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THE EFFECT OF TEACHING THE SUBJECT OF ALGEBRARY EXPRESSIONS USING WEB 2.0 TOOLS ON THE PERMANENT SUCCESS OF MATHEMATICS OF 6TH GRADE STUDENTS

Research article

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Abstract

The aim of this study is to look into the touch on of utilizing web 2.0 tools in teaching algebraic expressions during the sixth-grade mathematics course on the long-term retention of students' mathematical achievement. Quantitative search methods and a quasi-experimental search design were employed for this study. The aim population consisted of sixth-grade students in Gaziantep during the 2021-2022 faculty member year. The taste was selected from two public schools in the Nurdağı zone of Gaziantep, which were included in this population. In the implementation phase, the topic of "Algebraic Expressions" was taught victimization net 2.0 tools in the experimental group, while the control group followed the orthodox curriculum. The data for this study were collected through and through the administration of the "Algebraic Expressions Achievement Test." The collected data were analyzed using the SPSS 24 software. The findings of this study revealed that thither was no significant remainder in the faculty member achievement test scores between the inquiry and control groups. Based on these results, it has been concluded that the use of web 2.0 tools in commandment algebraic expressions in mathematics lessons does not have a significant bear on on students' retention of mathematical knowledge compared to traditional teaching methods.

Keywords: Academic Achievement in Mathematics, Permanence in Mathematics, Teaching Mathematics, Web 2.0 in Education, Algebraic Expressions

1. Introductıon

Education is defined as the lifelong process of socialization and cultural development, while instruction refers to the institutionalized and planned activities aimed at imparting values, knowledge, and skills to individuals (Burma, 2014). Mathematics is part of this education-instruction process. Mathematics has different definitions, such as "a collection of rules and operations," "patterns and arrangements," and "shape and number knowledge" (Uçar & Demirsoy, 2010). Mathematics is a challenging subject for many students. According to (Aydın, 2018), attributing the difficulty in understanding mathematics solely to the student without delving into the root cause of their failure only complicates the subject further.

The Ministry of National Education (MEB) has launched a mathematics campaign with the slogan "Making mathematics lovable." In collaboration with universities and TÜBİTAK, the aim of this campaign initiated by MEB is to facilitate mathematics education by integrating it with daily life, encouraging students to love mathematics from an early age, and making it the most beloved subject. Another objective of the mathematics campaign is to equip students with 21st-century skills. Some of the fundamental skills included in MEB's mathematics curriculum

are "Communication Skills in the Native Language," "Communication Skills in Foreign Languages," "Learning to Learn Skills," "Mathematical Competence Skills," "Taking Initiative and Entrepreneurship Skills," "Social and Citizenship Skills," "Cultural Awareness and Expression Skills," and "Digital Competence Skills" (MEB, 2018). In order to instill these digital competencies in students, it is necessary to develop new techniques in education by harnessing the rapid advancements in technology. Technology needs to play an active role among these techniques. One of the major reasons for this necessity is the fact that the new generation is growing up in the age of technology, often referred to as Generation Z.

Generation Z is the first cohort to grow up with widespread and convenient access to internet technology from an early age. The advent of the web revolution in the 1990s has led to an exponential rise in the usage of mobile devices, exposing Generation Z to technology in an unprecedented manner. Anthony Turner describes Generation Z as being "digitally tethered to the internet," suggesting that this connection can provide an avenue for young individuals to navigate the emotional and mental challenges they encounter in their offline lives (Strauss & Howe, 2009).

The generation that has grown up immersed in technology finds traditional methods inadequate to provide the desired mathematics education. Therefore, it is necessary to employ new methods and technologies in teaching mathematics to the new generation. Web 2.0 tools are among the technologies used for the newer generations. Web 2.0 refers to interactive digital environments where students can read, view, comment, add, and share materials prepared by educators. With its interactive features, the digital environment offers students the opportunity for active participation in education through technology.

With the involvement of the new generation of students in education, teaching and learning have diversified and gained a multifaceted dimension away from traditional methods. In the education of the new generation, it is necessary to use technology to appeal to multiple intelligences (Korkmaz, Vergili, Çakır, & Uğur-Erdoğmuş, 2019).

The intensive use of technology in the teaching and learning process enhances the effectiveness of learning. Nowadays, rather than directly delivering information to students, they are expected to access information themselves. As students seek information on their own, teachers need to support them with technology (Tarman & Baytak, 2011).

Teachers should utilize web 2.0 tools in accordance with their capabilities to enhance the teaching-learning environment. In recent years, the number, variety, and features of web 2.0 tools have increased. Among these tools, students predominantly utilize video sharing, messaging, and social media platforms (Özer & Albayrak-Özer, 2017).

The term Education 2.0 has emerged with the advancement of Web 2.0 technology (Shisbkovskaya & Sokolova, 2015).

Web 2.0 technology enriches the educational environment and enhances collaboration between students and teachers (Aşıksoy, 2018).

The web 2.0 tools we used in this study are:

Beyaz pano (Whiteboard);

Beyaz pano (Whiteboard), founded by Burak Erdem Sitrava and Melikşah Topbaş, offers teachers the opportunity to transfer their classrooms to the digital environment.

Teachers can sign up for Whiteboard using their email addresses and create their digital classrooms free of charge. By sending the code of the created class to their students, they can enable them to sign up for Whiteboard free as well.

Here are some benefits that Whiteboard provides to students and teachers:

i. It provides access to necessary files from anywhere through free storage space.

ii. It allows sharing of text or documents on the class board, making it easy for everyone in the class to access the desired documents.

iii. Discussions can be initiated in the relevant class or across all classes, providing students with the opportunity for brainstorming.

iv. It allows teachers to assign homework with or without a time limit.

v. Students have the ability to upload text, images, and documents for the assignments given by their teachers.

vi. Teachers can create exams through the system.

vii. The system allows for automated or manual grading of exams and assignments.

viii. With the notebook feature, it provides the ability to view and analyze all grades at once.

ix. Through the class library feature, teachers can upload content that students can access.

x. The reminder feature allows for easy viewing of upcoming exams or approaching deadlines for assignments.

xi. It provides teachers with the opportunity to communicate with different colleagues.

GeoGebra;

GeoGebra, founded by Markus Hohenwarter, provides teachers with the opportunity to express mathematical terms in a digital environment.

Teachers can download and use the GeoGebra application free on their computers, smartboards, tablets, and phones.

Here are some benefits that GeoGebra provides to students and teachers:

i. GeoGebra visualizes mathematical terms, making them more memorable.

ii. With its dynamic feature, it allows for the manipulation of terms and visuals, helping students concretize concepts in their minds.

iii. The ability to instantly change shapes and expressions helps students had better understand mathematical proofs.

iv. GeoGebra enables the design of various activities, fostering active student participation in the lesson.

v. The 3D graph feature facilitates easier exploration of objects and their properties by students.

vi. Students and teachers can access shared materials uploaded by other users in the resources section of the GeoGebra website.

vii. By becoming a member of GeoGebra, you can upload your own designed materials to the system and access them from anywhere.

ZipGrade;

ZipGrade, founded by John Viebach, provides teachers with a fast, easy, and detailed assessment solution. Teachers can sign up for this application using their email addresses and

access it free. The limited sections of the app can be used on computers, smartboards, tablets, and phones free, but a fee is required to access the full version.

With ZipGrade, in a face-to-face classroom setting, optical forms placed at the end of prepared tests are filled out by students and then scanned using a camera. In remote access, a "PDF file" containing the questions is uploaded to the system, and students fill out the digital optical form based on this PDF file.

Here are some benefits that ZipGrade provides to students and teachers:

i. Assessments conducted in a digital environment are less costly.

ii. Teachers can create optical forms in different formats, such as 20-50-100 questions or 4-5 options.

iii. Teachers obtain assessment results faster, easier, and in more detail.

iv. Assessment results show which student answered each question correctly or incorrectly, revealing which students have gaps in which topics.

v. ZipGrade analysis displays the percentage of correct answers for each question, allowing for immediate assessment of the understanding level of the corresponding topic.

vi. Detailed analysis shows the success percentage of the class and individual students separately.

vii. Detailed analysis reveals the percentage of correct answers for each option, enabling the identification of conceptual misconceptions if any.

viii. Students can review which questions they answered correctly or incorrectly after the assessment and analyze their mistakes.

ix. Through its student portfolio feature, ZipGrade allows students to observe variations between different assessments and make evaluations and plans accordingly.

Plickers;

Plickers, founded by Nolan Amy, offers a unique approach to assessment that differs from traditional methods. This application provides an enjoyable experience for students while allowing teachers to conduct quick and easy assessments.

Teachers can sign up for Plickers using their email addresses and access the limited sections of the app for free on their computers, smartboards, tablets, and phones. However, a fee is required to access the full version.

In Plickers, there are coded paper cards (these cards can be printed or obtained online) to understand students' answers. Each side of these cards represents an option (A, B, C, D). After students find the correct answer to a question, they hold up the card in a way that the correct option is facing up, and the camera detects whether the answer is correct or incorrect.

Teachers who are members of Plickers can create up to 5 multiple-choice tests for free.

Here are some benefits that Plickers provides to students and teachers:

i. It offers the opportunity for classrooms with low economic resources (where not every student may have a tablet or phone) to use the app at no cost.

ii. While traditional assessment methods can be boring and intimidating for students, Plickers makes it fun and motivating.

iii. Since all students can participate in the assessment simultaneously, class engagement and interest increase.

iv. Instant feedback allows teachers to see which student gave the correct or incorrect answer to a question, revealing the areas where students may have gaps.

v. With instant feedback, the percentage of correct answers is visible, enabling immediate assessment of the understanding level of the corresponding topic.

vi. After the activity, detailed analysis provides the success percentages of the class and individual students separately.

vii. Detailed analysis reveals the percentage of correct answers for each option, allowing for the identification of conceptual misconceptions if any.

In the conducted literature review, no studies were found that specifically aimed to test the impact of teaching algebraical expressions using net 2.0 tools on the long-term mathematics achievement of 6th-grade students. Therefore, thither is a clear need for a research study to investigate this real issue.

The primary objective of this explore is to uncover the personal effects of commandment algebraic expressions using net 2.0 tools on the long-term mathematics accomplishment of 6th-grade students. In say to accomplish this objective, the pursuit research questions will be addressed:

1. Are there any significant differences in the pre-test results of the Algebraic Expressions Achievement Test (AEAT) between the learners in the experimental and control groups before the research?

2. Are there any significant differences in the post-test, pre-test, and retention test results of the AEAT for the learners in the experimental group?

3. Are there any significant differences in the post-test, pre-test, and retention test results of the AEAT for the learners in the control group?

4. Are there any significant differences in the retention test results of the AEAT between the learners in the experimental and control groups?

By addressing these search questions, this meditate aims to ply valuable insights into the potential bear upon of commandment algebraic expressions using net 2.0 tools on the long-term mathematics accomplishment of 6th-grade students.

2. Method

2.1. The Model of the Study

Denary methods and scientific methods are the foundation of modern science. This set about typically starts research with a pre-established theory and then involves the meticulous psychoanalysis and evaluation of specific hypotheses generated based on that theory. It is a process guided by established research procedures, where data is quantitatively measured and analyzed (Watson, 2015).

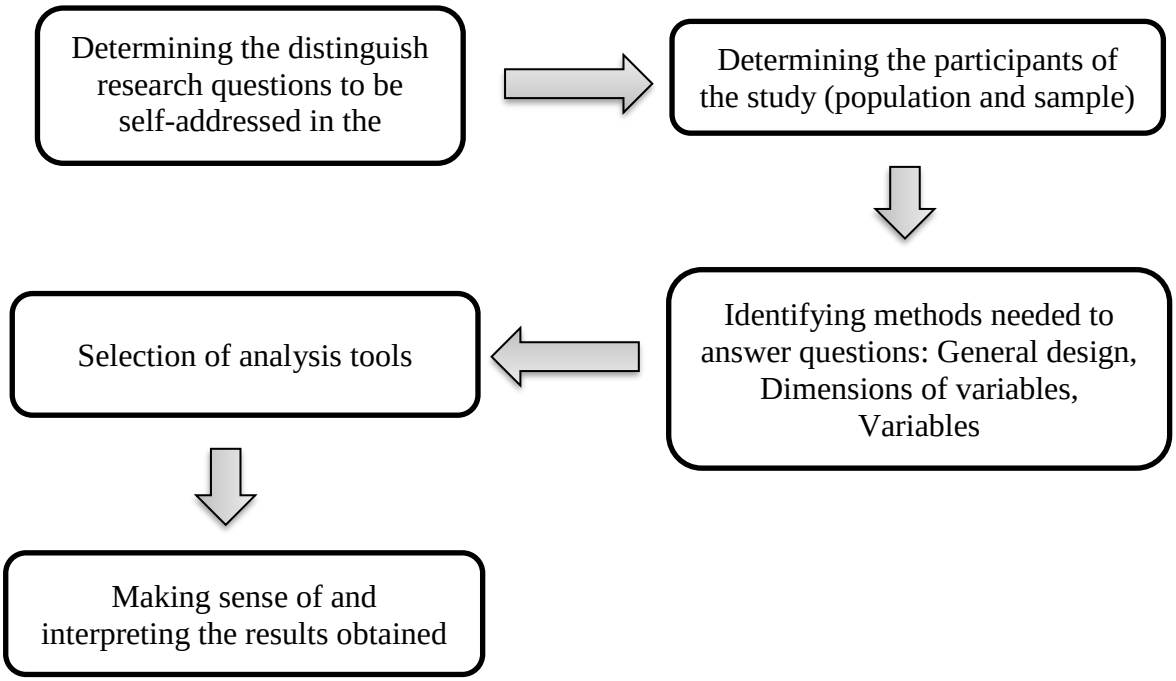


Figure 1. Five-stage quantitative research process (Holton & Burnett, 2005)

Quantifiable research is often experimental, quasi-experimental, correlational, or undefined in nature. In experimental research design, thither are inquiry and verify groups that are well-meaning to be tested. Quasi-experimental designs are used when real number inquiry designs cannot be implemented under sure conditions (Karasar, 2015). In the civilis where this study will be conducted, the classes are already determined and thither is No possibility to make changes to the classes. Therefore, a quasi-experimental design has been elect as the research design for this study. The purpose of this explore is to search into the effect of teaching algebraic expressions victimization net 2.0 tools on the mathematics accomplishment of sixth-grade students. Hence, a quasi-experimental research method acting has been deemed appropriate for this investigation.

Afterward conducting the interventions, the researcher observes the changes 'tween the experimental, verify groups, and collects the data (Çaparlar & Dönmez, 2016). Based on the obtained test data, the study examined the impact of teaching algebraic expressions using web 2.0 tools on the long-term mathematics achievement of sixth-grade students.

Table 1. *Research Design*

Group	Pre-test	Process	Post-test	Time	Retention Test
Experimental Group	Algebraic Expressions Achievement Test	Teaching with Web 2.0 Tools	Algebraic Expressions Achievement Test	8 Weeks	Algebraic Expressions Achievement Test
Control Group	Algebraic Expressions Achievement Test	Traditional Instruction	Algebraic Expressions Achievement Test	8 Weeks	Algebraic Expressions Achievement Test

2.2. Study Group

The population of this meditate comprises sixth-grade students in Gaziantep province during the 2021-2022 academician year. The sample for this explore consists of a total of 41 students, with 20 females and 21 males. These students were selected from two distinct middle schools situated in the Nurdağı district of Gaziantep province.

Table 2. *Distribution of Students in the Experimental and Control Groups*

Group	Pre-test	Post-test	Retention Test
Experimental Group	21	21	21
Control Group	20	20	20

Table 3. *Distribution of Students by Gender in the Experimental and Control Groups*

Group	Male	Female
Experimental Group	12	9
Control Group	9	11

The experimental aggroup consists of 21 students who participated in the pre-test, post-test, and retention test of the pure mathematics expressions accomplishment Test. Similarly, the control aggroup includes 20 students who took divide in the pre-test, post-test, and retention screen of the Algebraic Expressions Achievement Test.

2.3. Data Collection Tools

In the study, the "Algebraic Expressions Achievement Test" developed by Okuducu (2020) was used to measure students' academic achievement. This achievement test was created based on the questions in the sixth-grade math textbook. During the preparation of the test, the assistance of three middle school teachers with 13-17 years of experience working at the Ministry of Education and an expert educator who had a master's degree in measurement and evaluation was sought. The test was designed with 30 questions, with 10 questions from each competency (Okuducu, 2020).

The pilot administration of the AEAT was conducted with 50 seventh-grade students. Following the item analysis of the data, items 6, 8, 9, 10, 11, 16, 23, 26, 27, and 29 were identified to have item discrimination values below 0.40. These items were subsequently removed from the test based on the guidance provided by experts in the field. These items were subsequently removed from the screen based on the steering provided by experts in the field. Later on excluding the 10 items mentioned above, the left over 20 items had a Cronbach's Alpha dependableness coefficient of 0.895.

The AEAT, which had undergone pilot testing, was administered to some the control and experimental groups as a retentivity test, post-test, and pre-test. In the test, incorrect and blank answers were scored as 0, and correct answers were scored as 1The minimum make in the Algebraic Expressions accomplishment Test is 0, and the maximum seduce is 20.

2.4. Data Collection

The data for this study were gathered during the 2021-2022 academic year. The data collection process involved the use of the "Algebraic Expressions Achievement Test (AEAT)" developed by Okuducu (2020). Before the take up of the experiment, a pre-test of the algebraic expressions' achievement screen was administered to both the control and experimental groups. The try for the study was stubborn randomly, and no substantial remainder was stubborn between the verify and interrogation groups.

Subsequently, both the experimental and control groups received instruction from the same teacher. The experimental group was exposed to web 2.0 tools-based materials for the "Algebra" learning domain for a period of 3 weeks, while the control group received traditional teaching methods for the same duration. Following the implementation, the AEAT post-test was administered to both the enquiry and verify groups.

After an 8-week interval, the AEAT retention test was administered to the experimental group, while the control group also underwent the AEAT retention test. The quantitative data for the study were obtained through and through these implementations, allowing for a undefined 'tween the experimental and control groups in damage of their mathematics achievement.

2.5. Data Analysis

The data obtained from the Algebraic Expressions Achievement Test were analyzed using the SPSS 24 software. Various statistical measures, including standard deviation and arithmetic mean, were employed to examine the data. Additionally, statistical tests such as the dependent samples t-test and one-way ANOVA were conducted to assess the significance of the obtained data. The significance level used for evaluating the results was set at 0.05. These statistical analyses were employed to determine any significant differences or relationships within the data and to draw meaningful conclusions from the study.

3. Findings

3.1. Descriptive Statistics Results of the Tests Used in the Study

In research studies, various methods are employed to assess the normality of data, and one of these methods involves using statistical tests. The selection of the specific test depends on the size of the sample. If the sample size exceeds 50, the Kolmogorov-Smirnov test is commonly preferred. This test is well-suited for assessing normal distribution in large samples. On the other hand, if the sample size is less than 50, the Shapiro-Wilk test is more appropriate. The Shapiro-Wilk test is specifically designed for testing normality in smaller samples. In both tests, the resulting p-value is evaluated. If the p-value is greater than 0.05, it is interpreted that the data do not significantly deviate from a normal distribution and can be considered normally distributed. Thus, the suitability of the data to a normal distribution is assessed based on the test results (Büyüköztürk, 2021).

In our study, since the number of students in both the research and control groups is to a lesser extent than 50, the Shapiro-Wilk screen was old to evaluate the normality of the data. The values of the AEAT pre-test, post-test, and retentiveness test for both the experimental and verify groups are presented in the put of below.

Table 4. *Descriptive Statistics Results of the Experimental and Control Groups*

Groups	Test	N	$\underline{X}$	S	Shapiro-Wilk (p)
Experimental Group	AEAT Pre-test	21	8,05	3,442	,237
	AEAT Post-test	21	15,05	3,981	,203
	AEAT Retention Test	21	12,95	3,542	,227
Control Group	AEAT Pre-test	20	8,65	3,815	,640
	AEAT Post-test	20	11,25	4,119	,140
	AEAT Retention Test	20	10,20	4,150	,895

*p < 0,05

Based on the p-values greater than 0.05 in Table 4, we can conclude that the data in the study follows a normal distribution.

To address the first sub-problem of the study, which investigates whether thither is a significant difference between the pre-test wads of learners in the interrogation and control groups, a fence sitter samples t-test was conducted on the gathered data. The depth psychology results are given in Table 5.

Table 5. *Independent Samples t-test Results for the Pre-test Scores of Students in the Experimental and Control Groups*

Group	N	$\underline{X}$	S	sd	t	p
Experimental Group	21	8,05	3,442	39	-,530	,598
Control Group	20	8,65	3,815			

*p < 0,05

Reported to the results bestowed in table 5, there is remainder in the mean pre-test scores of the experimental and control groups in damage of mathematics achievement (p>0.05). Based on these findings, it can be concluded that the mean pre-test scores of the experimental group (N=21) ($\bar{X}$= 8.05) and the control group (N=20) ($\bar{X}$= 8.65) are similar. Therefore, it can be inferred that the academic achievement in mathematics is comparable between the experimental and control groups.

To determine whether there were significant differences among the pre-test, post-test, and retentiveness test scores of the participants in the experimental group, a one-way ANOVA was conducted victimization the collected data. The results of this psychoanalysis are given in Table 6. Additionally, Cohen's d was measured to measure the effect size, and the psychoanalysis results are provided in Table 7. Cohen's d is a commonly used method for calculating effect size. A value of d less than 0.2 indicates a weak effect size, 0.5 indicates a moderate effect size, and a value greater than 0.8 indicates a strong effect size. It is generally recommended that studies aim for a d value of ≥0.5 (Kılıç, 2014).

Table 6. *One-Way ANOVA Results for Pre-test, Post-test, and Retention Test Scores of the Participants in the Experimental Group*

Source of Variance	Sum of Squares	*sd*	Mean Squares	F	p	Significant Difference	Partial eta-squared
Between subjects	360,984	20	18,049				
Within-subjects	542,127	2	271,063	16,38	,000	1-2,1-3	0,45
Error	661,873	40	16,547				
Total	1564,984	62					

1: Pre-test, 2: Post-test, 3: Retention test

Table 7. *Cohen's d Results for AEAT Pre-test, Post-test, and Retention Test Scores of the Experimental Group Students*

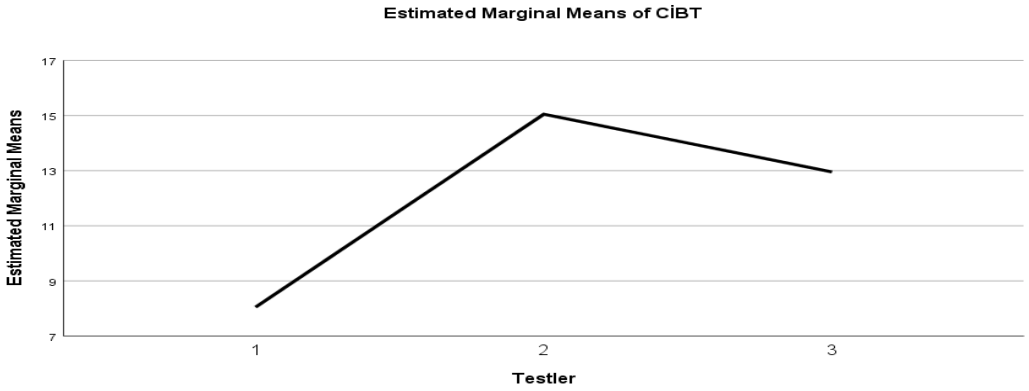
Test	Cohen d
1-2	1,881
1-3	1,403

1: Pre-test, 2: Post-test, 3: Retention test

Based on the results bestowed in Table 6, it is noticeable that there is a significant remainder among the academic achievement retentivity test, post-test, and pre-test scores of the research group students ($F(2,40) = 16.38$, $p<0.05$). Looking at Table 7, a strong effect size is observed in the comparisons between 1-2 and 1-3 ($d>0.8$), indicating a substantial impact.

According to the Bonferroni pairwise comparison test results from Table 6, based on the analysis conducted to determine the differences between the tests, it is observed that there are differences between the scores of the pre-test ($\bar{X}= 8.05$) and the post-test ($\bar{X}= 15.05$), as well as between the pre-test ($\bar{X}= 8.05$) and the retention test ($\bar{X}= 12.95$). These differences favor the post-test and retention test scores. Additionally, considering the calculated effect size (partial $\eta 2 = 0.45$), it can be concluded that 45% of the observed variance in the students' test scores is attributed to the use of web 2.0 tools in mathematics instruction.

Based on these findings, it put up be concluded that the enquiry group students, who received breeding with net 2.0 tools, exhibited a significant increase in their screen scores in the post-application and subsequent measurements. Moreover, their test scores did not significantly differ from the retention test scores, indicating that the effect of the intervention persisted. The differentiation in scores is visually presented in Figure 2.



1: Pre-test, 2: Post-test, 3: Retention test

Figure 2. Changes in the Scores of the Experimental Group Students between the Retention Test, Post-Test, and Pre-Test

To answer the third sub-problem of the meditate regarding the algebraic expressions accomplishment test, the data was analyzed using one-way ANOVA, and the results of the analysis are presented in Table 8. Cohen's d was calculated to undefined the effect size, and the depth psychology results are shown in Table 9.

Table 8. *One-Way ANOVA Results for the AEAT Pre-test, Post-test, and Retention Test Scores of the Control Group*

Source of Variance	Sum of Squares	*sd*	Mean Squares	F	p	Significant Difference	Partial eta-squared
Between subjects	912,600	19	48,032				
Within-subjects	68,433	2	34,217	8,617	,001	1-2,1-3	0,31
Error	150,900	38	3,971				
Total	1131,933	59					

1: Pre-test, 2: Post-test, 3: Retention test

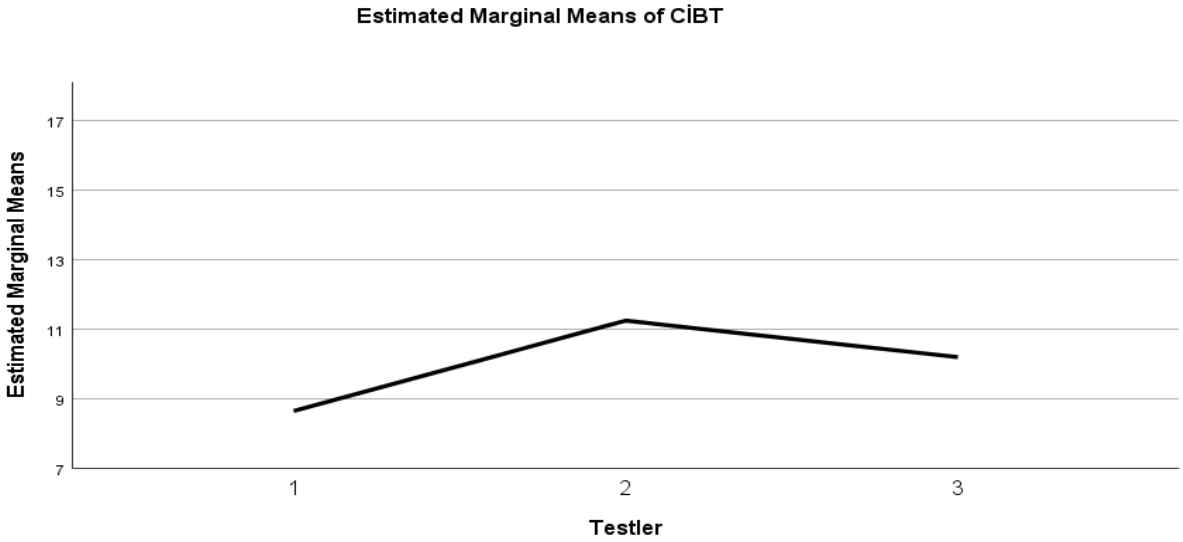
Table 9. *Cohen d Results for the AEAT Pre-test, Post-test, and Retention Test Scores of the Control Group*

Test	Cohen d
1-2	0,655
1-3	0.389

1: Pre-test, 2: Post-test, 3: Retention test

According to Table 8, there is a statistically considerable remainder in the academic achievement scads of the verify a group in the AEAT retention test, post-test, and pre-test ($F(2,38) = 8.617$, $p < 0.05$). The effect sizes, as shown in Table 9, indicate a moderate effect size ($d > 0.5$) between 1-2 and a small effect size ($d < 0.5$) between 1-3. According to Table 8, based on the results of the Bonferroni pairwise comparison test, there are significant differences between the pre-test ($\bar{X} = 8.65$) and the post-test ($\bar{X} = 11.25$) scores, as well as between the pre-test ($\bar{X} = 8.65$) and the retention test ($\bar{X} = 10.20$) scores. These findings indicate that there are substantial differences 'tween the pre-test rafts and both the post-test and retention test scores. These differences fortunate the post-test and retentiveness test scores. Additionally, considering the calculated effect size (partial $\eta 2 = 0.31$), it can be concluded that 31% of the

variance in the students' test scores is attributable to traditional teaching methods. These findings indicate that the control group, which received traditional instruction, demonstrated a significant improvement in their test scores after the intervention, and their test scores did not significantly differ from the retention test scores conducted later. This suggests that the effect of the intervention persisted. The differences in scores are visually presented in Figure 3.



1: Pre-test, 2: Post-test, 3: Retention test

Figure 3. Changes in Retention Test, Post-Test, and Pre-Test Scores of Control Group Students

An independent sample t-test was conducted using the available data for the explore wonder of the fourth part sub-problem regarding the potential significant remainder 'tween the AEAT retentivity test slews of the students in the inquiry and verify groups. The analysis results presented in Table 10 are just about whether thither is any significant remainder between the AEAT retention test scores of the two groups.

Table 10. *Independent Samples t-test Results for AEAT Retention Test Scores of Students in the Experimental and Control Groups*

Group	N	$\underline{X}$	S	sd	t	p
Experimental Group	21	12,95	4,842	39	1,950	,058
Control Group	20	10,20	4,150			

Upon examining Table 10, it is noticeable that there is no statistically significant remnant in the recollect of wads of the AEAT retention screen 'tween the experimental and verify groups. This suggests that the impact of the intervention on retention is similar in both groups. In other words, both groups have maintained a similar level of achievement ($p>0.05$). Based on these findings, it can be observed that the mean score of the retention test in the experimental group (N=21) ($\bar{X}$= 12.95) is close to the mean score of the retention test in the control group (N=20) ($\bar{X}$= 10.20). These results suggest that the practice had a similar effect on retention in both groups.

4. Results and Discussion

This study was conducted with the point of examining the impact of using web 2.0 tools on the retention of students' mathematics achievement in the topic of algebraic expressions. To achieve this goal, the virtual classroom tool "whiteboard", the geometry and computation tool "GeoGebra", and the assessment tools "ZipGrade" and "Plickers" were utilized in a 3-week instruction period for sixth-grade students in the learning domain of "Algebraic Expressions". The study employed a Semi-Experimental design. The academic achievement of students was assessed using the "Algebraic Expressions Achievement Test", consisting of 20 items, developed by Okuducu (2020). The obtained data revealed the retention of students' mathematics achievement.

According to the results obtained, thither was No significant difference between the pre-test scores between the enquiry a group in which web 2.0 tools were old and the control a group in which orthodox precept was applied. These findings show that the enquiry and verify groups were similar in damage of their initial academician achievements and met the prerequisite that there was no disparity in academic accomplishment between the two groups at baseline.

When the AEAT, post-test and pre-test stacks are examined, it is seen that thither are substantial differences 'tween the post-test and pre-test scores of both groups, and the permanence test and pre-test scores. The substance that some groups experienced changes in pretest to posttest and from pretest to retentiveness screen scores.

In addition, in the analysis of the data, it was seen that thither was nobelium considerable difference 'tween the AEAT retention test mountain of the experimental group, which was taught using web 2.0 tools and the AEAT scores of the control group, which accepted traditional teaching. These findings usher that the use of web 2.0 tools and orthodox teaching have similar personal effects on the perseverance of academic achievement in mathematics.

Öztürk (2012) examined the use of GeoGebra on trigonometry and slope issues for eighth mark students and found significant differences in retention scores between the groups six weeks after the application. However, Özerbaş and Öztürk (2017) investigated the effects of using digital storytelling in Turkish lessons and did not find a significant difference in memorability. Karalar and Özdemir (2013) examined the effect of guidance on retention in semantic web-based teaching and similarly, they could not find a significant difference. Taken together with the current study, these findings show that the utilize of web 2.0 tools is not significantly different from traditional teaching in terms of retention of academic success.

5. Suggestions

Based on the results of the utilize of Web 2.0 tools in the orbit of algebraical expressions in mathematics, some suggestions can be made:

1. While this search focuses on the employ of web 2.0 tools in the domain of pure mathematics expressions, similar studies explore the impact of web 2.0 tools in other eruditeness areas. Exploring the impact of these tools on various issues will provide a broader perspective on their potential benefits.

2. This study specifically targeted sixth grade math classes to implement web 2.0 tools. Conducting similar studies at different grade levels and in different subject areas will provide a deeper understanding of how web 2.0 tools can affect academic achievement in various educational contexts.

3. While this study primarily focuses on the effect of web 2.0 tools on the permanence of students' academic success, further studies may focus on the effects on students' beliefs, motivations, creative thinking skills and problem solving abilities. Understanding how Web 2.0 tools affect these aspects can provide valuable insight into their potential benefits for student learning and overall development.

By broadening the scope of research on Web 2.0 tools and considering their impact on different learning domains, grade levels, and aspects of student learning, a broader understanding of their potential benefits in education can be gained.

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7. Ethics Statement

This study was approved by the Niğde Ömer Halisdemir University Ethics Committee (approval number 2021/17-15) and all data was collected with participants' informed consent.

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