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Analysis of Student Learning Style Tendencies Reviewed from Learning Independence In Physics Learning

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ABSTRACT
The research aims to 1) describe student learning style profiles; 2) describe the profile of student learnig independence in physics learning; 3) describe the tendencies of leraning styles of SMPN student in Singkawang City in terms of learning independence in physics learning. This type of research is survey research using descriptive data analysis techniques where research data will be displayed using pie charts and tables. Respondents in this study were taken using a cluster sampling technique from the entire population, which is all state junior high school students in Singkawang City. The data collection technique used in this research uses a questionnaire, namely a questionnaire on student learning style tendencies and a questionnaire on learningindependence in physics learning. The research results show that the combination of multimodal learning style (65%) dominates unimodal learning style (35%). Based on the type learning style, it shows that 1 in 3 respondents have the VARK learning style, which makes it the most dominant type. The distribution of learning independence data forms a bell curve indicating that the data distribution tends to be normal. Analysis of learning style data in terms of the learning independence category shows that there is a tendency for the VARK learning style type to be dominant in each category.

INTRODUCTION

In the learning process, important elements are needed to achieve the desired goals. The learning proscess is basically a process of learning interaction between teachers and students. Teaching and learning interaction is a reciprocal relationship between teachers and students which must be demonstrated educative (educational) relationship (Inah, 2015).

What allows teachers to interact with their students is that teachers can recognize the characteristics, potential and abilities of students by knowing what factors influence the learning process. One of the factors that influences the learning process in class is learning style. Each student has their own learning style, so students' abilities to understand and absorb lessons are definitely different (Ghufron dan Risnawati, 2014).

By knowing students' learning styles this difference really helps teachers everywhere in conveying information in different ways to make it easier to interact with all their students. Learning style is the key to developing performance at work, at school and in situations between individuals (Deporter, 2015).
Fleming (2018) developed a learning style model VAK becomes VARK, namely visual, auditory, *read/write*, and kinesthetic. Students with a visual learning style tend to learn through visual aids and pictures, students with an auditory learning style tend to learn through listening ang speaking, students with the *read/write* learning style tends to learn through reading ang writing activities, and students with the kinesthetic learning style tend to learn through physical activity and experience.

Students who only have one learning style modality are called unimodal, while students who tend to have more than one style modality learning is called multimodal. In unimodal learning styles, there are four learning styles, namely V, A, R. and K. In multimodal combinations, they are divided into bimodal, trimodal, and quadmodal. Bimodal is a combination of two learning styles such as VA, VR, VK, AR, AK, and RK. Trimodal can be interpreted as a combination of three learning styles, namely VAR, VAK, VRK, and ARK. While the quadmodal combination is having the four learning styles are the VARK learning style types.

At the junior high school level, information about learning styles will help students build learning awareness, improve individual abilities, explore opportunities during classroom learning, and increase student understanding. Knowing students' learning styles can help them plan more effective learning. Students who are independent in learning tend to be better at adapting their learning style to their needs so that it is easier for them to identify the most suitable learning strategies for themselves (Kolb, 2005).
Independent learning is a need and demand for education today. Sundayana (2015) learning independence is a process where each individual can take their own steps in learning, with or without the help of others, in terms of determining their learning activities such as formulating learning goals, learning resources (either in the form of people or materials), identifying learning needs and controlling own learning process.

Suhendri, (2014) independent learning is a learning activity carried out by students without depending on other people, whether friends or teachers, in achieving learning goals, namely mastering material or knowledge well with their own awareness so that they can apply their knowledge to solve problems in everyday life.

Based on the definition above, it can be concluded that student learning independence is a trait or attitude possessed by a student where in the learning process students are able to act independently in determining learning goals, learning strategies, responsibility in learning and students can evaluate themselves in various situations. the learning environment.

METHOD

This type of research is survey research. This research was conducted at SMPN Singkawang City. The research was carried out in the odd semester of the 2023/2024 academic year.

2.1 Partisipant

To determine the sample size in this study, the Krejcie and Morgan equation (1970) was used, which is a statistical formula for determining or calculating the minimum sample size from a population that takes into account the level of error.
The Krejcie & Morgan equation (Krejcie, R.V., & Morgan, D.W., 1970) is formulated as follows:

$$n = \frac{X^2.N.P(1-P)}{e^2(N-1) + X^2.P(1-P)}$$

Where:
n = number of samples
N = total population
X^2= Chi Square Value

e = degree of accuracy expressed in proportion
P = population proportion

So the participants involved in this research were 382 junior high school students. Participants came from three state junior high schools in Singkawang City, where the selection of schools in this study was carried out randomly.

2.2 Instrument

The data collection instrument in this research used a questionnaire. This research uses two questionnaires, namely a student learning style tendency questionnaire adopted from VARK Learn Limited (2023) and a student learning independence questionnaire in physics learning adopted from research (Rusmini, M 2023). The scale used in making answer choices on this learning independence questionnaire is the Likert scale.

2.3 Data Analysis

The data analysis technique in this research is descriptive data analysis technique. Danuri dan Maisaroh, (2019) descriptive techniques are techniques used to analyze data by describing or illustrating the data that has been collected as it is without making general conclusions or generalizations. Analyzing descriptive data, only focuses on the existing data and explains what happened.

The initial stage in analyzing the data in this research was to correct the results of the answers to the student learning tendencies questionnaire and the learning independence questionnaire in physics learning. To correct the questionnaire for learning style tendencies, this is done by uploading the answers to the VARK Learn Limited web page, (2023). In processing and analyzing student learning independence questionnaire data, after calculating the total score from each questionnaire, the next step is to determine the average value (mean - M) and standard deviation (SD) of the data. The average value and standard deviation are used to determine the category of student learning independence by determining the score limits based on the references in Table 1 as follows:

Table 1
Category of student learning independence

No	Category	Score
1	Low	$X < (M - 1SD)$
2	Currently	$(M - 1SD) \leq X < (M + 1SD)$
3	Tall	$X \geq (M + 1SD)$

(Ramon Muhandaz, 2018)

The final stage in this research is to analyze data on learning style tendencies in terms of student learning independence by correcting the results of the second questionnaire. Furthermore, the results of the learning independence questionnaire will be analyzed in each category and grouped based on the same learning style tendencies. These three categories of levels of learning independence will be explained in the context of student learning style tendencies. To present the data obtained, the information will be presented in the form of a pie chart.

RESULTS AND DISCUSSIONS

1 Result

3.1.1 Student Learning Style

Based on the results of the analysis of questionnaire answers from 382 students, learning styles, the percentage of student learning styles based on a combination of unimodal, bimodal, trimodal and quadmodal can be seen in Figure 1 below:

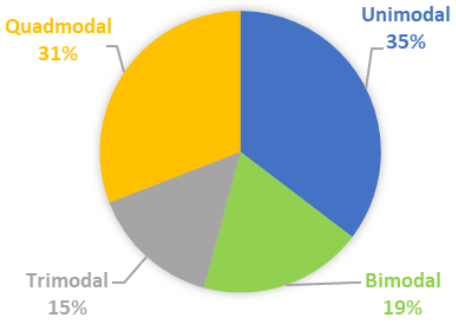

Figure 1
Combination of Student Learning Styles

Unimodal learning style reaches 35%. This means that the multimodal learning style is more dominant, namely 65%. The multimodal learning style consists of three combination patterns, namely bimodal at 19%, trimodal at 15%, and quadmodal at 31%.

Details of the overall types of student learning styles are contained in Table 2 as follows:

Table 2
Overall Student Learning Style

Combination	Type of Learning Style	Frequency	Percentage
Unimodal	V	4	1,05%
	A	56	14,66%
	R	26	6,81%
	K	49	12,82%
Sum:		135	35%
Bimodal	VA	5	1,31%
	VR	3	0,78%
	VK	5	1,31%
	AR	21	5,50%
	AK	31	8,11%
	RK	7	1,83%
Sum:		72	19%
Trimodal	VAR	5	1,31%
	VAK	8	2,09%
	VRK	2	0,52%
	ARK	42	10,99%
Sum:		57	15%
Quadmodal	VARK	118	30,89%

Sum:	118	31%
Total	382	100%

The most dominant type of learning style here is the VARK type, where this type reaches 30.9%. This number is quite far compared to type A learning style which is in second place, namely 14.6%. The next order for the largest percentage includes K at 12.8%, ARK at 10.9%, AK at 8.1%, R at 6.8%, AR at 5.5%. Meanwhile, for other types of learning styles, namely V, VA, VR, VK, RK, VAR, VAK, and VRK the figure is no more than 3%.

3.1.2 Student Learning Independence

The percentage of learning independence in physics learning in each category can be seen in Figure 2 as follows:

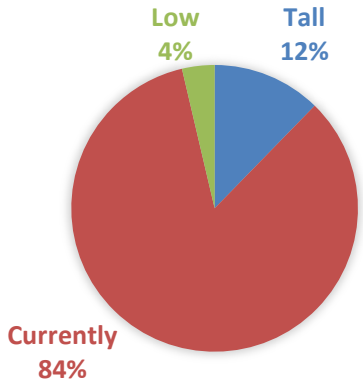

Figure 2
Percentage of Student Learning Independence Level

The majority of students have medium category learning independence which reaches 84%, while the number of students who have high category learning independence reaches 12% and low category learning independence reaches 4%.

3.1.3 Student Learning Styles from Each Learning Independence Category

3.1.3.1 Learning style with low learning independence

There are a total of 14 students who are classified as having learning independence in learning physics in the low category. Based on the combination of unimodal, bimodal, trimodal, and multimodal learning styles respectively, there are 7, 2, 1, and 4 students respectively. Details of the types of panda learning styles for each combination are included in Table 3 as follows:

Table 3
Student Learning Style in the Low Category of Learning Independence

Combination	Type of Learning Style	Frequency	Percentage
Unimodal	V	0	0%
	A	3	21,43%
	R	1	7,14%
	K	3	21,43%
	Sum:	7	50%
Bimodal	VA	0	0%
	VR	0	0%
	VK	0	0%

	AR	1	7,14%
	AK	1	7,14%
	RK	0	0%
	Sum:	2	14%
Trimodal	VAR	0	0%
	VAK	0	0%
	VRK	0	0%
	ARK	1	7,14%
	Sum:	1	7%
Quadmodal	VARK	4	28,58%
	Sum:	4	29%
Total		14	100%

The unimodal learning style in the low category of learning independence is dominated by types A and K with the same percentage, namely 21.43%. Type R is only found at 7.14%, while type V learning style does not exist at all. Then the learning style with a multimodal combination has the most dominant learning style type, namely the VARK type, which is 28.58% of the total in this category. For multimodal combinations in the bimodal and trimodal types, namely AR, AK, and ARK, they have the same percentage in this category, namely 7.14%. Meanwhile, learning styles in other bimodal and trimodal types, namely types VA, VR, VK, RK, VAR, VAK, and VRK do not exist at all in this category.

3.1.3.2 Learning style in moderate learning independence

The learning independence of students in the medium category is the highest with a total of 321 students. In this category, the number of unimodal learning styles is quite large with 113 students, followed by the quadmodal combination with 100 students and the combination of bimodal and trimodal with 61 and 47 students respectively. Details of the types of panda learning styles for each combination are included in Table 4 as follows:

Table 4
Student Learning Style in the Medium Category of Learning Independence

Combination	Type of Learning Style	Frequency	Percentage
Unimodal	V	4	1,25%
	A	45	14,02%
	R	23	7,17%
	K	41	12,77%
	Sum:	113	35%
Bimodal	VA	4	1,25%
	VR	2	0,62%
	VK	3	0,93%
	AR	18	5,61%
	AK	28	8,72%
	RK	6	1,87%
	Sum:	55	19%
Trimodal	VAR	4	1,25%
	VAK	6	1,87%

	VRK	2	0,62%
	ARK	35	10,90%
	Sum:	47	15%
Quadmodal	VARK	100	31,15%
	Sum:	100	31%
Total		321	100%

In the moderate category of learning independence, there are all types of learning styles with varying percentages. In the unimodal learning style, the largest percentage is 14.02%, namely type A. This is followed sequentially by learning style types K, R, and V, with percentages of 12.77%, 7.17%, and 1.25%, respectively.

In the multimodal learning style, the most dominant combination is quadmodal with the VARK learning style type at 31.15%. Then the ARK and AK types are quite large, with a percentage of 10.90% and 8.72%, respectively. Followed by the AR type at 5.61%. Apart from that, the percentage of other types of learning styles is no more than 2%.

3.1.3.3 Learning style with high learning independence

In the category of high learning independence among 47 students, there were 15 students with a unimodal learning style. For multimodal learning styles, 14 students are quadmodal, while bimodal and trimodal have the same number of students, namely 9 students. Details of the types of panda learning styles for each combination are included in Table 5 as follows:

Table 5

Student Learning Style in the High Category of Learning Independence

Combination	Type of Learning Style	Frequency	Percentage
Unimodal	V	0	0%
	A	8	17,03%
	R	2	4,25%
	K	5	10,64%
	Sum:	15	32%
Bimodal	VA	1	2,13%
	VR	1	2,13%
	VK	2	4,25%
	AR	2	4,25%
	AK	2	4,25%
	RK	1	2,13%
	Sum:	9	19%
Trimodal	VAR	1	2,13%
	VAK	2	4,25%
	VRK	0	0%
	ARK	6	12,77%
	Sum:	9	19%
Quadmodal	VARK	14	29,79%
	Sum:	14	30%
Total		47	100%

There are only three types of unimodal learning style in the high category of learning independence, namely type A, which is quite large, namely 17.03%, in second place is type K at 10.64% and then type R has a percentage of 4.25%. Meanwhile, type V learning style does not exist at all.

Then the learning style with a multimodal combination has the most dominant learning style type, namely the VARK type, which is 29.79% of the total in this category. In this category, the percentage for the ARK type is 12.77%, this figure is greater than other types of learning styles. The remaining learning styles VA, VR, VK, AR, AK, RK, VAR, and VAK do not exceed 5%. The type of learning style with a multimodal combination that is not in this category is VRK, which in this category is relatively small among all students.

3.2 Discussions

3.2.1 Student Learning Style

Overall, the majority of students show a tendency towards a multimodal learning style, with multimodal combination patterns (bi, tri, and quad) reaching a percentage of 65%. This figure is almost double the number of students who tend to have a unimodal learning style, which is only 35%.

Based on the data description of student learning style trends as a whole, the most dominant learning style is the VARK type, reaching a percentage of 30.9%. These findings show that almost 1 in 3 students studied has a tendency to use the four main modalities in learning styles, namely visual, auditory, read/write, and kinesthetic.

Apart from the VARK type, there are also other multimodal learning styles whose percentages are quite high, including ARK (10.9%), AK (8.1%), and AR (5.5%). Interestingly, these three categories do not involve any visual modality at all. Of all the data collected, the visual modality is indeed the least popular among the other modalities. In fact, in the unimodal learning style classification, type V shows the smallest proportion, only 1.05% of the total. This indicates that the majority of students at the junior high school level who were respondents have little preference for diagrams, graphs, maps and visual symbols which are used in many situations.

3.2.2 Student learning independence

The distribution of data on the level of learning independence shows that the number in the medium category is the majority, while the low and high categories are the minority. Thus, the data distribution is symmetrical. If the student learning independence data contains a curve, the shape can be seen in Figure 3 as follows:

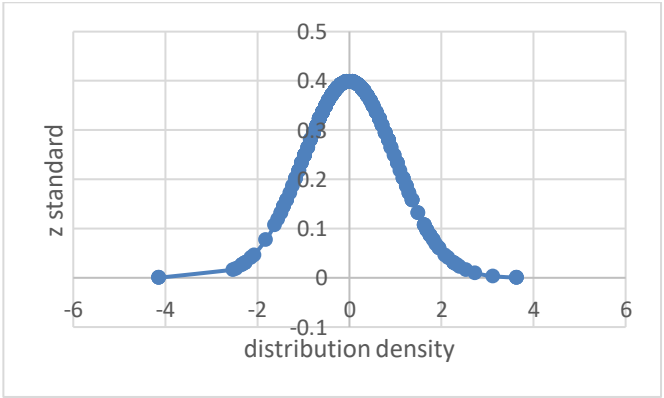

Figure 3
Learning Independence Data Curve

The overall student learning independence data curve forms a bell curve, indicating that the data distribution tends to be normal. This shows that the majority of respondents tend to be in the middle. It can be concluded that students with a majority of moderate learning independence tend to be in the middle, while students with a minority of low and high learning independence tend to be left behind.

3.2.3 Student Learning Styles from Each Learning Independence Category

The learning independence category is divided into three, namely low, medium and high categories. If viewed based on the category of learning independence, the VARK type dominates in each category of learning independence, where the percentage in each category is not less than 28%. This shows that the VARK learning style types are evenly distributed across the three categories of learning independence. For this reason, in analyzing learning styles based on these three categories, the VARK type is an exception.

Based on the results of data analysis on student learning style tendencies in terms of each category of learning independence in physics learning, there are indeed several patterns in the distribution of the data. Although these patterns are visible, they are not very striking. There were no specific learning style preferences that were clearly collected in certain categories of learning independence. This shows that learning style tendencies do not definitely or directly influence a student's level of learning independence. In other words, it cannot be guaranteed that someone with a certain learning style will definitely have or not have learning independence.

3.2.3.1 Learning style with low learning independence

The three types of unimodal learning styles in this category have quite high percentages, namely A, R, and K. One of the interesting findings here is the R learning style type, which has a percentage of 7.14%, making it the third largest among the types. others in the low category. This is interesting because overall, type R only accounts for around 6.81%. This finding can explain that students who tend to use reading and writing learning styles in this category have a greater chance of having learning independence in the context of physics learning. Related to this, teachers' teaching methods are still dominated by the reading-writing approach, such as recording material and using written teaching resources.

3.2.3.2 Learning style in moderate learning independence

In the moderate level physics learning independence category, the data distribution reflects the overall pattern, where the percentage of each type of learning style is identical to the overall data. The order of the top two most learning style data in this category is also exactly the same as the top two overall learning styles. As for type V and VRK learning styles, they are only found in the medium category. This is relatively normal because these two types constitute a very small percentage of the total data, while the medium category constitutes the majority.

3.2.3.3 Learning style with high learning independence

If we look at the data in the low category, types A and K really dominate. However, the bimodal combination with the AK type in the low category only accounted for 7.14% of the total. The AK type is less likely to fall into the high category, reaching 4.25%. This indicates that classroom learning methods may not fully accommodate the combination of these two modalities. It can be concluded that modalities A and K, which tend to have high independence, it turns out that when students have a combination of these two modalities in the AK learning style type, most of them do not have learning independence in learning physics in class.

The type of unimodal learning style that is most often found in the high learning independence category is type A. This indicates that students who have auditory tendencies have the opportunity to have good learning independence in physics learning. It can be concluded that the learning method in the classroom has fully met the needs of students who tend to learn through auditory/listening.

CONCLUSION AND SUGGESTION

The conclusion from this research can be broken down into several points, including: 1) The combined learning style profile of students is dominated by multimodal learning styles (65%), consisting of bimodal (19%), trimodal (15%), and quadmodal (31%). Meanwhile, the unimodal learning style (35%) has a fairly high percentage. Overall, the most dominant learning style is the VARK type (30.8%), which ilustrates that almost 1 in 3 students have this preference. Then orther types of learning styles which are quite prominent in number are type A (14.66%), type K (12.82%), type ARK (10.99%), type AK (8.11%), type R (6,81%), and AR type (5.50%).

2) The profile of student learning independence in physics learning is dominated by the medium category (84.03%), while the second category is high (12.30%) and then the low and low category (3.67%). 3)When viewed from the three categories of learning independence, there are several interesting things about student learning style tendencies. In the low category, one type of learning style with a quite large percentage is type A, reaching 21.43%. Apart from type A, type K also has quite a large percentage in the low category and AK combination are also more common in the low category than in the high category. One more interesting thing here is that in the high category, the percentage of type A reaches 17.03%. These findings indicate that students who have an auditory/listening yendency have better learning independence in physics learning.

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