of the most efficient ways to use computers is to use them as a tutee that is to teach the computer. In order to achieve this, the student or teacher doing the tutoring must learn to program, to talk to the computer in a language it understands, where real programming knowledge will be acquired by the students.

The main paradigm for learning with technology is knowledge construction. Technology should not be used as a substitute for a teacher to pour knowledge into a passive learner; instead, it must be used to engage students with real-world problem-solving, conceptual development, and critical thinking (Ringstaff & Kelley, 2002).

Inquiry-based lessons are one of the best ways to engage students in problem-solving, critical and creative thinking, hands-on activities, and mind-on activities. Interactive educational websites play an important role in providing teachers with opportunities to engage students in inquiry-based lessons (Irving, 2018). The following studies support the above-mentioned facts regarding the importance of websites in the teaching/learning process.

Consequently, a study conducted by Alderbashi (2021) explores the opinions of 99 male and female primary school students in UAE regarding the use of digital *storytelling* as a pedagogical tool in the context of web-based learning. The researcher created a survey to collect the data and follow a descriptive analysis. The results of this study showed that students in primary schools in UAE have positive attitudes toward the utilization of digital *storytelling* in their academic experiences. Additionally, it was shown that using this approach of web-based learning improved students' abilities for problem-solving and critical thinking.

In addition, Aljraiwi (2019) conducted a study to investigate the impact of gamification of web-based learning on primary school children's academic achievement and creative thinking. A quasi-experimental approach was used. The post-test

academic achievement test and the Torrance test of creative thinking revealed statistically significant differences between the means of scores for the experimental and control groups, favoring the experimental group.

Moreover, several studies have been conducted to investigate how factors such as the E-learning environment, e-learning adoption, digital readiness, and students' attitudes toward e-learning influence academic achievement (Fernandez et al., 2022). It focuses on the Gulf Cooperation Council countries, where disparities in student readiness and institutional resources are prevalent. Using partial least squares structural equation modeling, the study finds that a positive e-learning environment, digital readiness, academic engagement, and favorable attitudes of students and instructors toward e-learning are crucial for enhancing academic achievement.

In a related context, the investigation carried out by Rashid (2021) explores the impact of implementing the educational website and face-to-face instruction method in private schools in Dubai, focusing on students' academic performance and educators' perspectives. It involved 51 teachers from two American curriculum-based schools in Dubai, using a mixed-methods approach. Quantitative data were collected through a questionnaire, and qualitative insights were gathered via a Zoom-based focus group discussion. The findings indicate a positive influence of this approach on students' academic performance and classroom dynamics.

Finally, as suggested by Lei and Zhao (2007) in order to enjoy the tremendous benefits offered by e-learning, educators, students, and learning organizations should understand how to use technology efficiently. From their study, they proved that there is no significant difference in the academic achievement of students with the help of educational websites. Orr and Heaton (2007) also proved the same in their research and they explained that the main reason behind no significant increase in academic achievement with the use of technology is due to the lack of professional development and the limited opportunities and facilities that teachers have in their educational institutions.

Gaps in Existing Literature

Prior studies on educational technology sometimes focus on the general effects of digital tools without exploring the special characteristics and advantages provided by particular platforms like Purple Mash. This vacuum in the research makes it difficult for educators to choose the best digital tools for improving student learning experiences.

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provided by particular platforms like Purple Mash. This vacuum in the research makes it difficult for educators to choose the best digital tools for improving student learning experiences. With the intention of confirming the discrepancies related to the outcomes of utilizing educational websites, this research has been initiated. Its purpose is to investigate these conflicts and inconsistencies and ultimately provide thorough insights and answers to the issues and questions they pose.

METHOD

In this study, the researchers adopted the quasi-experimental design with a pre- and post-test, which was given to a controlled group and an experimental group. The control group (n=15 students) was exposed to a traditional way of teaching, whereas the experimental group (n=14 students) was exposed to an intervention. The intervention in this research is an educational website named Purple Mash.

Purple Mash is a multi-curricular website for students of ages three to 12, which helps to acquire knowledge in an interesting, fun, and creative way. It allows the students to explore through various topics and various open-ended tools. In addition, it allows the students to create stories, design multimedia, develop their own games and others. It gives a creative online space for each student and teacher who is registered in the system.

Purple Mash includes creative tools to paint, publish, design and make, to publish extra, go, graph, count, animate, and sequence, and logo to investigate, 2DIY, and 3D.

Also, it includes writing/publish projects (over 300 of these)-including leaflets, postcards, paint projects (over 70), mash cams, to type, simple city, mathematics games, science investigations & databases, computing, and coding activities.

The study participants are third-grade students from information and communication technology (ICT) classes. These students are from a variety of countries and cultures, including Egypt, India, Jordan, Pakistan, Sri Lanka, Sudan, Syria, and UAE.

To ensure the most accurate results, a research sample of 28 students was selected. This sample was chosen to be as close to equal as possible between the experimental and control groups. In both groups, there were 13 nine-to-10-year-old students. Seven of these students were boys and eight were girls in the control group; in the experimental group, there were equal numbers of boys and girls, which is seven each. Furthermore, the authors ensure that participation in the study is voluntary, and participants have the freedom to withdraw at any time without facing any negative consequences. Additionally, the authors prioritize the well-being and safety of the participants throughout the

Table 1. Results of pre- & post-test for control & experimental groups

| Control group | Pre-test | Post-test | Experimental group | Pre-test | Post-test |
|---------------|----------|-----------|--------------------|----------|-----------|
| CS1 | 18.3 | 63.3 | ES1 | 16.7 | 86.7 |
| CS2 | 21.7 | 81.7 | ES2 | 20.0 | 91.7 |
| CS3 | 23.3 | 75.0 | ES3 | 8.3 | 81.7 |
| CS4 | 6.7 | 50.0 | ES4 | 33.3 | 98.3 |
| CS5 | 16.7 | 85.0 | ES5 | 25.0 | 96.7 |
| CS6 | 18.3 | 80.0 | ES6 | 23.3 | 93.3 |
| CS7 | 25.0 | 96.7 | ES7 | 23.3 | 83.3 |
| CS8 | 20.0 | 85.0 | ES8 | 26.7 | 96.7 |
| CS9 | 40.0 | 98.3 | ES9 | 18.3 | 85.0 |
| CS10 | 31.7 | 93.3 | ES10 | 20.0 | 70.0 |
| CS11 | 21.7 | 63.3 | ES11 | 20.0 | 98.3 |
| CS12 | 25.0 | 71.7 | ES12 | 16.7 | 96.7 |
| CS13 | 26.7 | 76.7 | ES13 | 13.3 | 88.3 |
| CS14 | 18.3 | 55.0 | ES14 | 16.7 | 91.7 |
| CS15 | 28.3 | 83.3 | - | - | - |
| Average | 22.8 | 77.2 | Average | 20.1 | 89.9 |

Pre-test controlled vs. pre-test experimental

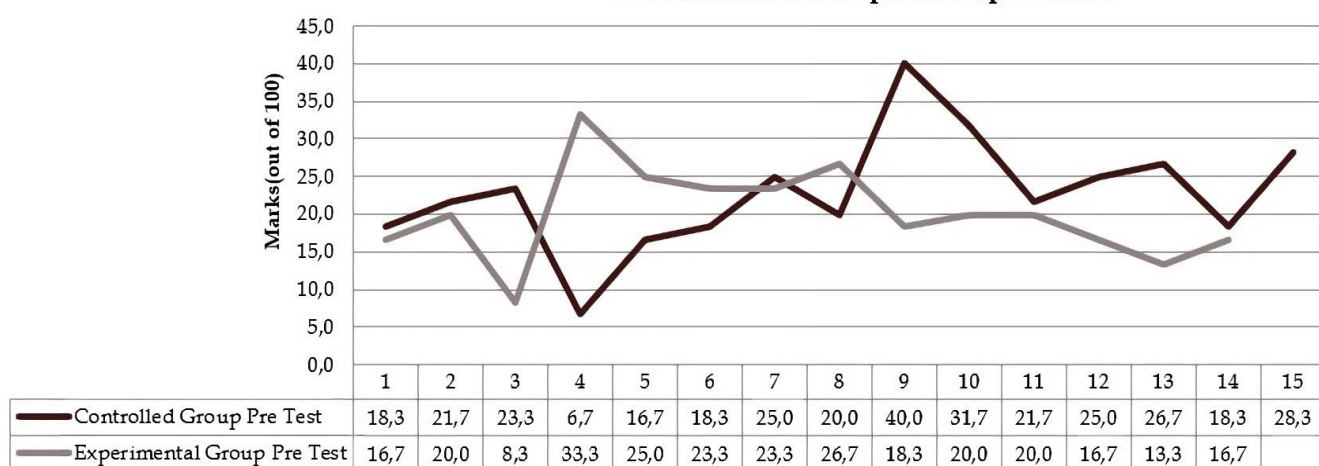


Figure 1. Data analysis between pre-test of control group & experimental group (Source: Author’s own elaboration)

research process. Also, they guarantee that all data collected will be handled with strict confidentiality and solely utilized for research purposes.

To understand student’s perspective on Purple Mash and its use, a researcher prepared a questionnaire. The questions were aimed to assess how easy it was for students to use Purple Mash compared to traditional systems, and whether they felt that it helped them with their learning experience. The questionnaire used for this survey utilizes a five-point scale for 10 items with statements ranging from one is strongly disagree to five is strongly agree. It was given to 20 professional who has work experience of over 10 years, and it was modified on their suggestions. We distributed 13 questionnaires among students. 12 were received back, and one was excluded for reasons not related to the study.

RESULTS

After conducting the pre-test before introducing the intervention and the post after introducing the

intervention to the experimental group the following results were obtained.

Based on the data obtained from **Table 1**, several layers of analysis were conducted.

At first, the results of the pre-test conducted on the experimental group and the control group were analyzed and the following results were obtained.

From **Figure 1**, it is clear that the academic results during the pre-test were almost the same for the control group and the experimental group.

The second analysis was conducted between the post-test of the control group and the experimental group, and the results in **Figure 2** were obtained.

It is clearly evident from the analysis that the intervention was successful and there is almost a 12% increase in the academic achievement of the experimental group than the control group.

The next step was a cross-linked analysis between the pre- and post-test of the control group. The output of the cross-test analysis is shown in **Figure 3**.

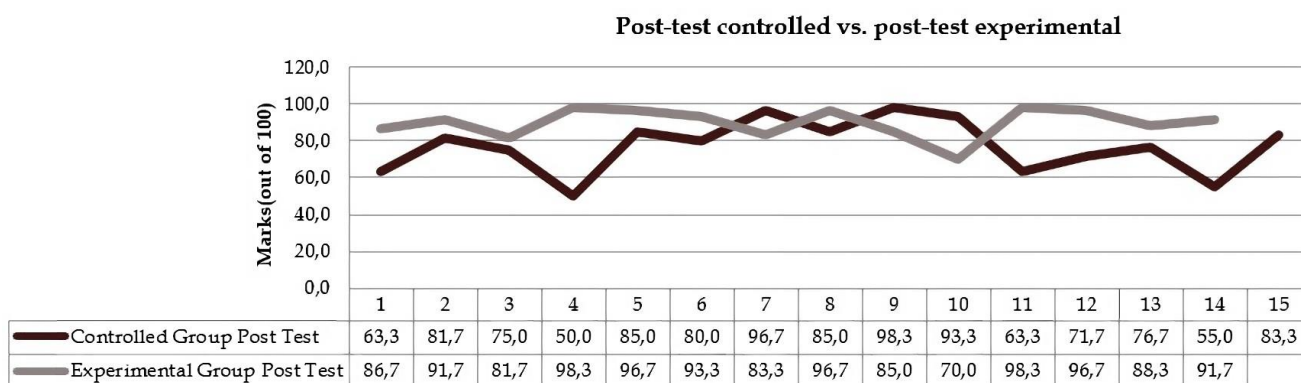


Figure 2. Data analysis between post-test of control group & experimental group (Source: Author's own elaboration)

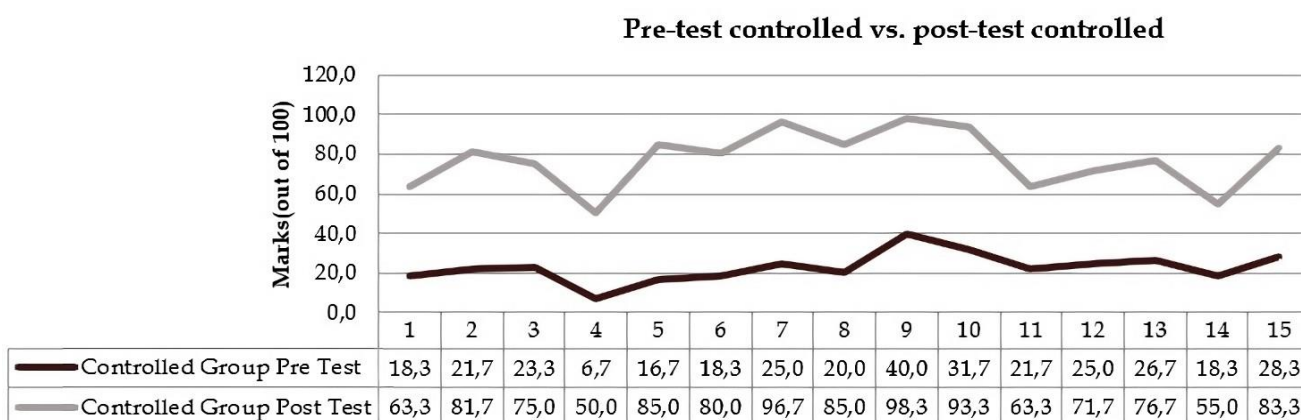


Figure 3. Data analysis between pre- & post-test of control group (Source: Author's own elaboration)

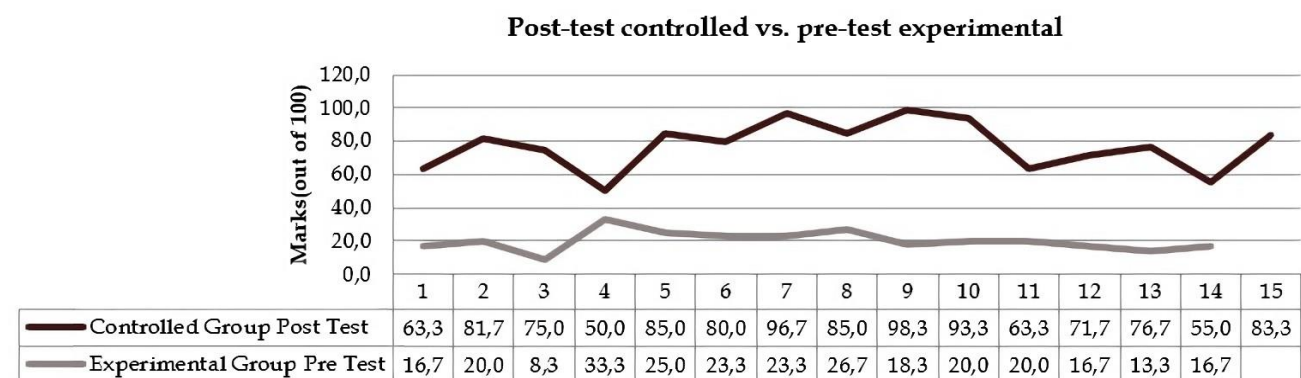


Figure 4. Data analysis between post-test of control group & pre-test of experimental group (Source: Author's own elaboration)

Finally, another cross-test analysis was conducted between the post-test of the control group and the pre-test of the experimental group (Figure 4).

Once the student survey forms were collected, the results were interpreted, and the data was organized and analyzed. Table 2 represents the results.

A representation of the marks of the Likert scale survey in Table 2 was conducted for the experimental group to assess the students' attitude towards Purple Mash (Figure 5).

Furthermore, the students expressed high levels of satisfaction with the interactive learning experiences

provided by Purple Mash. This positive feedback from students supports the notion that Purple Mash was easy to use and understand compared to traditional software. It also suggests that Purple Mash enhanced the students' learning experience.

The study recommends development of dedicated websites for each lesson to improve accessibility and enhance academic achievement and student perception in ICT courses. The integration of multiple data sources, including pre- and post-test scores, classroom observations, and interviews, bolstered the credibility and dependability of the research findings. This comprehensive approach provided a deeper

Table 2. Results of experimental group survey

| No | Questions | SA | A | N | D | SD |
|----|--|----|---|---|---|----|
| 1 | I find purple mash easier to use than traditional image processing software. | 5 | 3 | 2 | 0 | 0 |
| 2 | I am very satisfied with Purple Mash website. | 2 | 6 | 1 | 1 | 0 |
| 3 | I learned better while using Purple Mash website. | 4 | 4 | 1 | 1 | 0 |
| 4 | Purple Mash simulates my interests in learning activities. | 3 | 3 | 0 | 3 | 1 |
| 5 | I prefer to learn using Purple Mash than other software. | 8 | 1 | 1 | 0 | 0 |
| 6 | I think purple mash helps to enhance my creativity. | 4 | 3 | 0 | 2 | 1 |
| 7 | I find purple mash easy to understand. | 5 | 1 | 1 | 2 | 1 |
| 8 | I feel that teachers can teach easily using purple mash. | 3 | 2 | 3 | 1 | 1 |
| 9 | While using purple mash I need less help from teachers. | 1 | 1 | 2 | 2 | 4 |
| 10 | It is easy to organize and store my work in purple mash. | 2 | 1 | 2 | 4 | 1 |

Note. SA: Strongly agree; A: Agree; N: Neutral; D: Disagree; & SD: Strongly disagree

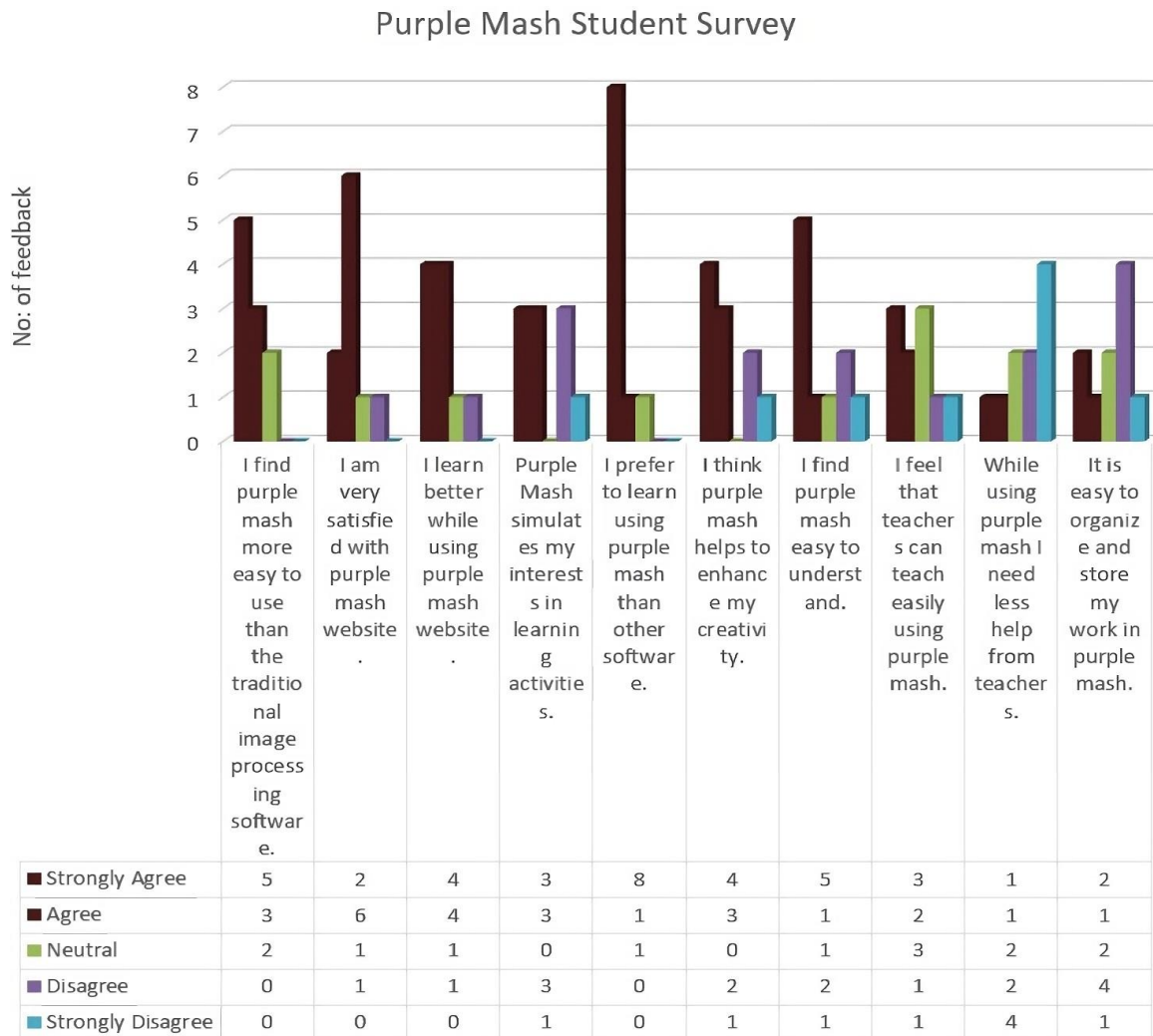


Figure 5. Data analysis of experimental group survey responses (Source: Author’s own elaboration)

understanding of dynamics of ICT class and facilitated the establishment of robust conclusions.

Based on these results, it can be concluded that educational websites have the potential to positively impact academic achievement. However, future research should delve into the specific characteristics of educational websites, such as content and design, that are most likely to improve academic performance. Additionally, it would be beneficial to investigate how different subject areas are influenced by the use of

educational websites and whether these effects vary based on grade level or subject area.

DISCUSSION

Previous Studies

The results of this study align with several previous studies that support the positive impact and benefits of using Purple Mash and educational websites in general.

Students preferred using Purple Mash over other available sources, finding it stimulating and effective in enhancing their learning experiences. This finding is consistent with studies by Bhavsar et al. (2018), Brockett and King (2010), Hulme and Stevens (2008), Kamruzzaman and Khondkar (2018), and Rosenbloom et al. (2015). These studies have shown that Purple Mash is easy to use, engaging, and preferred by users compared to traditional software.

However, it is important to note that these results contradict studies conducted by Berkun et al. (2007), Marion and Tittle (2013), and Tittle (2010). These studies found that academic achievement is not influenced by the use of educational websites. It is worth considering that different study designs, sample populations, approaches, and methodologies may contribute to these conflicting results.

Further Research

Despite the contradictory findings, the consistency in the positive results from several studies suggests that educational websites, including Purple Mash, can have a positive impact on students' learning experiences and academic achievement. Further research is needed to understand the specific factors and conditions under which educational websites can have a significant impact on academic outcomes.

In conclusion, while some studies have shown contrasting results, the overall body of research supports the positive impact of educational websites like Purple Mash on student learning experiences and academic achievement. Continuing research in this area will help provide a more comprehensive understanding of the effectiveness and limitations of educational websites in supporting student learning.

Implications

This study has several implications for education and the use of educational websites.

Academic achievement

The study suggests that students who use educational websites have higher academic achievement compared to those who do not use such websites. This highlights the importance of integrating technology into education to enhance learning outcomes.

Effective learning

Educational websites help students learn more effectively and understand concepts better. By providing interactive and engaging content, these websites can enhance student interest and participation in their education, leading to improved academic performance.

Design of educational websites

The study emphasizes the significance of website design in promoting student engagement. Educational websites that are designed to be more engaging and user-friendly can increase students' level of interest and active involvement in their learning.

Role of educational technology

The findings suggest that educational technology has a role in improving academic achievement. Educators should consider leveraging the advantages of online resources and technology to enhance student learning experiences.

Teacher awareness

The study highlights the importance of teachers being aware of the limitations of their own knowledge when selecting online resources for students. Teachers should actively seek out and evaluate the quality and appropriateness of educational websites to ensure their students receive the most effective learning experiences.

CONCLUSIONS

This study demonstrates the positive implications of using educational websites on academic achievement. It emphasizes the importance of integrating technology in education, designing engaging websites, and creating awareness among educators about the benefits and limitations of online resources. Further research in this area can contribute to a deeper understanding of the impact of educational websites on student learning outcomes.

The study indicates the need for further research to explore the relationship between online learning and academic achievement. Future studies could investigate the specific factors that influence this relationship, as well as the impact of different types of educational websites on student outcomes.

Recommendations

The results of this study demonstrate that the use of educational websites may have a positive effect on academic achievement. Future research should focus on the specific characteristics of educational websites (e.g., content and design) that are most likely to improve academic achievement. In addition, future research should examine how different subject areas are affected by the use of educational websites, as well as whether these effects vary based on grade level or subject area.

Moreover, and in order to fully benefit from e-learning, it is important for educators, students, and learning organizations to understand how to use technology efficiently and choose the right technology for students.

When selecting an educational website, the quality and quantity of technology usage should be considered. It is not just about how much technology is used, but rather how effectively it is integrated into the curriculum. It is recommended to use educational websites as aids to understand and familiarize curriculum topics in an easy and fun way. Therefore, it is essential to choose simple and attractive educational websites that students find easy to use.

The current study has shown an increase in students' academic achievement through the use of educational websites with proper training offered to staff and students on how to use the technology. It is crucial to effectively train teachers so that they are familiar with every aspect of the educational software, such as Purple Mash.

Improvements can be made to Purple Mash software, particularly regarding data organization. Based on student feedback, it is evident that students find it difficult to store and retrieve their work. Purple Mash can address this issue by introducing a student folder system. Another possible improvement is scaffolding, which aims to minimize teacher involvement and promote independent learning for students with little to no assistance from teachers.

The use of educational websites by primary school students has become increasingly common. Many teachers have found that these websites can help students learn concepts and skills that are challenging to teach in a traditional classroom setting. Educators can also use educational websites to support and supplement existing curricula, making them a valuable teaching tool. Based on these findings, it is recommended to use online educational resources both at school and at home to improve academic achievement. Additionally, creating a website for each lesson taught can ensure availability for both teachers and students.

As a result, it would be beneficial for educators to conduct further research on this subject. One approach could be a case study, where one or more schools that regularly use educational websites are selected. Observing how these schools perform academically compared to schools using traditional methods (e.g., textbooks) would provide valuable insights. Comparisons with national averages in countries, where similar programs are not yet in place (e.g., developing nations like UAE) could also be made. Such research would contribute to a deeper understanding of the effects of educational websites on academic achievement.

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Ethical statement: The authors stated that the study reflects the authors' own research and analysis in a truthful and complete manner. The authors further stated that the highest ethical

principles were strictly observed during the planning and conducting of the research. Written informed consents were obtained from the participants.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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