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Kumon's Learning Model with the Assistance of Multiplication Table in Observed from Achievement and Discipline Attitude In Mathematics Learning

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ABSTRAK

Matematika ialah mata pelajaran yang butuh diberikan kepada seluruh siswa dengan tujuan buat membekali keahlian berpikir logis, analitis, sistematis, kritis, serta kreatif, dan keahlian berkolaborasi. Akan tetapi menentukan model serta media belajar efektif dalam upaya meningkatkan presetasi dan disiplin siswa sangat sulit. Salah-satu solusi dalam menentukan media interaktif ialah multiplication table dengan model kumon. Tujuan dari penelitian ini adalah untuk menganalisis model pembelajaran kumon berbantuan tabel perkalian terhadap prestasi dan sikap disiplin dalam pembelajaran matematika. Metode penelitian pada riset ini adalah desain ekperimen dengan membandingkan kelas ekperimen dan kontrol. Penelitian ini menggunakan teknik pengumpulan data yang dilaksanakan antara lain, percobaan, mengamati, dan dokumentasi. Analisis yang digunakan dalam penelitian ini terdiri dari tes standar (Normalitas), pemeriksaan homogenitas, pengujian hipotesis. Hasil penelitian memperlihatkan bahwasanya ada peningkatan prestasi dan disiplin siswa kelas III SD sebelum dan sesudah menggunakan model pembelajaran kumon dengan media multiplication table, sehingga dapat dinilai model pembelajaran tersebut efektif, ditinjau dari segi prestasi dan disiplin siswa.

ABSTRACT

Mathematics is a subject that should be given to all students to equip them with logical, analytical, systematic, critical and creative thinking skills, and collaboration skills. However, determining effective learning models and media to improve student achievement and discipline is very difficult. One of the solutions for determining interactive media is a multiplication table with the Kumon model. The purpose of this study was to analyze the multiplication table-assisted Kumon learning model on achievement and discipline in mathematics learning. The research method in this research is an experimental design by comparing the experimental and control classes. This study used data collection techniques which included experimenting, observing, and documenting. The analysis used in this study consisted of standardized tests (normality), homogeneity checks, and hypothesis testing. The results of the study showed that there was an increase in the achievement and discipline of third-grade elementary school students before and after using the Kumon learning model with media multiplication tables so that it could be assessed that the learning model was effective, in terms of student achievement and discipline.

1. INTRODUCTION

Building a disciplined character requires cooperation and support from all parties, thus the world of education has an important role as a promoter by incorporating moral values in it.(Aini et al., 2021; Istiqomah & Indarini, 2021; Septirahmah & Hilmawan, 2021)Discipline is behavior that follows the rules and norms that are in force. Discipline is the individual's perception of adjusting to and complying with the rules, values, and existing punishments. To foster a sense of awareness and curiosity, it is necessary to build the discipline to achieve learning goals and avoid laziness in learning. Because a student who has discipline is used to an orderly life, the main focus that needs to be developed is discipline(Sugiarto et al., 2019; Syafriza, 2021). Discipline plays an important role in achieving goals and achieving better results than before. An academic discipline is obedience to the rules set in the learning and teaching process(Aini et al., 2021; Salam & Anggraini, 2018). Academic discipline plays an important role during the learning process of a student, especially in online learning, because it has an impact on the behavior or attitude of a student(NEI Lestari et al., 2021; Novera et al., 2021).

Mathematics is a basic science and has an essential role in the development of student academic discipline. In addition, mathematics can emphasize structural thinking, shape students' attitudes, and apply skills in real life and when working in various fields of a profession that are occupied.(Evi &

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Indarini, 2021; Nisa, 2019). Mathematics is a subject that must be taught to all students in guiding them with systematic, critical, logical, analytical, and creative thinking as well as the ability to work together (Rachmantika & Wardono, 2019; Ramadhani & Azis, 2020). These skills are essential for students to be able to acquire, manage, and use knowledge in an ever-evolving society (Salam & Anggraini, 2018; Watipah, 2020). Character creation is a more difficult process than searching for general information. Discipline is one of the most important qualities to achieve success. In practice, teachers need different ways so that these disciplinary values can be embraced by students. Teachers also need to take the right steps when encountering obstacles in the implementation process(Kusumaningsih et al., 2019; D. Lestari & Sardin, 2020). Teachers regard students as learning objects rather than students. Teachers do not provide opportunities for students to think critically, creatively, objectively and logically and pay less attention to the mastery of individual learning(Jannah et al., 2019; D. Lestari & Sardin, 2020).

Based on the results of current observations, at SDN Kayuringin Jaya II, learning mathematics is still dominated by the role (teacher orientation) of the teacher. This to the explanation above does not improve students' reasoning abilities and does not discipline students(Jannah et al., 2019; Sumartini, 2015). For this reason, it is necessary to use teaching methods that can improve skills. So in this case, especially in learning mathematics, the Kumon teaching method of mathematics was chosen. According to information from the grade 3 teacher, grade 3 student scores at SDN Kayuringin Jaya II are still low, only 20% of students take the material understanding test, and learning outcomes on the multiplication table are still missing. One of the reasons students are bored, afraid of difficulties, afraid of learning and assuming that learning mathematics is not useful in everyday life, especially in the multiplication table.

The state of the traditional learning model makes students negligent or less interested in learning mathematics, especially measurement. Even though measuring materials are very useful in everyday life. Therefore, teachers use teaching models to improve student learning outcomes and disciplinary behavior(Mayasari, 2020; Nursalam et al., 2021). If traditional learning continues, the value of children's learning outcomes will not increase because it will have an impact on reducing children's creativity in problem-solving. Based on these problems, the teacher's role is very important in finding other methods related to student development(Kusumadewi et al., 2019; Saputri & Wardani, 2021). From there, the Kumon teaching model is offered as an alternative to this problem. The Kumon Method is a technique for increasing the effectiveness of learning mathematics by controlling student achievement and discipline(Kusumaningsih et al., 2019; Nurfadilah & Hakim, 2019). We hope that through the Kumon method, teachers know each student's ability to get proper guidance. With Kumon, students are given an understanding of mathematical concepts through a fun and organized learning process. Confidence will increase when students can complete Kumon exercises according to their abilities(Lazuardi, 2019).

The Kumon learning model is a learning model that follows a contextual approach by linking concepts, skills, and individual work and maintaining a relaxed and fun atmosphere. The ability to work at one's own pace even allows children to study subjects above their level at school(Mufarokha & Utami, 2022; Yetti & Yullys, 2020). The Kumon teaching model is a learning model that links concepts, skills, and individual work, and maintains a comfortable and enjoyable environment (Amanda & Akhyar, 2018; Widyastuti & Airlanda, 2021). Learning materials are designed so that students can work on their skills, and even children can learn learning materials above their grade level at school (D. Lestari & Sardin, 2020; Nursalam et al., 2021). Two things stand out in this model: Individual Acceleration, which means each student learns at his own pace (as opposed to school), and *Diligence*, which means students are encouraged to work diligently, following the same concepts every day until they become experts (Bonita & Effendi, 2020; Mufarokha & Utami, 2022).

According to previous research on the application of the Kumon method to improve student learning outcomes in mathematics, the application of the Kumon method can improve student learning outcomes in Roman numerals (Halidin, 2020). Through known learning outcomes, the Kumon method emphasizes the capabilities of each student so that students can fully explore their potential and develop their talents. Based on other research also found that the practice of learning mathematics according to the Kumon method can affect student learning outcomes in determining the extreme value of the quadratic function (Mufarokha & Utami, 2022). Based on these problems, to overcome the problem of lack of academic achievement in the Kernel Documents of SDN Kayuringin Jaya II in class III, the researcher wants to conduct research that can improve the performance and discipline of class III students at SDN Kayuringin Jaya II to improve student learning outcomes and discipline. This study aimed to analyze the multiplication table-assisted Kumon learning model on achievement and discipline in mathematics learning.

2. METHOD

In this research, a two-group experimental design was used between the experimental group and the control group. In this study, a *random sampling* technique was used to determine which classes would become the sampling group, the experimental group and the control group. This design showed that there were similarities and differences between the experimental group and the control group. The similarity was the two groups carried out in the pre-test and post-test. The difference was the experimental group that used the Kumon learning model, while the control group did not receive any treatment (in this case it still used the conventional learning model). This design will give the best results if both groups are used equally. The equality of the two groups was seen in the *mean* (mean) and standard deviation (SD), the differences were not significant. To obtain equivalent conditions, pre-and post-trial tests were applied to the experimental and control groups. The pre-test and post-test designs are shown in Table 1.

Table1. Pre-test and post-test design

	Pre-test Measure	treatment	Post-test
Experimental Group	Pre-test	treatment	Post-test
Control Group	Pre-test	treatment	Post-test

This research was conducted at SDN Kayuringin Jaya II. Cendrawasih Raya Street No. 416, RT 002/RW. Number. 023, Perumnas 1, Kayuringin Jaya, Bekasi Sel District., Bekasi City, West Java 17144. This study used data collection techniques which included experimenting, observing, and documenting (Elvanisi et al., 2018; Tanjung et al., 2022). The analysis used in this study consisted of standardized tests (normality), homogeneity checks, hypothesis testing.

3. RESULT AND DISCUSSION

Result

The following are the results of existing research on the effectiveness of the Kumon learning model with *multiplication table* media in learning mathematics in terms of achievement and disciplinary attitudes in third grade at SDN Kayuringin Jaya II. The results of descriptive statistics are shown in Table 2.

Table 2. Descriptive statistics

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Means**	**std. Deviation**
Pre-test_PBE	22	20	75	43.64	14.889
Post-test_PBE	22	73	100	87.59	10.595
Pre-test_PBK	20	20	87	53.55	19.433
Post-test_PBK	20	53	185	91.90	25.177
Before_DE	22	25	75	52.55	15.883
After_DE	22	75	100	90.27	7.629
Before_DK	20	25	100	50.05	19.959
After_DK	20	50	100	82.15	15.625
Valid N (listwise)	20				

In Table 2, it explains that the minimum pre-test score is 20 with a maximum value of 75. Post-test with a minimum score of 73 and before with a kumon minimum score of 25 with a maximum of 100, after with a kumon minimum score of 50 with the highest score of 100. The normality test was carried out to determine whether the study population sample was normally distributed. The normal distribution is data that follows a normally distributed model, where the data is concentrated in the mean and median. Before being analyzed inferentially to see the effectiveness of the Kumon learning model in improving student learning achievement and discipline, a prerequisite analysis test was first carried out, namely the normality test. The normality test results can be seen in Table 3.

Based on Table 3, all variables have met the criteria that the data has been normally distributed, so they can proceed to the next data analysis. The second assumption of the parameter test is the uniformity of the data. The homogeneity of variance test assumes that the score of each variable has a uniform variance. A homogeneity test is used to check whether two or more data sets in a study are identical by comparing variances. Based on data analysis, showing the results of the homogeneity test, it

can be concluded that each variable studied did not have homogeneous data. Furthermore, because it has fulfilled the requirements, namely normal distribution and there is no homogeneity in the research data, then a hypothesis test is carried out using the *Paired* T-test to see an increase in learning achievement and discipline after the implementation Kumon learning model shown in Table 4.

Table 3. Normality test

Tests of Normality								
			Kolmogorov-Smirnova			Shapiro-Wilk		
	Code		Statistics	df	Sig.	Statistics	df	Sig.
Pre-test Learning Achievement	Experiment Class		0.172	22	0.091	0.925	22	0.099
	Control Class		0.155	20	0.200	0.940	20	0.236
Post-test Learning Achievement	Experiment Class		0.243	22	0.002	0.813	22	0.001
	Control Class		0.324	20	0.000	0.702	20	0.000
Prior Discipline	Experiment Class		0.152	22	0.200	0.920	22	0.077
	Control Class		0.199	20	0.037	0.901	20	0.043
Discipline After	Experiment Class		0.172	22	0.091	0.916	22	0.064
	Control Class		0.222	20	0.011	0.818	20	0.002

Table 4. Hypothesis Test t-test Learning Achievement

Model		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences	std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Learning Achievement after	Equal variances assumed	1.132	0.294	-0.735	40	0.467	-4.309	5.862	-16.157	7.539
	Equal variances not assumed			-0.710	25023	0.484	-4.309	6.066	-16.802	8.184

Based on Table 4, shows that the calculated value of the pre-post test on the learning achievement variable is known to be the Sig value. (2-tailed) Equal variances assumed is 0.467 > 0.05. Thus (Ha) is rejected and (H0) is accepted. So it can be interpreted that there is no significant difference between student achievement in the experimental class and the control class. The disciplinary t-test hypothesis test is shown in Table 5.

Table 5. Discipline t-Test Hypothesis Testing

Model		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences	std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Discipline After	Equal variances assumed	5.582	0.023	2.172	40	0.036	8.123	3.740	0.564	15.681
	Equal variances not assumed			2.108	26.982	044	8.123	3.854	0.215	16031

Based on Table 5, shows that the pre-post test calculated value on the learning achievement variable is known to be the Sig value. (2-tailed) Equal variances assumed is 0.036 > 0.05. Thus (H0) is rejected and (Ha) is accepted. So it can be interpreted that there is a significant difference between the discipline of students in the experimental class and the control class. The hypothesis test is shown in Table 6. Hypothesis testing is the process of testing research findings on a sample. The resulting results than whether the hypothesis being tested can be generalized. Based on the table *output of the test of homogeneity of variance*, it is known that the significance value is based on the mean of the pretest and posttest variables of learning achievement, as well as the attitude of discipline before having respective values of 0.69, 0.467, 0.655 greater than 0.05. This result means that the pretest and posttest learning

achievements in the experimental and control classes are the same, and the prior disciplinary attitude for the experimental and control classes is the same. However, the significance value for discipline after is 0.036 <0.05. This result means that the attitude of discipline after the experimental and control class students are not the same.

Table 6. Hypothesis testing

ANOVA						
		Sum of Squares	**Df**	**MeanSquare**	**F**	**Sig.**
Pre-test Learning Achievement	Between Groups	1029602	1	1029602	3,481	0.069
	Within Groups	11830041	40	295,751		
	Total	12859643	41			
Post-test Learning Achievement	Between Groups	194,525	1	194,525	0.540	0.467
	Within Groups	14401.118	40	360,028		
	Total	14595643	41			
Prior Discipline	Between Groups	65,238	1	65,238	0.203	0.655
	Within Groups	12866.405	40	321,660		
	Total	12931643	41			
Discipline After	Between Groups	691,205	1	691,205	4,717	0.036
	Within Groups	5860914	40	146,523		
	Total	6552119	41			

Discussion

The effectiveness of the Kumon learning model with *multiplication table* media can improve student achievement and discipline through the Kumon learning model will be demonstrated by students who are enthusiastic about learning, such as students who are more focused on participating in activities, active learning, students who do not do much outside of learning activities, and students who are eager to learn. In the Kumon learning model, teachers act as learning designers, teachers are learning designers, learning managers, evaluators of learning outcomes, and student learning. Director and student adviser. Based on the hypothesis test, it was found that the application of the Kumon model at SDN Kayuringing Jaya II had been effective in applying the Kumon method to improve achievement and discipline in learning mathematics for third-grade students.

This can be demonstrated by an increase in student learning outcomes, in line with the view of previous research which also confirms that teaching and learning outcomes indicate academic success (Halidin, 2020). In addition, students' actions show that they are actively involved in their educational process and respond positively to Kumon's techniques. In addition to better academic results, student engagement also increases because students become more enthusiastic, focus more on learning, dare to find answers, and stand in front of the class to present their answers. In the Kumon teaching method, in this case, the teacher acts as an instructional designer, instructional manager, performance assessor, instructional manager, and student adviser(Bonita & Effendi, 2020; Halidin, 2020; Ramadhana, 2022).

The results of this study are in line with the results of previous research which showed that the Kumon learning model was effective in increasing students' mathematics achievement (Halidin, 2020). The results of the above research are supported by the competence-based advantages of the Kumon method as described in previous research, namely 1) since students are given proficiency tests beforehand during learning so that students can adapt; 2) learning materials are arranged in stages so that students have solid basic skills; 3) Students complete assignments independently with various types of questions, from simple questions to more difficult questions. 4) Make students more disciplined(Ramadhan, 2022). Studies conducted by previous studies on the discipline of elementary school students show that there are three indicators of discipline: 1) obedience to school regulations, 2) good completion of assignments, and service, and 3) sanitation patrol performance (Purwanti et al., 2020). Other research shows that the discipline of elementary school students during online learning is a series of factors can affect the discipline of elementary school students during online learning(Melati et al., 2021). Then the previous study showed that online learning *(E-Learning) through Google Classroom, Youtube and WhatsApp* applications can improve the quality of learning (Ayus et al., 2021).

The implications of this study provide an understanding and description regarding the implementation of the multiplication table-assisted Kumon learning model in terms of achievement and discipline in mathematics learning. This research will be very useful for teachers, especially math teachers, in considering Kumon learning. However, this research has limitations, especially in the scope of

research which only involves one school as the subject. Therefore, it is hoped that future research will be able to deepen and broaden the scope of research related to the Kumon learning model.

4. CONCLUSION

A study of multiplication material conducted in the third lesson at SDN Kayuringin Jaya II found that the Kumon learning model using multiplication media increased student achievement, but the Kumon learning model using multiplication table media was less effective in learning compared to pictures. The second result is that the Kumon learning model with multiplication media can improve student discipline. Furthermore, there are differences in disciplinary attitudes towards multiplication material for third-grade at SDN Kayuringin Jaya II, and the Kumon learning model with multiplication table media is better than the picture and picture learning models using media images.

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