Jurnal Fundadikdas (Fundamental Pendidikan Dasar)
Vol. 8, No. 2, July 2025, pp. 117-130
ISSN 2614-1620
http://journal2.uad.ac.id/index.php/fundadikdas

The influence of liveworksheets media in social science on elementary school students' concept understanding

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ARTICLE INFO

Received 2025-05-19
Revised 2025-06-07
Accepted 2025-07-27

Keywords
Liveworksheet
Social Science
Digital Media
Concept Understanding

ABSTRACT

The integration of digital technology in education has become increasingly important to foster students' active engagement and deeper understanding of subject matter. In elementary Social Science learning, traditional approaches are often limited in providing interactive and student-centered experiences. This study aimed to examine the effect of Liveworksheets, an interactive digital learning platform, on students' conceptual understanding in Social Science. A quasi-experimental design with a pretest–posttest control group was implemented at Dawuan Tengah VI Public Elementary School during the 2024/2025 academic year. The experimental group was taught using Liveworksheets, while the control group received conventional instruction. Students' conceptual understanding, defined by their ability to identify, classify, and explain Social Science concepts, was assessed using validated pretest and posttest instruments. Data were analyzed through normality and homogeneity testing, followed by independent-sample t-tests. The findings revealed that the experimental group achieved significantly higher improvements in conceptual understanding compared to the control group (t = [insert value], $p < 0.05$). These results confirm that interactive digital platforms can effectively enhance cognitive engagement and mastery of concepts in Social Science learning. This study contributes to the growing body of research on digital pedagogy by highlighting the potential of Liveworksheets to support student-centered practices, while also recommending further investigations in broader educational contexts with larger sample sizes.

1. Introduction

Education plays a crucial role in shaping future generations to become knowledgeable, skilled, and responsible individuals. At the elementary school level, the integration of Science (IPA) and Social Science (IPS) into *Ilmu Pengetahuan Alam* and *Sosial* (IPAS) serves as a foundation for developing students' intellectual abilities. These subjects not only strengthen critical and analytical thinking but also build students' awareness of the natural and social environments around them. Through IPAS, children are expected to gain the capacity to observe, reason, and connect scientific concepts with real-life situations, thereby preparing them to be active and informed members of society. Despite the importance of IPAS, preliminary findings at Dawuan Tengah VI Public Elementary School during the 2024/2025 academic year indicate that student achievement in Social Science remains below expectations. Teacher interviews revealed that fifth-grade students face significant difficulties in understanding core concepts, such as classification of social phenomena, interpretation of community roles, and explanation of social interactions. Moreover, many students tend to demonstrate low participation during classroom discussions and activities, reflecting a lack of enthusiasm toward

the subject matter. These problems suggest that the current instructional approaches are insufficient in engaging students in meaningful and interactive learning. The persistence of these challenges points to the limitations of conventional teaching methods, which often rely on rote memorization and teacher-centered instruction [1], [2]. To overcome this, innovative learning strategies are required particularly those that leverage digital technology to foster active engagement and deeper conceptual understanding. One promising alternative is Liveworksheets, a web-based platform that transforms static worksheets into interactive online exercises [3]. By providing immediate feedback, supporting multimedia integration, and enabling independent as well as collaborative learning, Liveworksheets has the potential to make Social Science learning more dynamic, student-centered, and enjoyable [4], [5]. This study, therefore, seeks to examine its effectiveness in enhancing elementary students' conceptual understanding of Social Science.

To address the challenges of low learning outcomes and limited student engagement, digital learning media have been increasingly explored as alternative strategies to improve conceptual understanding. Unlike conventional methods, digital platforms provide interactive and student-centered experiences that can stimulate curiosity, motivation, and active participation in the learning process [6]. By integrating technology into classroom practices, teachers are better positioned to create dynamic learning environments that meet the cognitive and emotional needs of students. One promising tool that has gained attention is Liveworksheets, a web-based platform that converts traditional worksheets into interactive online exercises. This platform allows students to engage with learning materials more actively through features such as drag-and-drop activities, automatic feedback, and multimedia integration. Previous studies, conducted by Chalisyah et al. aimed to examine the benefits of using the Liveworksheet application in improving students' English exam results [7]. The research method used was a quantitative study with an experimental approach, where the experimental group used Liveworksheet and the control group used conventional methods [8]. The results showed that students who used the Liveworksheet application experienced significant improvements in their English exam scores. This finding confirms that the use of interactive technology such as Liveworksheet can improve the effectiveness of English language learning. Overall, this article suggests the implementation of Liveworksheet as an effective tool in improving student learning outcomes.

The research conducted by Novianti et al. aimed to develop interactive worksheets based on Liveworksheet to improve students' learning motivation [9]. The method used was product development through the design, validation, and student trials stages. The results showed that interactive worksheets based on Liveworksheet were effective in improving students' learning motivation, as reflected in the increase in motivation scores and student participation during the learning process. These findings support the use of interactive technology as a tool to motivate students. Overall, this article recommends the implementation of Liveworksheet as a learning medium that can significantly increase students' learning motivation. The study conducted by Widiantho et al. aimed to explore the perceptions, advantages, disadvantages, and impacts of using Liveworksheet in the learning process [10]. The method used was a qualitative study with data collected through interviews and questionnaires from students and teachers who use Liveworksheet. The results showed that the majority of respondents viewed Liveworksheet as having advantages such as interactivity and motivating students, although there were some disadvantages such as limited features and the need for a stable internet connection. Positive impacts of using Liveworksheet include increased student engagement and understanding during learning [11],[12]. Overall, this article concludes that Liveworksheet has great potential to improve the quality of learning, provided it is used optimally and tailored to students' needs.

Despite these promising findings, empirical evidence regarding the impact of Liveworksheets on conceptual understanding in Social Science subjects at the elementary level remains scarce. Much of the existing research has primarily focused on language learning or general digital literacy, while specific applications in Social Science education have not been widely investigated. This gap highlights the need for further studies to provide robust evidence on how Liveworksheets can be effectively implemented to improve students' understanding of key Social Science concepts in elementary education. The contribution of this research lies in its focus on expanding the application of Liveworksheets to the domain of Social Science at the

elementary level, an area that has received limited scholarly attention. By examining its role in fostering students' ability to identify, classify, and explain fundamental concepts, this study offers empirical evidence of the pedagogical value of interactive digital platforms beyond language learning contexts. Furthermore, the findings are expected to enrich the literature on digital pedagogy by demonstrating how technology can support more engaging, student-centered approaches in Social Science classrooms.

2. Method

2.1. Research Location and Context

This study was carried out at Dawuan Tengah VI Public Elementary School, located on Jalan Dawuan Tengah, Cikampek District, during the even semester of the 2024/2025 academic year. The school was selected as the research site because preliminary surveys indicated that fifth-grade students' learning outcomes in Social Science (IPS) were relatively low. This condition made the location relevant to investigate the effectiveness of digital learning media in improving conceptual understanding.

2.2. Research Design

A quantitative approach with a quasi-experimental design was employed, specifically the pretest–posttest control group design [13]. This design involved two groups: (1) The experimental group, which received instruction using Liveworksheets as the primary digital learning medium; (2) The control group, which received instruction through conventional teaching methods without digital assistance. Both groups were administered a pretest to assess their initial conceptual understanding, followed by a treatment phase according to their respective learning methods, and finally a posttest to measure learning outcomes. The inclusion of a control group strengthened internal validity by enabling direct comparison between treatments.

2.3. Population and Sample

The research population comprised all 62 fifth-grade students enrolled at Dawuan Tengah VI Public Elementary School. Samples were determined using purposive sampling, considering homogeneity of initial academic ability and similarity in age characteristics. Based on this criterion, 31 students from Class VB were assigned to the experimental group, while 31 students from Class VA were assigned to the control group. Report card data and pretest results confirmed the equivalence of the two groups prior to the intervention.

2.4. Data Collection Techniques and Instruments

Three complementary techniques were used to collect data:

- Learning Outcome Test: A multiple choice instrument was developed to measure students' conceptual understanding in Social Science. The test covered six levels of Bloom's taxonomy: knowledge, comprehension, application, analysis, evaluation, and creation. The items were validated by subject-matter experts and tested for reliability before use.
- Observation: Classroom observations were conducted to capture student engagement, interaction patterns, and responses to the instructional media. A structured observation sheet was employed to ensure consistency.
- Interviews: Short, semi-structured interviews with teachers and selected students were conducted to provide qualitative insights, triangulate the quantitative findings, and deepen understanding of the learning experiences with Liveworksheets.

2.5. Hypotheses

H_0: The use of Liveworksheets has no significant effect on elementary students' understanding of Social Science concepts. H_1: The use of Liveworksheets has a significant effect on elementary students' understanding of Social Science concepts.

2.6. Data Analysis

Quantitative data from pretest and posttest scores were analyzed using a series of statistical tests. Initially, normality tests and homogeneity tests were conducted to confirm data assumptions. Subsequently, an independent-samples t-test was applied to examine differences in posttest outcomes between the experimental and control groups. Significance was

determined at the 0.05 level ($p < 0.05$). Qualitative data from observations and interviews were analyzed thematically to reinforce the quantitative results and provide contextual interpretation. This study was restricted to one school and two classes, thereby limiting the generalizability of findings to broader populations. Future research should involve larger and more diverse samples, encompassing multiple schools and subject variations, to validate and extend the conclusions.

3. Result and Discussion

To evaluate the effectiveness of Liveworksheets in improving students' conceptual understanding of Social Science, this study began with an analysis of the students' initial abilities before the intervention. The pretest was administered to 31 students in the experimental class to establish a baseline of their knowledge and skills. This step was essential to determine the extent of learning improvement after the implementation of the digital learning media and to ensure that subsequent findings could be interpreted with validity. After the pretest, the students underwent the learning intervention using Liveworksheets during the instructional sessions. At the end of the treatment, a posttest was conducted with the same group of students. The posttest served to measure the impact of the intervention and to compare the results with the baseline data obtained in the pretest [14].

By analyzing both sets of scores, it was possible to identify any significant gains in conceptual understanding and to assess the effectiveness of the digital media in supporting learning outcomes. To strengthen the reliability of the findings, additional statistical tests were performed, including tests of normality and homogeneity. These tests were conducted to ensure that the data met the assumptions required for parametric analysis, particularly the t-test used to determine differences between pretest and posttest scores. The results of these statistical checks not only confirmed the quality of the data but also provided a strong foundation for interpreting the improvements in student learning as a direct effect of the implementation of Liveworksheets.

3.1. Pretest Results

Before the implementation of the Liveworksheets intervention, a pretest was administered to the experimental class to capture students' baseline understanding of Social Science concepts. The pretest served as an essential diagnostic tool to determine students' initial level of knowledge and to identify areas where conceptual difficulties were most evident [15]. By conducting this assessment, the study aimed to establish a clear reference point against which the effectiveness of the intervention could later be measured. The pretest items were designed to reflect key competencies aligned with the Social Science curriculum for grade five. These competencies included students' ability to identify social phenomena, classify relevant information, and explain the roles of individuals and communities in their environment. Such indicators were chosen because they represent fundamental aspects of conceptual understanding in Social Science and are critical for preparing students to apply knowledge in real-life contexts.

Administering the pretest also provided valuable insights into the overall distribution of student performance within the class. Analyzing the variation in scores was important to ensure that the experimental group represented a relatively homogeneous sample before treatment. This step was crucial for the validity of the quasi-experimental design, as it minimized potential biases and strengthened the reliability of subsequent comparisons with posttest data. The statistical summary of the pretest results revealed patterns that reflected students' initial learning conditions. In particular, the data highlighted the range of scores achieved, the central tendency of student performance, and the degree of variation within the group. These findings not only provided a snapshot of the class's readiness but also contextualized the challenges faced in Social Science learning prior to the introduction of Liveworksheets. The detailed results of the pretest are presented in Table 1.

Based on the summary of the statistical data for the Social Science pretest scores, with a total of 31 students, the maximum score was 76.00, the minimum score was 52.00, the mean score was 62.54, and the standard deviation was 7.28852. To complement the statistical summary of the pretest results, the data were also visualized in the form of a frequency distribution graph. This visualization was designed to provide a clearer picture of how students' scores were

distributed across different ranges, thereby making it easier to interpret overall learning conditions before the intervention. By examining the graph, researchers can identify not only the central tendency but also the proportion of students who fall into specific score intervals. The distribution of pretest scores is an important indicator of students' readiness prior to the use of Liveworksheets [12], [16].

Table 1. Statistical Data of Social Science Pretest Scores

	Descriptive Statistics				
	N	***Minimum***	***Maximum***	***Mean***	***Std. Deviation***
Value	31	52.00	76.00	62.5484	7.28852
Valid N (Listwise)		31			

In the context of this study, the graph serves to illustrate whether the majority of students' performance was clustered at the lower, middle, or higher ends of the score spectrum. Such insights help explain the degree of variation in the class and confirm whether the assumption of normality in the data is reflected visually as well as statistically. In addition, visualizing pretest results allows for a more intuitive understanding of students' conceptual weaknesses at the outset of the study. By showing how scores are spread, the graph highlights that most students were still concentrated in the moderate category of achievement, while only a small portion reached the higher levels. This condition justifies the need for pedagogical innovation, as conventional methods had not sufficiently supported students' learning outcomes [17]. The details of the distribution are illustrated in Fig.1.

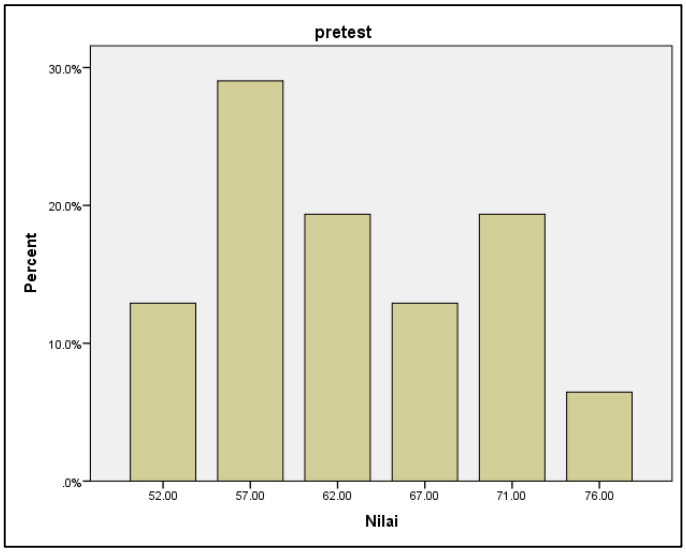

Fig. 1. Distribution of pretest scores for Social Science conceptual understanding in the experimental class

3.2. Posttest Result

After completing the instructional intervention with Liveworksheets, a posttest was administered to the experimental class to evaluate the extent of improvement in students' conceptual understanding of Social Science. This assessment was essential to measure the learning gains achieved after the digital media was integrated into classroom activities and to determine whether the intervention produced significant progress compared to the baseline pretest results. The posttest was designed to be parallel in structure and content to the pretest, ensuring that both assessments measured the same domains of knowledge [18]. Specifically, the items targeted students' ability to identify, classify, and explain fundamental Social Science concepts, thereby providing reliable and valid data for comparison. The equivalence of instruments between pretest and posttest strengthened the rigor of the research design and supported accurate interpretation of changes in student performance.

In addition to capturing overall learning outcomes, the posttest also provided insights into the distribution of student performance after experiencing technology-enhanced learning. By analyzing the range, mean, and variability of scores, it was possible to identify whether the

intervention had an equal impact across different groups of learners or whether improvements were concentrated among specific segments of the class. Such distributional analysis offered a more comprehensive understanding of the effectiveness of Liveworksheets beyond simple averages [19].

The posttest results were expected to reflect the potential of interactive learning tools to foster active participation, engagement, and deeper conceptual mastery. The integration of features such as immediate feedback, multimedia support, and interactive exercises in Liveworksheets was anticipated to translate into measurable improvements in student achievement. Consequently, the descriptive statistics derived from the posttest scores provide crucial evidence of the extent to which digital media can serve as a transformative element in Social Science education at the elementary level.

To present these findings clearly, the statistical results of the posttest are summarized using descriptive measures, including minimum, maximum, mean, and standard deviation. These measures provide a concise yet informative picture of student achievement after the intervention and serve as the basis for subsequent inferential analyses, such as tests of normality, homogeneity, and significance. The detailed statistical summary of the posttest results is presented in Table 2.

Table 2. Statistical Data Postest of Social Science Scores

	Descriptive Statistics				
	N	***Minimum***	***Maximum***	***Mean***	***Std. Deviation***
Value	31	67.00	100.00	80.4516	9.57719
Valid N (Listwise)		31			

The distribution of posttest scores provides a clear illustration of the improvements achieved by the students in the experimental group after the implementation of Liveworksheets. Compared to the pretest results, which showed most students concentrated in the lower to moderate score ranges, the posttest scores indicate a shift toward higher levels of achievement. This visual representation highlights how the intervention not only raised the average performance but also broadened the distribution of students who attained higher scores [20].

Fig. 2 shows that student scores after the intervention ranged from 67 to 100, reflecting a wider and more advanced spread compared to the pretest. The largest concentration of students, approximately 23%, scored around 76, which falls above the mean pretest score of 62.55. This shift suggests that the majority of students benefitted substantially from the interactive learning process, moving beyond the limitations observed prior to the use of digital media. The presence of several peaks across the score categories in the graph indicates that improvements were not isolated to a small group of learners. Instead, gains were distributed across a broader range of students, with notable percentages scoring in the 71, 81, and 86 ranges. Importantly, a portion of students also reached the highest score of 100, demonstrating mastery of the assessed concepts.

This outcome provides evidence that the use of Liveworksheets can support students with different initial abilities and promote more equitable learning outcomes. Another important aspect reflected in the graph is the balance of the score distribution, which suggests normality. This observation aligns with the statistical normality test results, where the posttest scores produced a significance value of 0.384 ($p > 0.05$). Together, the statistical and graphical evidence confirm that the posttest data were normally distributed, validating their suitability for further parametric testing, including the paired t-test used in this study.

Overall, the posttest score distribution underscores the effectiveness of Liveworksheets in enhancing conceptual understanding of Social Science among elementary school students. By providing interactive and engaging exercises, the platform enabled students to actively participate in learning, apply knowledge in meaningful ways, and achieve higher levels of mastery. These results not only support the research hypothesis but also align with previous studies highlighting the pedagogical potential of digital learning tools in fostering student motivation and achievement.

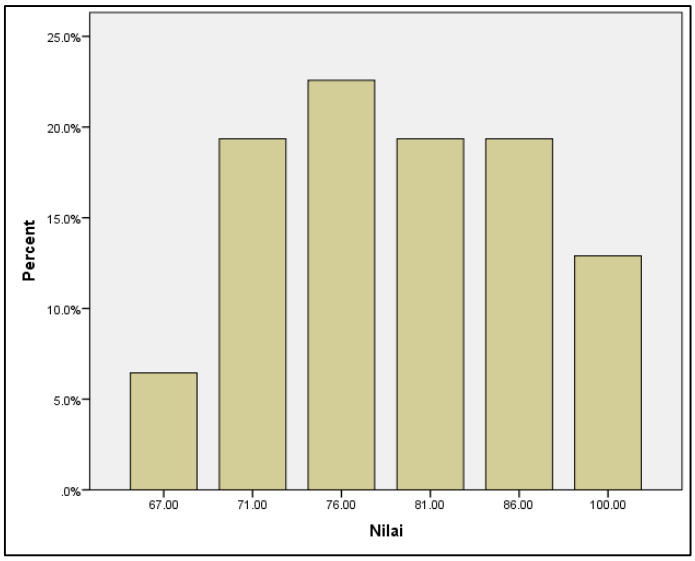

Fig. 2. Distribution of posttest scores in Social Science

3.3. Normaly Test

The normality test was an important step to ensure that the data obtained from the pretest met the statistical assumptions required for further analysis [21]. In quantitative research, particularly when using parametric tests such as the t-test, it is crucial that the dataset follows a normal distribution [22]. To evaluate this, the One-Sample Kolmogorov-Smirnov test was applied using SPSS version 21. This statistical procedure allows researchers to test whether the distribution of data significantly deviates from a normal curve, thereby confirming its suitability for parametric testing. In this study, the normality test was applied to the pretest scores of 31 students in the experimental group.

The descriptive parameters included a mean score of 62.55 and a standard deviation of 7.289, reflecting the central tendency and variability of the dataset. These values served as the foundation for calculating the test statistics and interpreting whether the distribution of pretest scores adhered to the characteristics of normality. Without such verification, any subsequent analysis involving parametric methods could be questioned for its validity. The Kolmogorov-Smirnov test generates several indicators to evaluate normality, including the absolute, positive, and negative values of the most extreme differences between the observed distribution and the expected normal distribution [23]. In this case, the absolute difference was 0.196, with a positive deviation of 0.196 and a negative deviation of -0.135.

These values represent the maximum distances between the actual dataset and a perfectly normal curve, providing insight into how closely the data aligns with a theoretical normal distribution. Another important output from the Kolmogorov-Smirnov test is the Z statistic, which for this dataset was 1.092. However, the primary focus for interpretation is the significance value (Asymp. Sig. 2-tailed). In this study, the significance value obtained was 0.184. According to the standard guidelines, if the significance value is greater than 0.05, the data are considered to be normally distributed [24]. Conversely, if the significance value falls below 0.05, the null hypothesis of normality would be rejected. Because the obtained significance value was 0.184, which is greater than the threshold of 0.05, it can be concluded that the pretest data were normally distributed.

This finding is critical because it confirms that the pretest scores of the experimental class satisfy one of the main assumptions for conducting parametric tests. In other words, the dataset is statistically appropriate for further analyses, including homogeneity testing and independent-sample comparisons. Therefore, the normality test results presented in Table 3 provide robust evidence that the dataset is suitable for subsequent inferential statistical procedures. By meeting the assumption of normality, the study gains stronger internal validity and ensures that any conclusions drawn from hypothesis testing are based on reliable and properly distributed data. These findings also support the credibility of the research design and reinforce the use of the quasi-experimental method applied in this study.

Table 3. Results of the One-Sample Kolmogorov-Smirnov normality test for pretest scores

One-Sample Kolmogorov-Smirnov Test		
Pretest		
		X
N		***31***
Normal Parameters[a,b]	Mean	62.55
	Std. Deviation	7.289
Most Extreme Differences	Absolute	0.196
	Positive	0.196
	Negative	-0.135
Kolmogorov-Smirnov Z		1.092
Asymp. Sig. (2-tailed)		0.184

a. Test distribution is Normal.

b. Calculated from data

The information in the table above is: (a) Test distribution is Normal; (b) Calculated from data. The normality test was conducted to examine whether the dataset met one of the fundamental assumptions of parametric statistical analysis. In this study, the Kolmogorov-Smirnov test was applied to both the pretest and posttest scores of the experimental class, with calculations performed using SPSS version 21. This test provides statistical evidence of whether the distribution of scores significantly deviates from a normal curve, which is necessary before proceeding to further analyses such as homogeneity and t-tests.

As presented in Table 4, the results of the normality test for the pretest scores, based on 31 students, showed a mean of 62.55 and a standard deviation of 7.289. The Kolmogorov-Smirnov statistic produced a Z value of 1.092, with the most extreme absolute difference recorded at 0.196. These values describe how closely the observed distribution aligns with the expected normal distribution. The most important indicator for interpretation, however, is the significance value (Asymp. Sig. 2-tailed).

For the pretest data, the significance was 0.184. According to statistical guidelines, if the significance value is greater than 0.05, the dataset can be considered normally distributed; if it is less than 0.05, the null hypothesis of normality is rejected. Since the obtained significance value was higher than the threshold, the pretest data are confirmed to follow a normal distribution. This finding indicates that the pretest scores of the experimental class meet the normality assumption and therefore qualify for further parametric testing. In practical terms, it ensures that comparisons made between pretest and posttest results, and any subsequent hypothesis testing, can be conducted validly.

Normality also supports the representativeness of the sample, reinforcing that the students' scores are distributed in a way consistent with standard expectations for educational research. In conclusion, the results shown in Table 4 confirm that the dataset for the pretest scores is normally distributed, with a significance value of 0.184 ($p > 0.05$). This outcome provides the necessary statistical foundation for proceeding to the homogeneity test, thereby strengthening the reliability and validity of the next stages of analysis.

Table 4. Results of the One-Sample Kolmogorov-Smirnov normality test for pretest scores

One-Sample Kolmogorov-Smirnov Test Pretest		
		X
N		***31***
Normal Parameters[a,b]	Mean	62.55
	Std. Deviation	7.289
Most Extreme Differences	Absolute	.196
	Positive	.196
	Negative	-.135
Kolmogorov-Smirnov Z		1.092
Asymp. Sig. (2-tailed)		.184

a. Test distribution is Normal.

b. Calculated from data

The information in the table above is: (a) Test distribution is Normal; (b) Calculated from data. The normality test was also conducted for the posttest data to ensure that the scores obtained after the intervention with Liveworksheets fulfilled the assumptions required for parametric analysis. As with the pretest, the Kolmogorov-Smirnov test was employed, and

calculations were carried out using SPSS version 21. This procedure allowed researchers to evaluate whether the distribution of posttest scores was consistent with a normal distribution, thereby validating their use in subsequent statistical tests such as homogeneity and paired-sample t-tests.

The descriptive parameters from the posttest results, shown in Table 5, indicated a mean score of 80.45 with a standard deviation of 9.577 for a total of 31 students. These values reveal a considerable improvement compared to the pretest mean of 62.55, reflecting the positive impact of the intervention. In addition, the higher variability of posttest scores suggests that while most students improved, the level of achievement varied, with some reaching the maximum score of 100. The Kolmogorov-Smirnov test further reported the most extreme differences between the observed data and the expected normal distribution. The absolute difference was 0.163, with positive and negative deviations of 0.163 and -0.108 respectively.

These deviations are relatively small, indicating that the dataset closely aligns with the shape of a normal curve. The Kolmogorov-Smirnov Z value for the posttest was 0.907, a figure consistent with a dataset that does not significantly deviate from normality. Most importantly, the significance value (Asymp. Sig. 2-tailed) for the posttest was 0.384. According to statistical guidelines, a dataset can be considered normally distributed if the significance value is greater than 0.05. Since 0.384 is well above the threshold, it is concluded that the posttest scores are normally distributed.

This finding not only confirms the suitability of the dataset for parametric statistical procedures but also reinforces the reliability of the improvements observed in students' learning outcomes. In summary, the results presented in Table 5 provide strong evidence that the posttest data meet the assumption of normality, with a significance value of 0.384 ($p > 0.05$). This allows the research to proceed confidently to the homogeneity test and subsequent inferential analyses. Establishing normality for both the pretest and posttest ensures that the conclusions drawn about the effectiveness of Liveworksheets in improving Social Science conceptual understanding are based on sound and scientifically valid statistical foundations.

Table 5. Results of the One-Sample Kolmogorov-Smirnov normality test for posttest scores

One-Sample Kolmogorov-Smirnov Test posttest		
		X
N		***31***
Normal Parameters[a,b]	Mean	80.45
	Std. Deviation	9.577
Most Extreme Differences	Absolute	.163
	Positive	.163
	Negative	-.108
Kolmogorov-Smirnov Z		.907
Asymp. Sig. (2-tailed)		.384

a. Test distribution is Normal.

b. Calculated from data

3.4. Homogeneity Test of Pretest and Posttest

The homogeneity test was carried out after the assumption of normality had been satisfied for both the pretest and posttest data [25]. This step was essential to determine whether the variances between the datasets were equal, thereby meeting one of the primary prerequisites for applying parametric statistical tests such as the t-test. The analysis was performed using SPSS version 21, employing Levene's test of equality of variances. This test specifically evaluates the null hypothesis that the population variances are equal across groups. As presented in Table 6, the Levene statistic obtained was 0.986 with degrees of freedom df1 = 1 and df2 = 60. The key value for interpretation was the significance (Sig.), which was found to be 0.325. According to the decision rule, if the significance value is greater than 0.05, the null hypothesis (H_0) is accepted, indicating that the variances are homogeneous. Conversely, if the value is less than 0.05, the null hypothesis is rejected, implying that the variances are heterogeneous.

The result of 0.325, which is comfortably above the 0.05 threshold, demonstrates that the pretest and posttest data share homogeneity of variance. This finding is important because it validates that the differences observed between pretest and posttest outcomes are not due to unequal variances across groups, but rather reflect genuine differences resulting from the learning intervention. The presence of homogeneity strengthens the statistical rigor of

subsequent analyses and ensures that comparisons are made under appropriate assumptions. By confirming variance homogeneity, the study gained confidence to proceed with parametric hypothesis testing, specifically the paired-samples t-test.

This condition is vital to avoid misleading results that could arise if the assumption of equal variances were violated. In addition, the homogeneity of variances suggests that the class was relatively balanced in terms of student performance characteristics, further supporting the fairness and representativeness of the experimental design. In conclusion, the results of the homogeneity test shown in Table 6 provide clear evidence that the data from the experimental class are homogeneous (Sig. = 0.325, $p > 0.05$). This outcome not only satisfies another critical assumption for parametric analysis but also enhances the internal validity of the study. With both normality and homogeneity confirmed, the research was able to confidently advance to hypothesis testing using the t-test to evaluate the effect of Liveworksheets on students' Social Science learning outcomes.

Table 6. Results of the homogeneity test (Levene's test) for pretest and posttest variances

Test of Homogeneity of Variances			
Learning outcomes			
Levene Statistic	df1	df2	Sig.
.986	1	60	.325

3.5. T-test

The final stage of statistical analysis in this study was hypothesis testing to determine the effect of using Liveworksheets on students' Social Science learning outcomes. This analysis was carried out using the Paired Samples T-test in SPSS version 21. The paired t-test is an appropriate procedure because it compares two related means—in this case, the pretest and posttest scores of the same group of students—before and after the intervention [26]. By applying this test, the study aimed to assess whether the difference between the two sets of scores was statistically significant. The hypotheses tested were formulated as follows: (H_0) there is no effect of applying the Liveworksheets learning media on students' learning outcomes, and (H_1) there is an effect of applying the Liveworksheets learning media on students' learning outcomes. These hypotheses provided a clear framework for interpreting the results of the t-test. If the significance value obtained was less than 0.05, the null hypothesis would be rejected in favor of the alternative hypothesis.

As presented in Table 7, the paired differences between pretest and posttest scores showed a mean difference of -17.90. This negative value reflects that posttest scores were considerably higher than pretest scores, indicating substantial improvement after the intervention. The standard deviation of the difference was 9.73, with a standard error of 1.74, demonstrating some variation in individual student improvements but an overall consistent upward trend. The 95% confidence interval for the mean difference ranged from -21.47 to -14.33, which does not cross zero. This further confirms that the difference between pretest and posttest scores was statistically meaningful and unlikely to have occurred by chance. The t-value obtained was -10.244 with 30 degrees of freedom, which is a strong indicator of statistical significance. These values reinforce the robustness of the results and highlight the effectiveness of Liveworksheets as a learning tool. Most importantly, the significance value (Sig. 2-tailed) for the paired t-test was 0.000, which is well below the 0.05 threshold.

This result leads to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_1). Therefore, it can be conclusively stated that the use of Liveworksheets had a significant positive effect on students' Social Science learning outcomes. This finding directly addresses the research objective and confirms the potential of interactive digital media in improving conceptual understanding. In conclusion, the results of the paired samples t-test presented in Table 7 provide strong empirical evidence that the implementation of Liveworksheets significantly enhanced students' performance in Social Science. Beyond the statistical values, these results align with classroom observations and teacher feedback, which noted greater engagement, participation, and motivation among students during the intervention. This combination of statistical rigor and practical classroom evidence strengthens the argument that Liveworksheets is an effective pedagogical innovation for elementary education.

Table 7. Results of the Paired Samples T-test for pretest and posttest scores

Paired Samples Test									
		Paired Differences							
		Mean	*Std. Deviation*	*Std. Error Mean*	*95% Confidence Interval of the Difference*		*t*	*df*	*Sig. (2-tailed)*
					Lower	*Upper*			
Pair 1	PRE TEST - POST TEST	-17.90323	9.73090	1.74772	-21.47255	-14.33390	-10.244	30	.000

3.6. Discussion

The findings of this study clearly demonstrate that the use of Liveworksheets as a digital learning medium has a significant positive effect on students' learning outcomes in Social Science. The interactive features of the platform, such as drag-and-drop tasks, automatic feedback, and multimedia integration, provide a more engaging experience compared to static worksheets. This interactivity allows students to not only answer questions but also to actively explore concepts, correct mistakes immediately, and receive reinforcement in real time. As a result, their attention and focus during lessons increased noticeably compared to previous classes that relied solely on conventional teaching methods. In addition, Liveworksheets offers a user-friendly interface that is accessible to both teachers and students. Its ease of use reduces the technical barriers often associated with digital learning tools. Teachers reported that students were able to adapt quickly to the platform, and many showed a higher level of independence in completing tasks.

This autonomy is important for developing self-regulated learning skills, which contribute to long-term academic growth. Thus, the platform not only improves immediate learning outcomes but also supports the cultivation of essential learning habits. The improvement in outcomes is supported by the results of the statistical tests, which confirmed a significant difference between pretest and posttest scores (sig. 0.000 < 0.05). The mean posttest score increased by nearly 18 points compared to the pretest, highlighting the substantial impact of the intervention. This quantitative evidence reinforces qualitative observations from the classroom, where students displayed greater enthusiasm, asked more questions, and engaged in discussions more actively. Together, these results strengthen the claim that Liveworksheets effectively enhances students' conceptual understanding. These findings are consistent with prior research, such as the study by Purba et al., which emphasized the role of interactive digital media in creating engaging learning experiences and enhancing student motivation [27]. By situating the present study within this broader context, it becomes evident that the benefits of Liveworksheets are not limited to language learning, where it has been widely applied, but extend to Social Science education as well. This expansion of evidence underscores the versatility and pedagogical value of digital platforms in diverse subject areas.

However, the study also acknowledges challenges associated with the use of Liveworksheets. One notable limitation is the reliance on digital devices and internet access, which are not always equally available to all students. In some cases, students with limited access faced difficulties completing assignments or participating fully in online activities. This digital divide poses a barrier to equity in learning outcomes and highlights the importance of infrastructure support to maximize the benefits of technology-enhanced learning. Teachers also noted that while Liveworksheets is effective in fostering engagement, its implementation requires careful planning and integration into the curriculum. Without alignment to learning objectives, there is a risk that digital activities may become superficial rather than meaningful.

Therefore, professional development for teachers is essential to ensure that the platform is used strategically to reinforce key concepts and promote deeper learning rather than simply substituting traditional worksheets with digital equivalents. Another implication of the study is that Liveworksheets promotes a shift from teacher-centered to student-centered learning. Students were observed to take more responsibility for their own progress, collaborating with peers and experimenting with problem-solving strategies. This transformation aligns with modern educational paradigms that emphasize active learning, critical thinking, and the development of 21st-century skills. Thus, the adoption of digital media such as Liveworksheets is not only beneficial for improving test scores but also for fostering broader educational competencies. In conclusion, the use of Liveworksheets has been proven effective in

significantly improving students' Social Science learning outcomes by increasing motivation, participation, and conceptual understanding. The statistical evidence, supported by classroom observations, confirms the reliability of these findings. Nevertheless, for sustainable implementation, attention must be given to overcoming infrastructure limitations and equipping teachers with the necessary skills to integrate digital tools effectively. By addressing these challenges, Liveworksheets can serve as a powerful medium to transform learning experiences and enhance the quality of elementary education in Social Science and beyond.

4. Conclusion

This study investigated the impact of using Liveworksheets as a digital learning medium on fifth-grade students' conceptual understanding of Social Science at Dawuan Tengah VI Public Elementary School. Prior to hypothesis testing, the data were examined for normality using both the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests at a significance level of $\alpha = 0.05$. The results confirmed that the pretest scores were normally distributed (K-S: $p = 0.184 > 0.05$; S-W: $p = 0.212 > 0.05$), thereby fulfilling the assumptions required for parametric testing. This validation ensured that the subsequent analysis using a paired-sample t-test was statistically appropriate and reliable. The results of the paired-sample t-test revealed a statistically significant improvement in students' conceptual understanding following the implementation of Liveworksheets. The mean score increased from 62.54 in the pretest to 80.45 in the posttest, with a significance value of 0.000 ($p < 0.05$). These findings led to the rejection of the null hypothesis and the acceptance of the alternative hypothesis, confirming that the integration of Liveworksheets had a meaningful positive effect on student learning outcomes in Social Science. Several pedagogical advantages explain the effectiveness of Liveworksheets. Its interactive features, such as drag-and-drop tasks, multimedia support, and automatic feedback, were instrumental in creating an engaging and student-centered learning environment. These features not only stimulated students' motivation and active participation but also encouraged independent learning, as the platform allows flexible access beyond classroom settings. Overall, the findings of this study underscore that Liveworksheets is an effective and innovative digital learning tool for elementary education, particularly for enhancing conceptual understanding in Social Science. Beyond improving academic achievement, the platform contributes to fostering meaningful, engaging, and technology-enhanced learning experiences that address the limitations of traditional teacher-centered instruction. Future studies are recommended to replicate these findings across larger and more diverse populations, as well as to explore the long-term impacts of digital platforms on students' learning engagement and achievement.

Acknowledgment

The authors would like to thank the Faculty of Education, Universitas Buana Perjuangan Karawang, for the support provided during this research. We also sincerely appreciate the teachers and students of Dawuan Tengah VI Public Elementary School for their active participation and cooperation in this study.

Declarations

Author contribution	:	All authors contributed equally to the main contributor to this paper. All authors read and approved the final paper
Funding statement	:	None of the authors have received any funding or grants from any institution or funding body for the research
Conflict of interest	:	The authors declare no conflict of interest
Additional information	:	No additional information is available for this paper

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