

Analysis of Students' Psychomotoric Abilities in *Daily Life -Based Practicum* on Reaction Rate Material

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Abstract

The aim of this research is to analyzing students' psychomotor abilities in daily life -based practicums on reaction rate material. This research was carried out in the 2022/2023 academic year at Madrasah Aliyah Negeri 1 Kampar with the material Reaction Rate. The method used in this research is quantitative descriptive. The instruments used in this research were performance assessment sheets to determine students' psychomotor abilities and interviews to strengthen the data obtained. The results of data analysis show that the average psychomotor ability of students is 79.19. The highest average score obtained was in the naturalization domain with the very good category and the psychomotor ability with the lowest average score obtained was in the precision domain with the good category. The psychomotor indicator with the highest average score is assembling experimental equipment in the very good category, and the psychomotor indicator with the lowest average score is the indicator for splitting and smoothing solid substances in the good category. The psychomotor abilities of the students are mostly in the good category, which is 52% with the highest rating scale score being scale 4 with a good category, which is 59%. Daily life -based chemistry practical learning can make it easier for students to carry out practical work.

Keywords: daily life based practicum; psychomotor abilities; reaction rate

Abstrak

Tujuan penelitian ini adalah untuk menganalisis kemampuan psikomotorik siswa dalam praktikum kehidupan sehari-hari pada materi laju reaksi. Penelitian ini dilaksanakan pada tahun ajaran 2022/2023 di Madrasah Aliyah Negeri 1 Kampar dengan materi Laju Reaksi. Metode yang digunakan dalam penelitian ini adalah deskriptif kuantitatif. Instrumen yang digunakan dalam penelitian ini adalah lembar penilaian kinerja untuk mengetahui kemampuan psikomotorik siswa dan wawancara untuk memperkuat data yang diperoleh. Hasil analisis data menunjukkan rata-rata kemampuan psikomotorik siswa sebesar 79,19. Nilai rata-rata tertinggi yang diperoleh pada domain naturalisasi dengan kategori sangat baik dan kemampuan psikomotorik dengan nilai rata-rata terendah yang diperoleh pada domain presisi dengan kategori baik. Indikator psikomotorik dengan skor rata-rata tertinggi adalah merakit peralatan percobaan dengan kategori sangat baik, dan indikator psikomotorik dengan skor rata-rata terendah adalah indikator membelah dan menghaluskan zat padat dengan kategori baik. Kemampuan psikomotorik siswa sebagian besar berada pada kategori baik yaitu sebesar 52% dengan skor skala penilaian tertinggi berada pada skala 4 dengan kategori baik yaitu sebesar 59%. Pembelajaran praktik kimia berbasis kehidupan sehari-hari dapat memudahkan siswa dalam melaksanakan kerja praktik.

Keywords: kemampuan psikomotorik; laju reaksi; praktikum berbasis kehidupan sehari-hari

Introduction

Chemistry is a field of science that is not just knowledge of concepts, facts and principles but also a process of discovery. Most chemical concepts are abstract. Chemistry studies special phenomena that occur in substances and everything related to them such as the composition, structure and properties of substances. Judging from the content, learning chemistry involves skills and reasoning. There are two things related to the chemistry learning process that cannot be separated, namely chemistry as a product and chemistry as a process (Siregar, 2018).

Chemistry material at school is often considered difficult for students. One of the teacher's efforts is to relate it to everyday life so that the learning material is easier to understand and more interesting for students. In this way, students can take advantage of the chemical knowledge they have gained by applying it in everyday life (Siagian & Yasthophi, 2021).

According to Lilia and Widodo (2014), daily life -based practicum is a series of activities to carry out experiments with materials and equipment that are available in the natural environment around students and are cheap to use as a good alternative for doing it sustainably (Astuti et al., 2019). Daily life -based chemistry learning in schools connects current and future needs for both students and teachers. Apart from that, according to Sumarni (2016), the application of project-based learning methods can improve students' psychomotor abilities (Simanjuntak & Utama, 2019).

Performance skills that students carry out during practicum activities are important things that students must do because they can improve their psychomotor abilities. In general, assessment is done by observing the performance of a task or by checking student work. Observations can be influenced by subjective factors, so an observation sheet with appropriate assessment guidelines is needed (Isnaini & Utami, 2020).

Performance assessment is a form of authentic assessment, namely an assessment

of students' abilities to carry out tasks in real life (Mudhakiyah et al., 2022). Students are asked to use the knowledge and skills obtained from learning in carrying out tasks in real situations. According to Kusnandar (2007), to measure the psychomotor domain, the indicators used are adjusted to the type of activity carried out (Juvitasari et al., 2018).

The facts in the field are that teachers have carried out performance assessments authentically, but it is suspected that they have not assessed them based on psychomotor indicators in experimental learning such as practical activities. This is reinforced by the results of the researcher's interview with a teacher at Madrasah Aliyah Negeri 1 Kampar named Melva Suryani. He said that assessments of psychomotor abilities are usually only assessed based on fleeting observations during the teaching and learning process in the classroom.

The same problem is explained in the research of Kusumaningtyas et al. (2018). Assessments carried out by teachers are usually based only on student activity. So the assessment carried out does not cover all the expected chemistry subject competencies (Kusumaningtyas et al., 2018).

Based on research by Santri Widia Astuti et al. (2018), the results of interviews with teachers at schools were that teachers confirmed that schools rarely measure skills other than students' cognitive skills. Apart from that, usually practicum guides in schools only use tools and materials which mostly come from laboratories, which are generally not well known to students. So students do not relate learning to everyday life. Teachers are of course required to include student activity in the learning process, namely by implementing innovative learning methods, one of which is daily life -based practicum. (Astuti et al., 2019)

One of the chemistry materials taught in school is reaction rates. The reaction rate is defined as the process of changing concentration per unit time (Mudhakiyah et al., 2022). In the reaction rate material there are many concepts that can be found in everyday life. The difference in work procedures between reaction rate

material and other material results in differences in psychomotor abilities that can be observed and assessed.

Method

The research method used in this research is a non-experimental quantitative method with descriptive research type. The population in this study was all class XI MIA Madrasah Aliyah Negeri 1 Kampar in the 2022/2023 academic year. The sample in this study were students from class XI MIA 2 Madrasah Aliyah Negeri 1 Kampar in the 2022/2023 academic year with a sampling technique using purposive sampling technique. Data collection techniques in this research used performance assessment sheets and interviews. The performance

assessment sheet in this study uses a rating scale with a range of 1-5. The results will be processed using quantitative descriptive analysis techniques and clarified based on the psychomotor domain and indicators. The score obtained is converted into a percentage value based on the following formula where P is the percentage number, R is the raw score, and MS is the maximum score.

$$P = \frac{R}{MS} \times 100$$

Based on the data obtained from the analysis of the performance assessment sheet, it is then interpreted by giving categories as in the following Table 1.

Table 1.
Score Interpretation Category

No.	Score Range	Categories
1.	81-100	Very good
2.	61-80	Good
3.	41-60	Sufficient
4.	21-40	Poor
5.	0-20	Very poor

This study measured psychomotor abilities based on the psychomotor domain and psychomotor indicators in 4 experiments on factors that influence

reaction rate. The psychomotor indicators assessed in this study are presented in Table 2.

Table 2.
Indicators of Psychomotor Ability

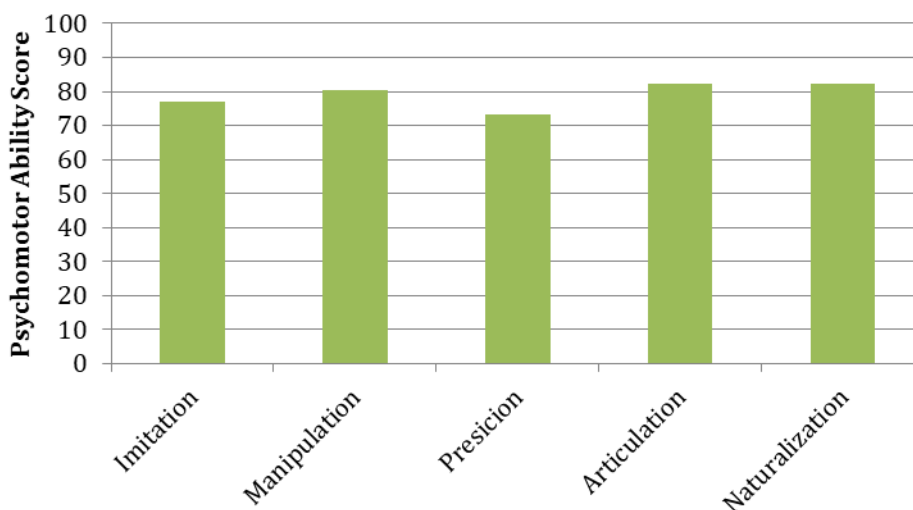
No.	Psychomotor Domain	No.	Psychomotor Indicators
1	Imitating (P1)	1	Select the type of tool used
		2	Determine the materials used
2	Manipulation (P2)	3	Assembling experimental equipment
		4	Splits and refines solid substances
		5	Record the results of the experiments carried out
3	Precision (P3)	6	Weighing solids
		7	Measuring the volume of liquids
4	Articulation (P4)	8	React with experimental materials
		9	Using a stopwatch
		10	Observe the reaction that occurs
5	Naturalization (P5)	11	Washing and drying tools
		12	Clean the work desk

Result and Discussion

The domain of psychomotor abilities according to Harrow (1972) There were five things measured in this study, namely imitation, manipulation, precision, articulation, and naturalization (Djulia et al.,

2020) . Based on the results of data analysis, the average score for each domain was obtained for all experiments which can be seen in Figure 1.

Figure 1.
Average Score of Students' Psychomotor Ability Domain



Based on the data in Figure 1, it shows that the highest average score in the psychomotor ability domain is in the naturalization domain at 82.26 in the very good category and the lowest average is in the precision domain at 73.18 in the good category. In the realm of manipulation, the average student can carry out the aspects carried out in the experiment, namely washing and drying the experimental equipment and cleaning the work table very well. This proves that when using daily life-based practicums , waste or waste from experiments is easier for students to clean because they use less toxic materials (Sajeena, 2021) . Meanwhile, in the realm of precision, students are a low in carrying out the experimental aspect of measuring the volume of liquid using a measuring cup. Of the entire experiment, about 29% of students read the scale on a measuring cup with their eyes not aligned when looking at the meniscus scale and are less careful in reading the scale. This is due to the lack of experience of students carrying out practical

activities, considering that the results of interviews conducted by researchers with 10 students stated that they had never carried out daily life -based practical activities before.

The same thing also happened in Juvitasari's (2018) research, in the skill of measuring the volume of liquids, it was found that 57% of students could read the scale on a measuring cup with their eyes at eye level using a concave meniscus, while 43% of other students read the scale on a measuring cup using a concave position. eyes that are not aligned and use a convex meniscus. This shows that students are less careful and do not know how to measure solutions properly and correctly. Students' abilities on the reading skills scale are categorized as sufficient (Juvitasari et al., 2018) . Meanwhile, in Enawaty's (2020) research, students' skills in using measuring cups in acid-base titration practice were obtained by 66.67% of students measuring the volume of solution in measuring cups by reading the bottom meniscus and 33.33% of

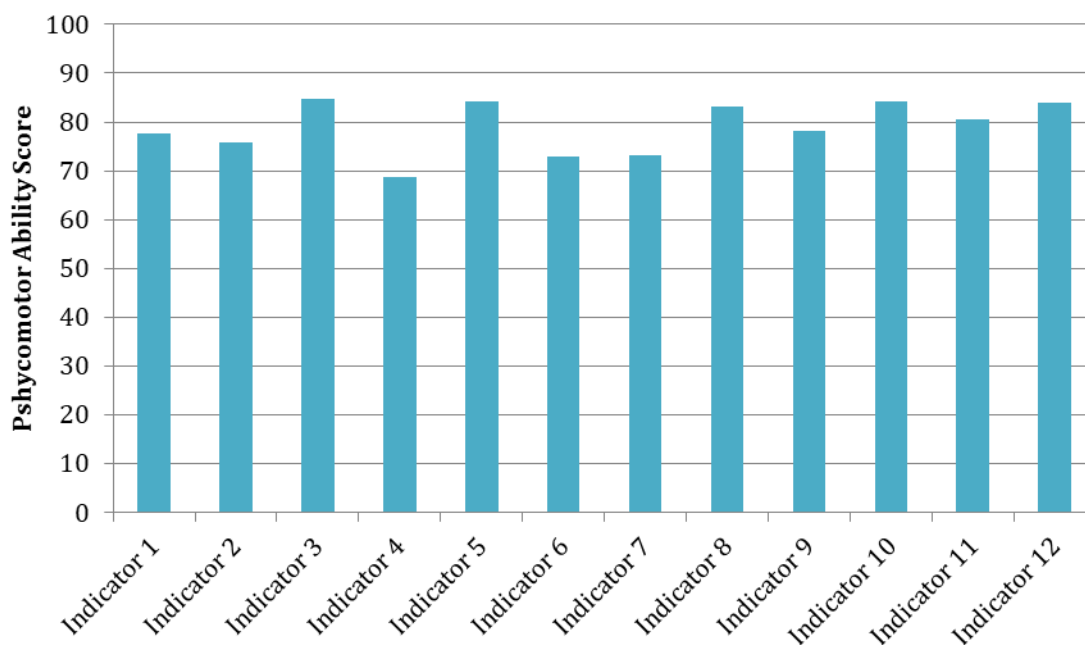
students reading the top surface of the solution. Based on the results of the interview, students who read with the upper meniscus know the theory that to see the volume of the NaOH solution they look using the lower meniscus, but after visualizing with pictures, they show the top surface of the solution to see the volume of the solution. This shows that students do not know which is the lower meniscus. The next aspect to be observed is looking at the measuring cup scale with the eye level with the meniscus of

the solution. This aspect has a correct percentage of 87.5%. As many as 12.5% of students do not look parallel but instead look at the measuring cup scale with their eyes above the surface of the solution (Enawaty, 2020).

Assessment of psychomotor abilities is also carried out based on psychomotor indicators. The average score of psychomotor ability indicators for all trials can be seen in Figure 2.

Figure 2.

Average Score of Indicators of Students' Psychomotor Abilities



Based on the data in Figure 2, it shows that the highest average psychomotor ability score is in indicator 3, namely assembling experimental equipment, amounting to 84.84 in the very good category and the lowest score is in indicator 4, namely splitting and smoothing solid substances, amounting to 68.71 in the category Good. In indicator 3, 65% of students were able to assemble a tool, namely attaching a balloon to the mouth of a plastic bottle, in an experiment on the effect of concentration on reaction rate very well. The same thing was obtained in research by Gupitasari (2019), the ability to install distillation equipment made from waste

obtained a score of 87.50 in the very good category (Gupitasari et al., 2019). Apart from that, in Enawaty's (2020) research, students' ability to assemble titration tools was 76.38% in the category of good psychomotor skills. Meanwhile, in indicator 4, students got the lowest average score because many students could not split vitamin C tablets equally. This happens because students do not pay attention to the size of vitamin C when dividing so that the final result does not comply with the provisions in the practical guidelines, namely that vitamin C is divided equally.

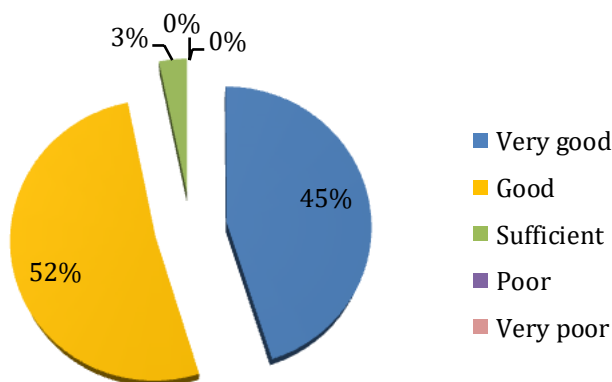
Overall, the average gain in psychomotor skills of students in daily life -

based practicum was 79.61. The recapitulation data on the acquisition of students' psychomotor ability scores in daily life -based practicums are grouped into five categories, namely very good, good,

sufficient, poor, and very poor with percentages respectively (81-100%), (61 - 80%), (41- 60%), (21 - 40%) and ($\leq 20\%$) (Supardi, 2015) which can be seen in Figure 3.

Figure 3.

Average Percentage of Students' Psychomotor Abilities



Based on the data in Figure 3, students' psychomotor abilities in daily life -based practicum learning are on average in the good and very good categories. This proves that using daily life -based practical learning can support students' psychomotor abilities.

The research data is also supported by the results of interviews with 10 students. Based on the interview results, it was found that all students had never used daily life-based practicums in class, therefore all students were interested in carrying out learning using daily life -based practicums . Students said that by using daily life- based practicums , learning became easier and provided benefits when studying. All students also felt that using this daily life -based practicum made students more motivated in following the reaction rate material and created more curiosity compared to the usual daily learning process so that learning outcomes could improve. Of the 4 experiments carried out, as many as 60% of students felt difficulty during the learning process in experiment 1, the effect of concentration on reaction rate and the other 40% of students did not experience difficulty. As many as 30% of students felt

difficulty during the learning process in experiment 2, the effect of temperature on reaction rate and the other 70% of students did not experience difficulty. As many as 20% of students found it difficult during the learning process in experiment 3, the effect of catalysts on reaction rates and the other 80% of students did not experience difficulties. As many as 70% of students felt difficulty during the learning process in experiment 4, the effect of surface area on reaction rate, while the other 30% of students did not experience difficulty. Of all the students interviewed, 90% said they wanted to use daily life -based practicums in every chemistry lesson, only 10% of students did not want to use daily life- based practicums because they found it difficult to work with groups.

The results of this analysis explain that students feel they can understand the material on reaction rates using daily life -based practical methods . Chemistry practicum activities using daily life -based practicum methods carried out in this research open up space for students to improve their psychomotor skills. In accordance with Sumarni (2016), stated that through the application of project-based

learning methods can improve students' psychomotor abilities (Simanjuntak & Utama, 2019).

Several previous researchers have assessed psychomotor abilities using practical methods using laboratory tools and materials. As a comparison, in Nurbaiti's (2018) research, it was found that the results of students' psychomotor abilities in the burette rinsing stage indicator had the highest percentage in the very poor category, namely 92.7% and the percentage in the good category was 8.3%. This is because only a few students rinse the burette with the standard solution and some others do not rinse the buret with the standard solution (Nurbaiti et al., 2018). In research by Gupitasari et al (2019), the results of students' psychomotor abilities for the readiness aspect of practical tools and materials and working solutions were in the low or poor category. This is because students do not yet properly understand the components of teaching aids and their functions (Gupitasari et al., 2019). Thus, daily life -based practical activities have several advantages, including being safer for students, saving costs, tools and materials that are easier to use, do not cause dangerous chemical waste (Sajeena, 2021) and students gain the ability to experiment directly. However, building students' psychomotor skills requires time and requires continuous habituation. This can also be a consideration for teachers to continue carrying out daily life -based practical learning on other chemistry materials at school.

Conclusion

Overall, the average acquisition of students' psychomotor abilities was 79.61 in the good category. The psychomotor abilities of students with the highest average score are in the naturalization realm and the lowest are in the precision realm. The psychomotor indicator with the highest average score was assembling experimental tools and the lowest was splitting and smoothing solid substances. *Daily life* -based practicum can support and train students'

psychomotor skills. Apart from that, *daily life* -based practicums make the learning process more interesting and easier. This is proven by the average acquisition of students' psychomotor abilities in the good and very good categories because *daily life* -based practicums are safer for students, tools and materials are easier to use, and do not cause dangerous chemical waste.

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