The Effectiveness of Multiple Intelligences Based Adobe Flash Professional CS6 Learning Media in Supporting Student Learning Achievement on Acid Base Lesson

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ABSTRACT. The use of media to address educational challenges is crucial for tracking and facilitating students' diverse intelligences. One effective tool for this purpose is Adobe Flash Professional CS6. This study aimed to evaluate its effectiveness as a learning medium based on Multiple Intelligences in improving student performance in acid-base content among XI MS students at SMA Negeri Plus, Riau Province, during the 2019/2020 academic year. A Quasi-Experimental Design was employed, involving 58 students selected via purposive sampling. Data were gathered through pretests, posttests, and interviews.Results showed a significant difference in academic performance between experimental and control groups. The experimental group achieved a higher mean posttest score (93.82) compared to the control group (87.13). T-test analysis confirmed the significance of this difference (p = 0.000, less than 0.05), leading to the acceptance of Ha and rejection of Ho. The N-gain test further validated the effectiveness of Adobe Flash Professional CS6, with 86.2% of students in the experimental group achieving high N-gain scores and 13.7% achieving medium N-gain scores, categorizing the tool as effective in enhancing academic outcomes. However, optimizing the potential of students with multiple intelligences requires additional support from various dimensions to fully harness their capabilities.

Keywords: adobe flash professional cs6, student learning achievement, acid base.

INTRODUCTION

The industrial revolution 4.0 indirectly changed the educational paradigm in the 21st Century era (Sari et al., 2020). The shift in 21st Century learning at this time is not only in the concept of teaching methods, but what is far more essential is the way of looking at the concept of learning itself. Nowadays, humans are very dependent on technology. This makes technology a basic need for everyone. From children to adults, experts to lay people use technology in various aspects of their lives. Technology today has developed very rapidly. The increasingly rapid development of information technology in the current era of globalization cannot avoid its influence on the world of education. Global demands require the world of education to always adapt technological developments to efforts to improve the quality of education, especially adjusting the use of information and communication technology for the world of education, especially in the learning process (Nainggolan et al., 2024).

Technology is a science in the form of hardware and software that is used to facilitate and help achieve human goals, for example, it can be used as a tool for human development. learning media. Learning media are materials or tools used by educators as learning support so that student creativity increases (Nurdiana & Hasanudin, 2023). Effective use of technology for education is a way of utilizing technology in order to facilitate the process of teaching and learning activities and facilitate access to information for students in an effort to improve and develop the quality of student potential (Laila et al., 2016)

One of the computer programs that can be used for learning media development is the Adobe Flash program. Flash is one of the animation software issued by Macromedia which has now been adopted by Adobe, Inc, Adobe Flash Professional CS6 is a version of Adobe Flash that

has been updated from the previous versions, namely Adobe Flash CS3 Professional, Adobe Flash CS4 Professional, and Adobe Flash Professional CS5. Adobe Flash Professional CS6 is software that can produce presentations, games, movies, Interactive CDs, and learning CDs, as well as to create interactive, attractive, and dynamic websites (Hilmi et al., 2018). The use of Flash animation in learning is a tool to help students understand the material more meaningfully, understand the importance of the material, connect the material with the real world, and visualize abstract concepts to be more concrete (Salim & Tiawa, 2015).

Student reasoning on chemical science concepts is described in three different representations, namely macroscopic representation, submicroscopic representation, and symbolic representation (Andina et al., 2017). The three representations of chemical concepts turned out to have a relationship with the ability of multiple intelligences in students. Gardner divided multiple intelligences into eight types of intelligence, namely visual, spatial, oral or linguistic, logical mathematics, kinesthetic, naturalist, music, interpersonal, and intrapersonal (Handayaningsih & Nusantara, 2021). Developing multiple intelligences on three representations of chemistry concepts with learning principles is one of the principles in paying attention to all students' intellectual abilities and evaluating contextualized learning processes.

Through technological advances, teachers can use various media according to their needs and learning objectives. One technology that can help make learning media is the Adobe Flash CS6 program (Harahap & Siregar, 2020). Some learning media which is one of the series from Adobe Flash that can be used in the learning process such as 3D Macroscopic chemistry media, Complete Chemical Structure, and so on. Media that can be used in this learning process requires an effectiveness test in learning, this aims to determine whether this media supports student learning outcomes in the learning process.

From the explanation above, it is necessary to test the effectiveness of Adobe Flash Professional CS6 learning media based on Multiple Intelligence to support student learning outcomes and significant differences in student learning outcomes on acid-base materials.

METHOD

This research was conducted in May 2020 at SMA Negeri Plus Riau Province. The subjects in this study were students of class XI MS SMA Negeri Plus Riau Province, while the object in this study was Adobe Flash Professional CS6 learning media based on multiple intellegences. The samples in this study were students taken from two classes, namely students from class XI MS 1 and students from class XI MS 3 SMA Negeri Plus Riau Province who were enrolled in the 2019/2020 school year. This sampling is based on purposive sampling technique, Purposive sampling is a non-random sampling method where the researcher ensures the quotation of illustrations through the method of determining the special identity that matches the research objectives so that it is expected to respond to the research case (Lenaini, 2021)

The research method used is the Quasi-Experimental Designs method to assess the effectiveness of Adobe Flash Professional CS6 as a learning medium. This method allows comparison between experimental and control groups, providing insight into the impact of the intervention on student learning outcomes. The sample consisted of 58 students, selected using saple purposive technique. This approach ensured that participants were selected based on specific characteristics relevant to the study. Data collection involved administering a Pretest and Posttest to measure student learning before and after the intervention. This method helps in evaluating the changes in knowledge and skills caused by multiple intellegences-based Adobe Flash Professional CS6 learning media on acid-base concept. In addition, interviews were conducted to collect qualitative data, which supported and enriched the quantitative findings. This mixed method

approach provides a more comprehensive understanding of students' experiences and perceptions of the learning media.

RESULT AND DISCUSSION

Result

This research is a test of the effectiveness of Adobe Flash Professional CS6 learning media based on Multilple Intellegences on student learning outcomes on acid-base material. The data obtained from the research are quantitative data and qualitative data, quantitative data will be analyzed by descriptive statistical analysis to describe the intelligence data of Multiple Intellegences students from student learning outcomes. The data was obtained from the pretest and posttest results of experimental and control class students.

Quoted from (Joko Widyanto, 2010) the homogeneity test of the variance of the data on the test scores of experimental and control class students is the same or homogeneous. the results of the content validity analysis showed that 11 items submitted were declared valid and 4 other items could be used to test the validity empirically after revising the questions. based on quotations (Zainal Arifin, 2016) Of the 11 questions that have been declared valid, 10 questions were selected as instruments in the study and obtained a test reliability of 0.76 which is included in the very high reliability criteria. Normality testing in this study was carried out using statistical techniques assisted by SPPS V.23 with the Shapiro-Wilk test. A data is said to be normally distributed in the Shapiro-Wilk test if the sig. value is greater than 0.05. the data from the students' pretest and posttest scores for both sample classes are normally distributed. And the pretest and posttest data for both sample classes are homogeneous.

Research hypothesis testing

1) T-Test

Table 1
T-test Results of Posttest Data of Both Classes Sample
Independent Sample Test

		Student Learning Outcomes (posttest)	
		Equal variances assumed	Equal variances non assumed
Levene Test for Equality of Variances	F	.336	
	Sig.	.565	
t-test for Equality of Means	T	9.889	9.889
	Df	56	55.336
	Sig. (2-tailed)	.000	.000
	Mean Diffrences	6.690	6.690
	Std. Error Differences	.676	.676
	95% Confidence Interval of the Difference: Lowwer	5.335	5.334
	Upper	8.045	8.045

The results are statistically significant, with the t-test yielding a significance value of 0.000, which is less than the 0.05 threshold. This led to the acceptance of the alternative hypothesis (Ha) and rejection of the null hypothesis (Ho), confirming that learning media has a positive impact on student performance.

2) N-gain Test
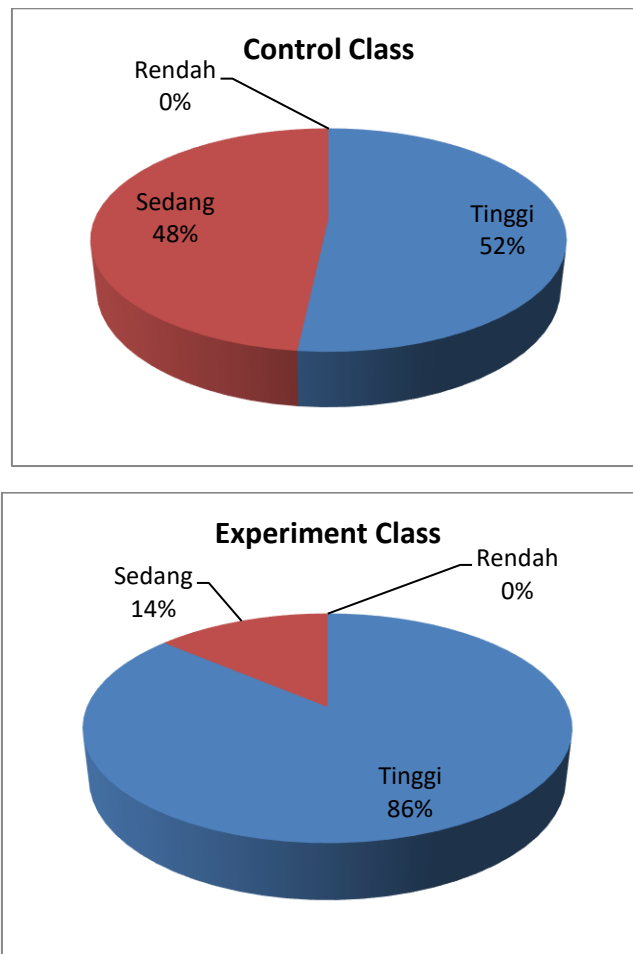
The N-gain analysis further supported the findings, showing that 52% in the control group fell into the high N-gain category, 48% medium N-gain and 0% low. whereas 86.2% of students in the experimental group fell into the high N-gain category, indicating substantial improvement. Only 13.7% were in the moderate N-gain category, indicating that most students benefited significantly from the intervention.
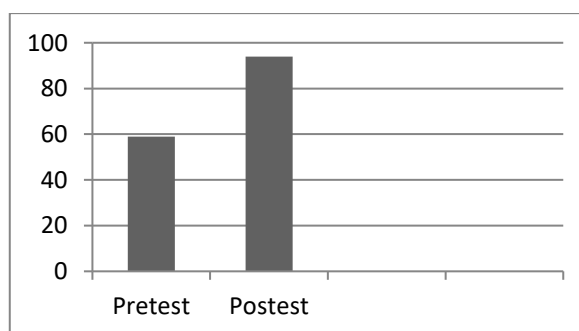

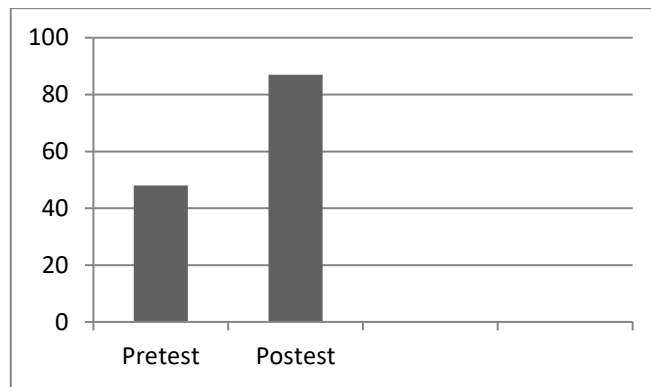**Figure 3. Avarege learning outcomes of experiment class**

Figure 4. Average learning outcomes of control class students

Discussion

The cognitive capabilities associated with Multiple Intelligences (plural abilities) among students are evaluated through student learning outcomes facilitated by the Adobe Flash Professional CS6 educational media, which have been procured employing the testing methodology, specifically through a descriptive essay assessment manifested in the form of pretest and posttest. The posttest data regarding student learning outcomes further serves to evaluate the attainment of indicators related to student Multiple Intelligences. This investigation encompasses four distinct indicators of students' Multiple Intelligences, namely logical-mathematical intelligence, visual-spatial intelligence, interpersonal intelligence, and intrapersonal intelligence. The percentage of accomplishment for each indicator of students' Multiple Intelligences can be observed in the subsequent figure (Gani et al., 2024).
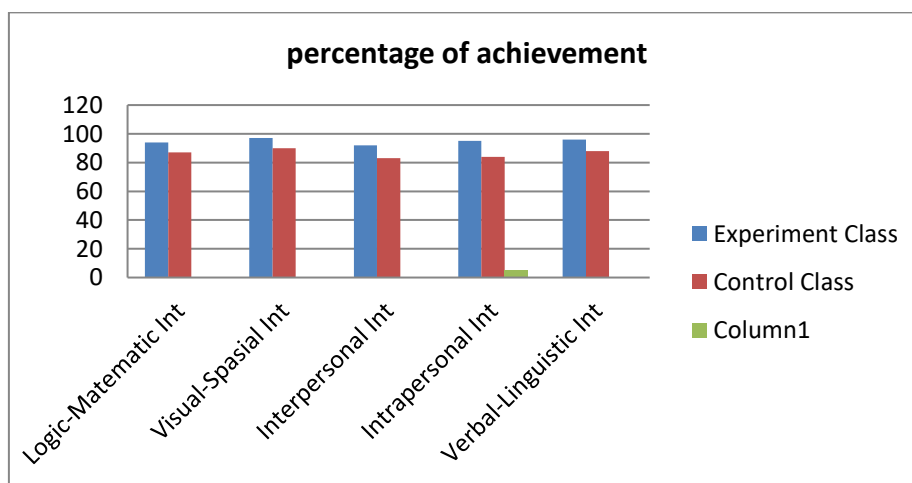
The analysis of four indicators of Multiple Intelligences reveals that the highest level of achievement is attributed to visual-spatial intelligence, exhibiting a percentage of 94% within the experimental cohort and 89.9% within the control cohort. Conversely, the lowest level of achievement among the four indicators pertains to interpersonal intelligence, demonstrating a percentage of 92.3% in the experimental cohort and 83% in the control cohort. The remaining two indicators are categorized as exhibiting a medium level of achievement in this investigation, specifically logic-mathematical intelligence and intrapersonal intelligence.

The primary metric evaluated in this investigation pertains to the logic-mathematical intelligence of the student cohort. The aforementioned data delineates the achievement percentages of the indicators, revealing that the experimental group attained a remarkable 94.2%, categorizing

it within the 'very good' criteria, whereas the control group achieved a commendable 87.1%, placing it in the 'good' criteria. Adobe Flash Professional CS6, grounded in the theory of Multiple Intelligences, offers the distinctive benefit of consolidating educational content in a manner that is both effective and efficient, utilizing a singular medium capable of elucidating concepts through simulations that encourage students to engage in logical and mathematical reasoning, experimentation, and calculation, thereby fostering a favorable impact on the logic-mathematical capabilities of the students, which in turn enhances their academic performance. This assertion is corroborated by research70 which posits that the enhancement and cultivation of students' logic-mathematical faculties are imperative, as they subsequently exert a beneficial effect on the overall academic outcomes of the learners (Qu, 2023).

The second indicator of multiple intelligences examined in this research pertains to the visual-spatial intelligence metric, which is identified as an indicator within the maximum achievement range of the study. The proportion of achievement associated with the visual-spatial intelligence metric in the experimental group surpassed that of the control group. The superior performance of the experimental group can be attributed to the distinctive characteristics of the acid-base indicator material, which were elucidated through simulations incorporating images, movements, and colors, thereby facilitating a real-world interpretation via Adobe Flash Professional CS6 learning media grounded in the principles of Multiple Intelligences, allowing students to effectively demonstrate their visual-spatial competencies. This assertion is corroborated by prior research which indicates that students possessing well-developed visual-spatial intelligence are more likely to assimilate information through visual representations, ultimately exerting a substantial influence on their academic performance (Achdiyat & Utomo, 2018).

The third metric evaluated in the framework of multiple intelligences is interpersonal intelligence. According to the data presented, it is evident that the achievement percentage for the experimental group is recorded at 92.3%, categorizing it within the excellent range, whereas the control group displays a percentage achievement of 83% for the third metric, classifying it as good. This distinction arises from the utilization of Adobe Flash Professional CS6 as a pedagogical medium, which effectively facilitates the learning process by enabling students to articulate opinions, conduct analyses, and comprehend the underlying processes of the problems presented, thereby allowing them to communicate and derive conclusions based on their analytical efforts (Herlandy et al., 2019). However, within the context of this investigation, the interpersonal intelligence metric is identified as an area of minimal achievement, potentially attributable to the limited communication skills of the participants. A study (Wijayanti et al., 2018) indicates that students exhibiting a moderate level of interpersonal learning style may encounter difficulties in communication due to various factors, including apprehension in posing questions and a propensity to prefer solitary or independent work.

The fourth metric for assessing multiple intelligences is the intrapersonal intelligence construct. Intrapersonal intelligence necessitates that learners possess the capacity to accomplish tasks autonomously while engaging in reflective and strategic thinking (Jannah, 2023). Adobe Flash Professional CS6, grounded in the principles of Multiple Intelligences, serves as a pedagogical tool that encourages students to undertake independent learning and equips them with the requisite skills to tackle problems through strategic methodologies. This assertion is substantiated by (Nuraeni et al., 2021) explains that intrapersonal intelligence is closely related to sensitivity or awareness to conduct self-evaluation, where the person concerned shows his strengths and weaknesses to others.

The fifth metric associated with multiple intelligences is the verbal-linguistic intelligence metric. This particular intelligence necessitates that learners possess the capability to execute tasks that reflect their comprehension as determined by the linguistic elements employed in the instructional media. Empirical research indicates that verbal-linguistic intelligence plays a critical role in enhancing students' oral communication abilities, particularly when augmented by digital media platforms (Sutarso Setyaningsih et al., 2022). Adobe Flash Professional CS6, as a pedagogical tool grounded in Multiple Intelligences theory, possesses the capacity to engage students in problem-solving activities that are derived from the content presented and from the reading resources available within the instructional media.

The pinnacle of achievement in the realm of multiple intelligence indicators, among the four assessed indicators within both the experimental and control groups, is represented by the second indicator, specifically the visual-spatial intelligence of the students, with respective percentages of 97% and 89.9%. This phenomenon can be attributed to the effectiveness of Adobe Flash Professional CS6 as a learning medium grounded in the principles of Multiple Intelligences, which facilitates a more tangible comprehension of the material through simulations presented in the medium. Consequently, this approach engenders increased student engagement, prompting them to observe, analyze, and identify elements based on the animated movements, colors, and shapes incorporated within the educational media.

CONCLUSION

The research findings indicated that the implementation of Adobe Flash Professional CS6 as an educational medium, grounded in the theory of multiple intelligences, markedly enhanced students' academic performance in the domain of acid-base chemistry. The experimental cohort exceeded the control cohort in performance metrics, thereby illustrating the efficacy of this multimedia pedagogical strategy in the realm of education. Rigorous statistical evaluation substantiated these findings, with the t-test revealing a significance level of 0.000, which is considerably lower than the conventional threshold of 0.05. Such compelling statistical evidence reinforces the assertion that multimedia instructional techniques exert a beneficial influence on student outcomes. The n-gain analyses elucidated that a substantial proportion of the participants in the experimental group exhibited pronounced improvement, with 86.2% classified as demonstrating a high N-gain. This indicates that the educational medium not only aided in fostering understanding but also substantially enhanced academic success. The study advocates for subsequent research endeavors to investigate supplementary support mechanisms that could fully harness the potential of students with diverse intelligences, positing that while existing methodologies yield positive results, there remains potential for further enhancement of educational strategies.

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