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The influence of the environment and learning style on student GPA

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ABSTRACT

This study aimed at analyzing the direct or indirect effect of learning styles and the learning environment through independent learning on the cumulative grade point average of students in the Mathematics Education Study Program, FKIP Undana. This research was quantitative research, with the research population of all active students in the Mathematics Education Study Program. The sample in this study was 95 people. Samples were taken based on the Slovin formula with 5% of error. Data was collected through questionnaires regarding the learning environment, learning styles, independent learning, and GPA. The data collected was then analyzed by path analysis. From the results of the data analysis, it was concluded that 1) there was a significant direct effect between learning styles on student independent learning; 2) there was a significant direct effect between the learning environment on student independent learning; 3) there was no significant direct effect between learning styles on students' GPA; 4) there was a significant direct effect between the learning environment on the student's GPA; 5) there was a significant direct effect between independent learning on the student GPA; 6) there was a significant direct effect between learning styles through independent learning on the student's GPA; 7) there was a significant direct effect between the learning environment through independent learning on the student's GPA. Overall, it can be concluded that there is a significant influence between the environment and learning styles through independent learning on student GPA.

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INTRODUCTION

The Covid-19 pandemic in Indonesia has drastically changed the learning system from a face-to-face to an online learning system. Since the emergence of the Covid-19 case in Indonesia, the Government through the Ministry of Education and Culture and the Ministry of Religion of the Republic of Indonesia implemented a study and work-from-home policy in mid-March 2020. Many campuses, including Nusa Cendana University, which was not used to online lectures, have been forced to change the system to online lectures. This causes learning to be less efficient, and more difficult for students to understand the material provided by the lecturer due to its lack of interaction between lecturers and students, it is more difficult for students to ask questions about material they do not understand and the lack of student concentration when learning is carried out online (Limbong & Simarmata, 2020; Mastuti,

2020). In accordance with the curriculum reference, courses consist of various types, namely theories, practicum, theoretical and practicum courses, as well as practical fieldwork (DIKTI, 2014; Rusdiana & Nasihudin, 2018).

With the stay-at-home policy enforced by the government, all activities were limited. Such as educational activities at schools, and in tertiary institutions which were forced to carry out from home until the end of 2020. This policy encourages students to look for new innovations that can be used in learning activities from home. Not all regions in Indonesia can enjoy an uninterrupted internet connection and not all students in Indonesia have smartphones. Rather than helping students understand the material, this has a stressful impact on students.

The implementation of the online learning process is expected to increase independent learning, where students are required to maximize their time at home by studying independently. This is very important because the face-to-face learning process is very limited by space and time. Independent learning is a learning method or process in which students have rights and control over the learning they do, they learn by their own actions, direct, organize, and assess their own learning (Livingston, 2012). Self-regulated learning is a learning activity that originates from the students themselves following predetermined goals (Ananda, 2019). Self-regulated learning is a process of careful design and self-monitoring of cognitive and affective processes in completing academic tasks (Nurhafsari, 2019; Patiung, 2016; Sudiana et al., 2017; Zamnah, 2017).

Self-regulated learning will affect the success of the experience in the learning environment (Bell & Rothberg, 2004). Almost the same as this opinion Yates (2002) states that independence has an influence on learning mathematics so that students can succeed in the process of learning mathematics with independent learning.

Independent learning can be defined as students' interactive behavior to plan, organize, and evaluate during their learning. Mardianto (2012) defines self-regulated learning as the ability to learn based on a sense of responsibility, self-confidence, initiative, and self-motivation with or without the help of other people who are relevant to mastering certain competencies, both in terms of knowledge, skills, and attitudes to solve learning problem. Mulyaningsih (2014) stated that independent or self-regulated learning is a learning activity carried out by students with little or without any help from outsiders.

Based on the views of these experts, it can be concluded that independent learning or self-regulated learning is a situation where students are required to be more independent in learning and be able to maximize their time effectively so that they are not depending on other people. Thus, what is meant by independence in this study is the behavior of learners (students) in carrying out activities or learning activities in real terms by not relying on other people so that the learner is able to study independently, can determine how to study well and able to maximize time in his learning activities. This means that the learner is responsible for all actions and decisions in the learning process and is able to execute the decisions made. In addition, in developing learning abilities students must have an attitude of independence that is not only needed in formal learning but also in non-formal learning. Furthermore, independent learning is useful for equipping students so they could be ready to face competition in the work, especially during the 21st century and the era of globalization. Therefore, it is not surprising that the realization of independent learning is one of the goals of education in most countries, especially higher education because it is a characteristic of the maturity of a learner in his learning activities (Aitken & Balapumi, 2012; Mckendry & Boyd, 2012; Ros et al., 2012). If students can develop their independent learning abilities, the learning outcomes achieved will be of higher quality, originality, and long-lasting (Leung et al., 2019).

Every student certainly wants to perform well in his class because their success will be determined by the learning process they have attended and their exploration about success and failure in the educational goals or success that have been achieved by an educator. The factors that influence students' learning achievement are internal and external factors. Internal factors are factors that come from their selves, while external factors are factors that come from outside and one of them is the learning environment.

The learning environment is one of the important components in the learning process. Learning environtment have a major impact on student cognition, socio-emotional, and physically development Florescu (2020). The learning environment should be a part that gets the attention of students in learning activities. The learning environment is the all contents that are interconnected to the learning activities.

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It needs to be well laid out in order to support learning activities so that it can increase the comfort feeling of students to carry out learning activities.

Saroni (2006) asserted that the "learning environment" is everything related to where the learning process is carried out". The learning environment according to him includes two main things; the physical environment and the social environment. The physical environment is the environment around students, in the form of physical facilities, both within the school and around the school, including the community. In this case, more emphasis on the physical environment in the classroom, such as learning tools or media. The physical environment is a source of satisfaction, complaints, and a symbol or embodiment of deep achievement. Furthermore, Syah (2011) divides the environment only into two major groups involved social and non-social environment. The social environment consists of the school social environment, student social environment, and family environment. This division is almost similar to the first, except that researchers consider this division to be more flexible, simpler and more in scope because Muhibbin groups everything that is not socially related into non-social environments, such as school buildings, residential houses, learning tools, learning resources, weather conditions, lighting, study time, and others.

Barnett & Casper (2001) argued that human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact, it means that the human social environment includes the whole physical environment, social relations and cultural environment which is defined as a group of people with certain functions and interact with each other. The social environment also includes all individuals, groups, organizations and systems with which one relates. As stated by Zastrow & Kirst-Ashman (1988) the social environment also includes the all-individuals groups, organization, and system with which a person comes into contact. Likewise in the teaching and learning process, the environment is a source of learning that has a lot of influence on the learning process that takes place in it.

In addition to the learning environment, there are other factors that affect student academic achievement, one of which is student learning styles. Learning style is defined as a combination of a person's way of absorbing knowledge and how to organize and process the information or knowledge obtained (Sukadi, 2008). The learner's learning style also influences their academic achievement. This shows how students proceed the information they acquired, analyze it for further use in everyday life and are able to solve real problems.

Learning style has a very important role in every implementation of learning activities, because learning style is a characteristic that remains and needs to be owned by students in absorbing information. Ghufron & Risnawita (2012) defines learning styles as preferred ways of thinking, processing, and understanding information. Lehmann & Ifenthaler (2012) state that learning style is a unique way of learning for students. This unique way is individual way which is often not realized by students, which after being formed will stay for a long period. This distinctive way of learning affects the ability of students to understand and absorb lessons (Riyanto, 2010).

Learning style is a specific pattern of behavior in receiving new information and developing new skills, as well as the process of storing new information or skills. Learning style is defined as a combination of a person's way of absorbing knowledge and how to organize and process information or knowledge obtained (Sukadi, 2008). Furthermore, Porter & Hernacki (2014) argue that learning style is a combination of how it absorbs, how it organizes and processes the information. A person's learning style is key to developing performance at work, at school and in interpersonal situations.

Research related to learning styles has been carried out by Wahyuni (2017) who found that the types of learning styles in mathematics education are dominated by auditory and visual types. Bire et al. (2014) in his research found that there was a significant influence between learning styles (visual, auditory, and kinesthetic) on learning achievement. Learning style can be summed up as a learner's way or strategy in absorbing information from various learning sources which then proceed and transmits the information acquired to solve the problems.

This study looks at the direct effect of learning style and learning environment variables on GPA and the indirect effect of these variables through the independent learning variable. Direct influence or relationship occurs when one variable influences another variable without a third intervening variable the relationship between the two variables (Khuzaini, 2018). Furthermore, the influence or indirect relationship is if there is a third variable that mediates the relationship between the two variables (Ardini, 2018).

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METHOD

This study uses a quantitative approach, therefore statistical calculations and analysis are needed. This paper aims to find out the effect of the environment and learning styles through independent learning on the GPA scores of mathematics education students. The population of this study were all active students of Mathematics Education Study Program at Nusa Cendana University, with a research sample of 95 active students who are in the even semester of 2022 (Semester II-VI). Sampling was based on the Slovin formula with an error tolerance of 5%, so that the sample selected was 95 students with details in the second semester: 39 students, fourth semester: 26 students, and sixth semester: 30 students.

The variables in this study consisted of independent variables, variables intermediary, and the dependent variable. The independent variables include the environment and learning styles, the intermediate variable is independent learning, and the dependent variable is the cumulative grade point average. Research data was collected using a questionnaire instrument to measure the influence of the environment and learning styles through independent learning on the GPA scores of mathematics education students. The questionnaire instrument given uses a Likert measurement scale. For items with positive statements, the scale used is: Always = 4, Often = 3, Rarely = 2, and Never = 1. For items with negative statements, the scale used is: Always = 1, Often = 2, Rarely = 3, and Never = 4.

The research questionnaire indicators used to measure the influence of the environment and learning styles through independent learning on the GPA scores of mathematics education students are shown in Table 1, Table 2 and Table 3.

Table 1. Indicators and learning environment grids

Variable	Indicators	Grids	Questionnaire Items
Learning environment	Home environment	How to educate parents	3
		Relations between family members	3
		Home atmosphere	3
		Parents attention	3
	Campus environment	Lecturer teaching method	3
		Relations between students and lecturers	3
		The relationship between students and students	3
		Supporting facilities and infrastructure on campus	3
	Community environment	Student activities in society	2
		Friends get along	2
		Mass Media	2

Table 2. Indicators of learning styles

Type of Learning Style	Indicators	Questionnaire Items
Visual	How to take notes	5
	Neatness	5
	Regularity	5
	Accuracy	5
Auditorial	Clarity in speech	5
	How to read	5
	How to remember information	5
	How to concentrate	5
Kinesthetic	How to learn	5
	Getting bored	5
	Sitting position in class	5
	liveliness	5

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Table 3. Indicators and independent learning grids

Variable	Indicators	Grids	Questionnaire Items
Independent Learning	Initiative	Plan something yourself	5
		Troubleshoot yourself	5
	Have a Sense of Responsibility	Take risks and decide for yourself	5
		Exercising own rights and obligations	5
	Self-confident	Do something on your own accord	5
		Feel what you are doing is right	5
		Feel firm	5

The learning environment questionnaire instruments, learning styles and independent learning are proven by the validity of the content and construction. The validity of the questionnaire instrument is proven by means of review by judgment expert. The expert proves the validity by assessing the conformity of the achievement indicators with the statements in the questionnaire. The questionnaire instrument in this study was validated by two experts. Construct validity was obtained from trials conducted on non-sample students by analyzing exploratory factors (AFE). Criteria for factor analysis by looking at the KMO Measure of Sampling Adequacy value of more than 0.5 with a significance value of less than 0.05.

The study environment questionnaire trial data yielded a KMO value of $0.678 > 0.5$, the learning style trial data yielded a KMO value of $0.475 > 0.5$ while the results of the analysis of the independent learning questionnaire trial data yielded a KMO value of $0.501 > 0.5$. The reliability of the questionnaire instrument used Alpha Cronbach (α). The results of the analysis of the reliability coefficient of the study environment questionnaire instrument before treatment was 0.721 and after treatment was 0.767. The results of the analysis of the reliability coefficient of the learning style questionnaire before treatment was 0.688 and after treatment was 0.680. The results of the analysis of the reliability coefficient of the independent learning questionnaire before treatment was 0.836 and after treatment was 0.875.

The data collected is then tabulated or recapitulated and analyzed with the analytical tool used is path analysis. Dachlan (2014) describes path analysis as a class of multivariate statistical techniques used to identify the underlying structure of the matrix of interrelationships (correlation) between a large number of variables. Analysis requirements test is used before conducting research data analysis. The analysis requirements test used is the normality test. The normality test is determined based on the parameters if the sig. greater than (>) 0.05, then the data is classified to be normally distributed. Hypothesis testing is carried out with the criterion that if the value of Sig.(p-value) < α then the path coefficient is significant, otherwise the path coefficient is not significant. Significant level (α) = 0.05.

To measure the value of the path analysis is carried out with the help of the SPSS application by fulfilling the assumptions of factor analysis, namely: (1) Correlation between independent variables. The correlation between independent variables must be strong enough; (2) Partial Correlation. The magnitude of the partial correlation, the correlation between two variables by assuming the other variables remain, must be small. In SPSS detection of partial correlation is provided via the Anti-Image Correlation option; (3) Testing the entire correlation matrix (correlation between variables), which is measured by the Bartlett Test of Sphericity or Measure Sampling Adequacy (MSA). This test requires that there is a significant correlation between at least several variables; (4) The assumption of normality of the variables or factors that occur is met. After all these assumptions are met, it is continued with factor analysis.

RESULTS AND DISCUSSION

Before conducting a factor analysis of the variables studied, an analysis is carried out regarding the assumptions that must be fulfilled in the factor analysis. The results of the correlation analysis between variables are stated to be quite strong.

Table 4. Correlation between independent variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.763
Bartlett's Test of Sphericity	Approx. Chi-Square	$8.510E4$
	df	6
	Sig.	.000

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Based on the KMO and Bartlett tests, it can be seen that if the sum of the squares of the partial correlation coefficients among all pairs of variables is small when compared to the sum of the squares of the correlation coefficients, then the KMO value will be close to 1. The KMO value is considered sufficient if it is more than 0.5. The results showed that the value of the Kaiser Meyer Olkin Measure of Sampling was 0.763. Thus, the KMO requirements meet the requirements because it has a value above 0.5, with a significance = 0.000 meaning that each variable has a strong correlation.

Tabel 5. Communalities

Variable	Extraction
Learning Environment	.894
Learning Style	.783
Independent Learning	.775
GPA	.748

From table 5 above it shows that the 4 variables tested meet the requirements of communality that is, greater than 0.5 (community > 0.5). The learning environment variables that can be explained by the factors formed was 89.8%, the learning style variables that can be explained by the factors formed was 78.3%, the independent learning variable is explained by the factors formed was 77.5%, the cumulative grade point index variable explained by the factors formed was 74.8%.

The results of the Goodness of Fit (GoF) test are obtained by multiplying the average root value of the communalities with the average root value of r-square, which can be seen from table 5. From the GoF calculation results above, a value of 0.538 is obtained so it can be concluded that the model has a GoF which is larger and the greater than GoF value, which more appropriate in describing the research sample.

Based on the normality test performed, the Asymp results were obtained. Sig. for the learning environment variable of 0.200; learning style of 0.200; and independence of 0.300; and a GPA of 0.190. The result of Asymp .Sig value is greater than (>) 0.05. This means that the research data is normally distributed. The normality test results are shown in Table 6.

Table 6. Normality test

Variable	*P*	Decision
Learning Environment	0.200	Normal
Learning Style	0.200	Normal
Independent Learning	0.300	Normal
GPA	0.190	Normal

The results of the analysis of the path coefficient of Model 1 between the variables of the learning environment and learning styles on independent learning can be seen in table 7.

Table 7. Path coefficient of first model

Variable	Coefficient	Sig
Learning Environment	0.524	0.000
Learning Style	0.478	0.000

It can be seen that the path coefficient of Firest Model is the significance value of the two variables; X1 (learning environment) = 0.000 and X2 (learning style) = 0.000 is less than 0.05. These results conclude that the Regression Model I, namely the Learning Environment and Learning Style variables have a significant effect on the Independent Learning variable. The value of R2 or R Square is 0.358, this shows that the contribution of the learning environment and learning styles on independent learning is 35.8% while 64.2% is the contribution of other variables not included in the study. Meanwhile, the value of e1 can be found using the formula $e1 = \sqrt{(1 - 0.358)} = 0.642$. Thus, the path diagram of the structure model I is obtained in Figure 1.

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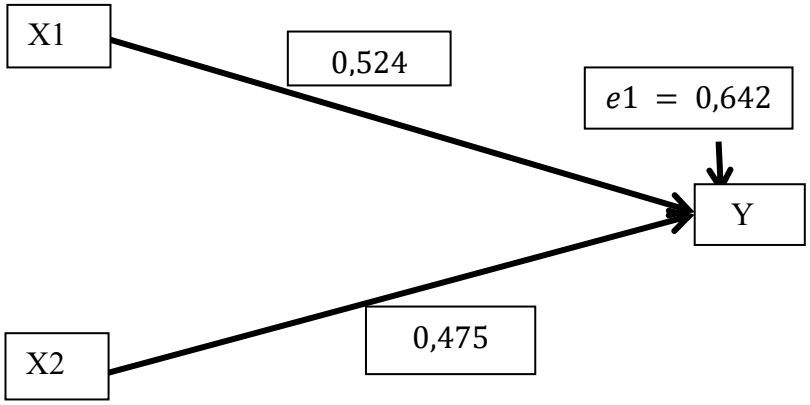

Figure 1. Path analysis first model

The results of the Model II path coefficient analysis between the learning environment variables, learning styles, and independent learning on GPA can be seen in Table 8.

Table 8. Path coefficient of second model

Variable	Coefficient	Sig
Learning Environment	1.655	0.478
Learning Style	5.785	0.012
Independent Learning	−7.585	0.004

It is known that the coefficients of the Pathway Model II show that the significance values of the three variables are X1 (learning environment) = 0.478, X2 (learning style) = 0.012 greater than 0.05, and Y (cumulative achievement index) = 0.004 less than 0.05. These results conclude that the Regression Model II, namely learning environment variables, and learning styles have no significant effect on the cumulative grade point average, while the independent learning variable has a significant effect on the cumulative grade point average. The value of R2 or R is 0.120. This indicates that the contribution of learning environment variables, learning styles and independent learning to the cumulative grade point average is 12%, while the remaining 88% is contributed by other variables not examined in this study. Meanwhile for the value of e2 = $\sqrt{(1-0.120)}$ = 0.880. Thus, a path diagram of the structure second model is obtained as shown in Figure 2.

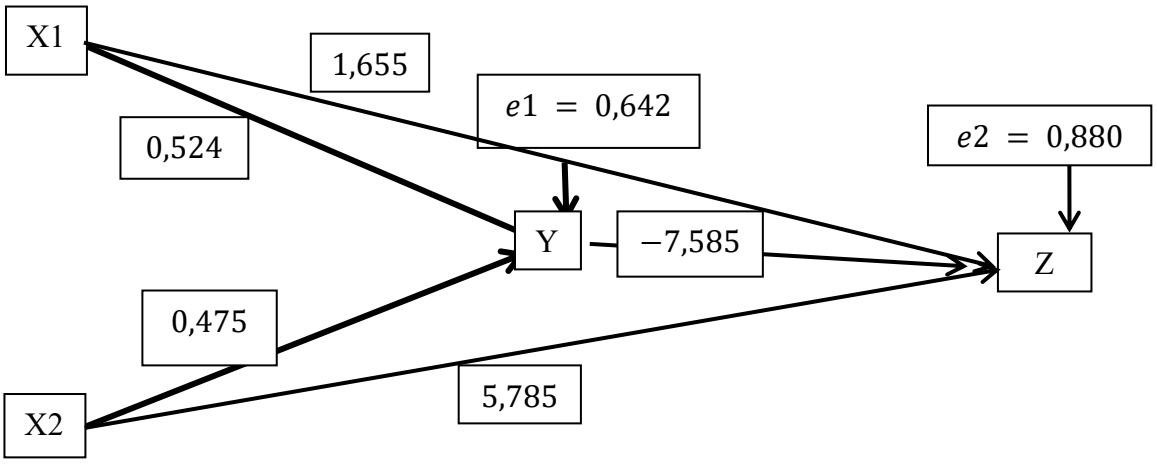

Figure 2. Path analysis second model

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Table 9. Recapitulation of direct influence, indirect influence and total influence calculations

Independent Variable	Intervening Variable	Dependent Variable	Direct Influence	Indirect Influence	Totallinflunce
Learning Environment	Independent Learning	GPA	X1 ⟶ Y 0,524 X1 ⟶ Z 1,655 Y ⟶ Z −7,585	−3,974*	−2,319**
Learning Style	Learning Environment	GPA	X2 ⟶ Y 0,475 X2 ⟶ Z 5,785 Y ⟶ Z −7,585	−3,602*	2,182**

Information:

* Multiply between the effect of X on Y with the effect of Y on Z

** Sum of X's direct influence on Z with X's indirect influence on Z through Y

From table 9 it is known that the learning environment and learning styles directly affect GPA. In addition, the environment and learning styles also have a direct effect on independent learning. The results of data analysis obtained a significance value of the learning style variable of $0.000 < 0.05$. So it can be concluded that there is a direct significant influence of learning styles on independent learning. The results of this study are in line with the earlier research conducted by Rasdjo et al. (2017), which concluded that there is a significant influence between learning styles on student independent learning.

The learner's learning style must be considered by the students because their learning style is one of the main characteristics of students that might help them to know their abilities, and their limitations as the students. Learning style is the preferred way of thinking, processing, and understanding information. Huda (2014) says that visual modalities access visual images that are created or remembered, such as colors, spatial relations, mental portraits, and images, auditory modalities access all types of sounds and words that are created or remembered, such as music, tones, rhythms, rhyme, internal dialogue, and voice and kinesthetic modalities access all kinds of created and remembered movement and emotion, such as movement, coordination, rhythm, emotional response, and physical comfort.

Based on the results of data analysis it was found that learning styles affect independent learning. The relationship between learning styles and significant independent learning can be seen from the learning styles of students. Students who have visual, auditory, and kinesthetic learning styles can have an impact the independent learning. This shows that there is a significant influence of learning styles on independent learning. Learning style is the key to develop performance at work, at school and in interpersonal situations (Rambe & Yarni, 2019).

Furthermore, it will be seen that there is a significant direct effect between the learning environment on the independent learning of Mathematics Education Study Program students at FKIP Undana. From the analysis above, it is obtained that the significance value of the learning environment is $0.000 < 0.05$. So, it can be concluded that there is a direct influence between the learning environment and independent learning. This implies that any changes occurred in the independent variable will affect the student's independent learning.

The learning environment is one of the external factors that influence very supportive towards student independent learning. This indicates that the learning environment which is included in external factors is one of the supporting factors for student independent learning. A conducive learning environment for learning will make it easier for students to acquire knowledge, and vice versa. An

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unconducive learning environment makes students unable to concentrate on studying and tends to decline the students' learning achievement. The learning environment which is divided into social environment and non-social environment (physical) can improve student achievement, this is in line with the theory from Hutabarat E.P (1995); & Sulzan Z. Arbi, (1991) which states that the learning environment consists of the social environment and the non-social (physical) environment which might affect the achievement of independent learning.

The learning environment both at home, residence or on campus greatly affects student learning achievement, because students can spend their time for studying. Therefore, it is important for parents, family, friends to pay attention to the situation or environmental atmosphere that suits the needs and conditions of the child, so that children's independent learning can be developed. This research is supported by Aisyiyah (2016) who found that there was a significant influence of learning environment on the independent learning of Jember State Polytechnic students. The same thing was explained by Erlina (2017) who concluded that there was an influence of the learning environment on the independent learning of Islamic Religious Education at SD Negeri 14 Bengkulu Selatan.

The environment has a big role in the formation of independent learning. This is because, children's development is largely determined by the interaction with their peers (peer group) as well as parental or family control. The environment is surrounds the individual's life, both in the form of the physical environment such as parents, home, playmates, and the surrounding community as well as in the form of the psychological environment such as feelings experienced, ideals, problems faced and so on (Aini & Taman, 2012). A supportive learning environment for students will certainly inspire learning enthusiasm for the students. Thus, if the learning environment supports students, it will have a positive effect on the independence of their learning.

In the next hypothesis, it will be seen to what extent the learning style has a significant direct effect on the Cumulative Achievement Index of students of the Mathematics Education Study Program, FKIP Undana. The results of data analysis obtained a significance value of learning style of $0.478 > 0.05$. So, it can be concluded that there is no direct effect of learning style on the Grade Point Average. Learning styles are very influential in a teaching and learning process, because if everyone understands their respective styles they will quickly and easily receive new information or knowledge. There are many factors that influence student academic achievement. The results of this study indicate that there is no direct influence, meaning that no matter how good a person's learning style is, if it is not supported by other factors, it will not affect their achievement. In connection with this study, there are other factors that were not examined in this study which are more influential to student learning achievement (GPA).

The results of this researcher are in line with research conducted by Suharto (2020), which shows that there was no relationship between learning styles and academic achievement. In line with this, research conducted by Japlani (2018) concluded that there was no significant correlation between learning styles and the Grade Point Average (GPA). However, this research is in contrast with the research conducted by Rahmawati et al. (2018) where the results of their research show that there was a relationship between learning styles and the cumulative grade point average (GPA) of students at the Faculty of Medicine, University of Lampung. In addition, research conducted by Sakdiah et al. (2018) concluded that there was a relationship between learning styles and GPA in students of the Faculty of Medicine, Syiah Kuala University who suffered from functional dyspepsia.

Learning styles have an important role in learning activities. Students are often forced to study in ways that are not suitable and pleasing to them, especially in terms of concentration for absorbing the information. As a result of this, this will not increase the student learning achievement as expected. In order to maximally increase their achievement, students must understand that they have different learning styles towards learning activities in responding to various ways by seeing, hearing, reflecting, memorizing, remembering, and describing. When lecturers and students can combine their learning styles, they will be able to maximize the learning process in class and can improve their academic achievement.

Furthermore, there is a significant direct effect between the learning environment and the Cumulative Achievement Index of students of the Mathematics Education Study Program FKIP Undana. The results of the data analysis obtained a significance value of the learning environment of $0.012 < 0.05$, which can be concluded that there is a direct significant influence between the learning environment on the Student Grade Point Average. Learning environment factors come from the social environment including the family environment, the social environment of students at home, and the

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social environment of the school, and the non-social environment which includes learning places, school locations, learning tools, learning resources, condition of school buildings, classrooms, cleanliness of the school environment and learning support facilities.

A conducive learning environment certainly creates a comfortable atmosphere for learning. A well-supportive learning environment conditions such as the availability of physical learning facilities, comfortable learning places, a calm atmosphere, harmonious relations with the surrounding environment can foster students' interest in learning to improve their academic achievement in the Cumulative Grade Point Average. The results of this study are in line with the study conducted by Hartini & Sukadari (2021) who concluded that there was a positive influence of the learning environment on students' social studies learning achievement. Meanwhile, Nurastanti et al. (2019) concluded that there was an influence between the learning environment on learning outcomes in fiqh subjects at Madrasah Aliyah Negeri 1 Banyuasin.

Learning activities have a very important role for improving the quality of education. The learning environment as one factor that influence student academic achievement also influences the learning activities of each student. To ensure that an education run well, a conducive learning environment is needed to create calm and comfort for students during their learning, which will help to master the material easily. According to Mariyana (2010) the learning environment is a means for students to devote themselves to activities, to be creative, until they get a number of new behaviors from these activities. In other words, the learning environment can be interpreted as a laboratory or a place for students to explore, experiment, express themselves to get new concepts and information. Meanwhile, according to Sidi (2005), the learning environment plays a very important role in creating a pleasant learning atmosphere. This environment can increase active learning. Therefore, the learning environment needs to be managed properly. It can be concluded that the learning environment is a situation of the environment where it allows students to interact well, and carry out learning activities well so that they can improve their academic achievement.

The results of the data analysis showed that the significance value of independent learning was $0.004 < 0.05$. It means that there is a direct significant influence between independent learning on the Student Grade Point Average. The real influence between independent learning and Mathematics Education Student Achievement Index makes a significant contribution in this study. The strong influence between independent learning and the Mathematics Student's GPA means that if a student's independent learning is high, the tendency for the Cumulative Grade Point Average obtained will also be high. Students who have high independent learning will try to complete all exercises or assignments given by lecturers. In addition, this study also shows that there is an indirect effect of the environment, learning styles through independent learning on GPA, which has a negative value. This illustrates that no matter how good the learning environment and learning styles of students have, if they do not have good independent learning, it will not affect their academic achievement. Therefore, student independent learning is very important to be noticed and improved by students.

Independence is one aspect of personality that is very important for individuals. The part of the brain that functions as a center for the development of intelligence, attitude, personality and memory is in the middle and back of the cerebrum. However, basically a person's personality is completely controlled by the genes in the cells of the human body. The gene will be dormant or inactive and active. If we often activate dormant genes by thinking positively, our personality will be better, so do with the independence (Nurlia et al., 2017). The research results of Rahmi et al. (2015) show that there is a fairly strong relationship between independent learning and the Cumulative Achievement Index (GPA) of Chemistry Education Students Classes of 2012, 2013, and 2014 University of Syiah Kuala, with a correlation coefficient value obtained of 0.030.

A student can be categorized as having independent learning if he or she has his or her own will to learn, able to solve problems, has responsibility and confidence in every learning process. Independent learning can be seen in students' daily habits such as the way students plan and conduct learning (Aini & Taman, 2012). There is a significant direct effect between learning styles through independent learning on the Cumulative Achievement Index of students of the Undana FKIP mathematics education study program. Based on the results of calculations or data analysis it is known that the direct effect value is 1.655 and the indirect effect is 0.524 which means that the indirect effect value is smaller than the direct influence value, these results indicate that learning styles directly affect

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the Cumulative Achievement Index of Study Program Students Mathematics education. That is, without independent learning variables, student learning styles have a direct influence on their GPA.

The results of this study are in line with research conducted by Rasdjo et al. (2017) which concluded that there was an effect of learning motivation, learning style, and independent learning on learning outcomes for PGSD undergraduate students entering undergraduate degrees at UPBJJ UT Bandung. In addition, Kartika Saragih (2014) in her research concluded that there is a simultaneous influence between independence, learning style and learning environment on the learning outcomes of class X Accounting SMK PGRI 3 Sidoarjo. However, the studies they conducted did not use factor analysis as an analytical tool. So that the conclusions drawn are only as a comparison material if the variables in this study also affect students' academic achievement both directly and through intermediary variables. The results of this study indicate that learning styles directly affect the cumulative grade point average of students in the Mathematics Education Study Program. This means that if students have different learning styles it will affect their academic achievement which means that it has an impact on the GPA that will be obtained. Although the results of the data analysis in the previous section show that there is a direct influence between learning styles on independent learning.

Overall, it can be seen that all of these variables can affect the student's grade point average. One of the characteristics of students that influence their academic achievement is learning style. Learning styles are very important and very decisive for anyone in carrying out their learning assignments, people can learn easier, when they find a learning style that suits him (Marpaung & Napitupulu, 2017). Learning style is an individual attitude that tends to settle in perceiving a certain stimulus or stimulus from the environment, then using it uniquely and personally in interacting with stimuli and sources of stimuli (Nurlia et al., 2017).

Thus, it can be concluded that learning style is one of the factors that has a direct effect on academic achievement resulting in a student's grade point average increasing or decreasing depending on the student's learning style and not depending on the independence of learning. There is a significant direct effect between the learning environment through independent learning on the Cumulative Achievement Index of students of the Undana FKIP mathematics education study program. Based on the calculation results, the direct effect value was 5.785 and the indirect effect was 0.475 which means that the direct effect value is greater than the indirect effect value. This research is in line with the study by Alfiyah (2015) who concluded that there was a positive relationship between independent learning and the Learning Environment together with the Learning Achievement of Office Administration Education Study Program students of 2010 FIS-UNY class. Furthermore, Halim & Rahma (2020), in her research concluded that simultaneously the learning environment, learning motivation and independent learning have a positive and significant impact on the mathematics learning outcomes of class XI IPA SMAN 9 Pangkep.

For the students' learning process is influenced by both internal and external factors. Internal factors involved physical and psychological while external factors refer to family, school and community. Independent learning also affects student learning achievement in addition to learning styles. This is supported by Yamin (2010) who said that independent learning is an active and participatory way of learning to develop each individual that is not related to the presence of teachers, lecturers, face-to-face meetings in class, and the presence of school friends. Independent learning is the factors that influence mathematics learning achievement from inside the learner. A student who has high independent learning will be diligent in doing his assignments individually. Conversely, a learner who has low independent learning might do his assignments by looking at the results of his friends.

Nurmalasary (2018) says that independent learning is learning independently, not depending on others. Learners must have their own activeness and initiative in their learning process to improve their learning achievement. Student independent learning arises with physical changes that can trigger emotional and cognitive changes. Independent learning, such as other psychological matters, can develop well if it well developed through a continuous training, the exercise is in the form of giving assignments without assistance. Independence will have a positive impact on children's development, so independence should be taught to children as early as possible according to the child's abilities, through independence a person can determine and choose his own direction to continue and develop a better life. The development of independence is an important issue throughout human life. Specifically, the problem of independence requires individual readiness, both physical and emotional readiness to organize, manage, and carry out their own responsibilities without much dependence on others.

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The results of this study indicate that the learning environment has a significant influence on the cumulative grade point average of students in the Mathematics Education Study Program. This means that the high and low GPA depends on the learning environment and does not depend on the student's independent learning. A conducive environment also influences the student's academic achievement.

CONCLUSION

The results of this study can be concluded that the learning style and learning environment have a direct and significant effect on the cumulative grade point average. While indirectly these variables do not affect the cumulative grade point average but affect the independence of learning. From the results of data analysis, the variable learning styles and independent learning have a more dominant influence on the cumulative grade point average of students. Thus, as a learner, it is necessary to pay attention to the environment and learning styles as well as the independence of the learner in carrying out their learning activities so that they can support their learning achievements, both academically and non-academically.

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