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Identification Students Learning Conceptions: A Comparative Study

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Abstract

The conception of learning is a psychological construct that influences learning outcomes. Therefore, many researchers have explored the concept of learning, especially in higher education. is study aims to identify students' conceptions of learning based on di erences in majors. Identifying student learning conceptions is very important for future education to help them understand the nature of learning and help them become a student aware of their duties and responsibilities. Moreover, in the end, they can guide the learning process independently to achieve maximum learning outcomes. A total of 136 voluntary respondents were taken randomly from four majors, namely veterinary education (54 students), biology education (38 students), educational technology (26 students), and educational administration (18 students). e instrument used to measure students' conceptions of learning was adapted from the conception of learning science (CoLS) developed by Lee et al. (2008). e data were analyzed descriptively and multivariately using SPSS 24 for windows at a signi cance of 5%. From the results of the analysis that has been done, it is concluded that veterinary education students tend to have mixed conceptions of learning (reproductive and constructive), and biology education and educational technology students tend to have constructive learning conceptions. In contrast, educational administration students tend to be quantitative or reproductive pro les. e di erence in majors does not a ect our participants' learning conceptions. e implications of these results are brie y described in the conclusions, limitations and recommendations.

Keywords: Conception of learning, reproductive profile, constructive profile

Introducton

The study of the concept of learning was first conducted by Saljo (Chiou et al., 2013; Chiu et al., 2016; Dikmenli & Cardak, 2010; Entwistle & Peterson, 2004; Lee et al., 2008; Rabanaque & Martínez-Fernández, 2009; Tao et al., 2019; Vermunt & Vermetten, 2004; Zhao, 2022), refers to students' understanding and interpretation of learning (Ashong & Commander, 2017), or one's beliefs about the nature of learning (Alamdarloo et al., 2013; Campos et al., 2018; Hsieh & Tsai, 2017; Lin et al., 2019; Xu et al., 2021), how students guide their learning process independently (Cai et al., 2022), related to learning orientation and learning strategies (Vermunt & Vermetten, 2004), consists of several aspects, including memorizing, calculating and practising, testing, understanding and seeing in a new way, application, and increase of knowledge (Cai et al., 2022; Chiou et al., 2013; Tao et al., 2019). Components or aspects of this conception of learning are divided into two groups, namely quantitative and qualitative groups (Burnett et al., 2003; Chiou et al., 2013; Entwistle & Peterson, 2004; Shen et al., 2018; Tsai, 2004; C. Tsai & Kuo, 2008; Zhao, 2022).

e quantitative group is referred to as the reproductive pro le, while the qualitative group is called the constructive pro le (Chiou et al., 2013; Lin et al., 2012; Purdie et al., 1996; Tan et al., 2021; Vermunt, 2005; Vermunt & Donche, 2017; Vermunt & Vermetten, 2004). e quantitative group or reproductive pro le is a conception of learning at a low level, while the qualitative group or a constructive pro le is a conception of learning at a high level (Chiou et al., 2013; Lin et al., 2019; Soltani & Askarizadeh, 2021). e quantitative group consist of calculating and practising, memorizing, and testing, while the qualitative group consist of increase of knowledge, understansing and seeing in a new way, and application (Chiou et al., 2013; Lin et al., 2012; Purdie et al., 1996; Tsai, 2004; Tsai & Kuo, 2008).

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The quantitative group shows that learning is identical to remembering, acquiring and adding knowledge, while the qualitative group shows that learning is a process of understanding and applying knowledge to real life (Burnett et al., 2003; Duarte, 2007). Students with a quantitative conception of learning or reproductive profile usually think learning is related to remembering. Usually, they are not confident (Vermunt & Donche, 2017), have low curiosity (Lin et al., 2012; Tao et al., 2019), have low learning motivation (Tao et al., 2019), passive in learning (Marouchou, 2012a, 2012b). Consequently, they believe lecturers are the only source of knowledge (Entwistle & Peterson, 2004). Usually get low learning outcomes (Purdie et al., 1996). Meanwhile, students with a qualitative conception of learning or a constructive profile consider learning a process of forming meaning, have high learning motivation, and usually get high learning outcomes (Lin et al., 2012).

If we pay attention to the trend of research conducted by researchers, almost over the last 20 years, research on the conception of learning as a psychological construct or cognitive construct continues to be the main theme of research because the conception of learning is very influences learning outcomes (Ashong & Commander, 2017; Dikmenli & Cardak, 2010; Lin et al., 2019). Many have been studied both in primary, secondary, and higher education (Campos et al., 2018), also studied in specific domains (Hsieh & Tsai, 2017), such as biology, physics, chemistry (Sadi, 2016), mechanical engineering (Tao et al., 2019), computer science (Umapathy et al., 2020; Xu et al., 2021). Several studies have shown a relationship between learning conceptions and learning outcomes (Alamdarloo et al., 2013; Ashong & Commander, 2017; Cai et al., 2022; Marouchou, 2012a, 2012b). The conception of learning is not only correlated with learning motivation, but also the learning strategies used by students to obtain maximum learning outcomes (Campos et al., 2018), also related to self-regulated learning (Soltani & Askarizadeh, 2021; Tao et al., 2019), correlated with learning approaches (Chiou et al., 2013; Ho & Liang, 2015; Lee et al., 2008).

As described above, studies on the conception of learning, both theoretical and empirical, are an inspiring factor for us to improve the quality of education at our campus, Mandalika University of Education. Therefore, studying the conception of learning at the Mandalika University of Education is necessary. There are several reasons why we should do this. *First*; the conception of learning as a vital part of education has never been carried out at the Mandalika University of Education. *Second*; paying attention to the learning outcomes of prospective teachers at the Mandalika University of Education still needs to be higher (Fitriani et al., 2019). Indeed, many factors influence student learning outcomes (Kapinga-Mutatayi et al., 2018; Senemoğlu, 2011), such as educational background, student attitudes and motivations, parents' attitudes towards education, peers, and social groups (Kapinga-Mutatayi et al., 2018). However, psychologists and researchers state that the conception of learning is one of the most influential factors on learning outcomes (Tsai & Kuo, 2008).

Third; the Mandalika University of Education, as one of the higher education institutions, has a moral responsibility to improve the quality of student learning. Therefore, the Mandalika University of Education in the 21st century is required to help students not only to gain knowledge and solve problems related to scientific problems (conceptual), as well as problems in life, but also develop students' understanding that goes beyond their conceptual understanding, which allows them to be actively involved, both intellectually and emotionally, and all of this is related to whether students conception of learning (McCune & Entwistle, 2011). In short, the Mandalika University of Education in the 21st century plays a role and aims to help students become effective students, namely students who are aware of their learning (Senemoğlu, 2011), to guide their learning process and to thinking independently (Cai et al., 2022), and refine their initial concepts scientifically and accurately (Entwistle & Peterson, 2004).

Referring to the opinion of Hsieh and Tsai (2017), the conception of learning studied from various specific domains is a factor that affects the conception of learning itself. Or in other words, students from different majors have different conceptions or beliefs about learning. Therefore, this study aims to identify and explain students' conceptions of learning based on differences in majors. Identifying students' conception of learning is crucial for future education (Dikmenli & Cardak, 2010)learning conceptions profoundly impact learning outcomes (Tsai, 2009. We can use the results to help them understand the nature of learning (Sadi, 2016) and help them become a student aware of their duties and responsibilities, which is a breakthrough in the learning paradigm (Talebinejad & Matou, 2012). Ultimately, they can guide the learning process independently to achieve maximum learning outcomes (Cai et al., 2022). As for the research questions that must be answered in this study, first; what learning conception tends to be used by students from various majors? Second; do students from different majors have significantly different conceptions of learning?

Method

Research Design

This study aims to identify and explain students' conceptions of learning based on differences in majors and whether students from different majors have significantly different conceptions of learning. This research uses a quantitative

survey method. Survey research is research that is widely used because it allows researchers to obtain data in a short time (Totten et al., 1999)Australia.\nsix registered midwives and 10 postnatal women reviewed the instrument. The instrument was then completed by 293 inpatient women who had experienced a vaginal birth.\nthe Birth Companion Support Questionnaire (BCSQ. Surveys as a type or research method are classified into two groups, namely qualitative and quantitative surveys. Qualitative surveys, in the process of collecting data, usually use open-ended questions, while data collection in quantitative surveys usually uses questionnaires (Ponto, 2015).

In this study, a total of 136 voluntary respondents were randomly selected from four majors, namely veterinary education (54 students), biology education (38 students), educational technology (26 students), and educational administration (18 students). The instrument used to measure students' conceptions of learning was adapted from the conception of learning science (CoL) developed by Lee et al. (2008)"properties":{"formattedCitation":"(Lee et al., 2008, consists of memorizing, increase of knowledge, testing, application, and the last one is understanding and seeing in a new way. The conceptiof learning instrument developed by Lee has been widely adapted and validated by many researchers, such as Bahcivan and Kapucu (2014), Lin et al. (2012), Umapathy et al. (2020), and many more. Therefore, the problem of the validity of the learning conception instrument does not need to be doubted.

Data Analysis

A Likert scale with four choices was used to obtain participants' agreement, from strongly disagree to strongly agree. Descriptive analysis was used to identify students' learning conceptions, while to see whether differences in learning conceptions were based on different majors, the data were analyzed multivariately using SPSS 24 for windows at a significance level of 5%. Before conducting multivariate analysis, a prerequisite test analysis was carried out, including tests for the sample's normality and homogeneity. The normality test was carried out using Box's test of equality of population covariance metrics, while the homogeneity test was carried out using the Levene test. As a consequence, if the two prerequisite analyzes are not met (Box's test of equality of population covariance metrics and Levene's test), the data were analyzed using non-parametric analysis.

Findings

Based on the results of the descriptive analysis, as shown in Table 1, it is known that students majoring in education administration and veterinary medicine tend to think that learning is related to memorization. Likewise, the testing aspect tends to be on veterinary students. At the same time, the calculating and practising aspects are students majoring in veterinary medicine and biology education, likewise, with the application aspect. Meanwhile, for the aspect of understanding and seeing in a new way, students majoring in biology and educational technology tend to think that learning is related to the way of looking at a phenomenon (Tab;e 1.

Based on the analysis of the equality of population covariance metrics, as shown in Table 2, it is stated that the assumption of the similarity of the population covariance matrix is fulfilled. Meanwhile, the results of the analysis of the homogeneity test or the similarity of variance can be seen in Table 3. Based on the results of the analysis, it is stated that the sample is homogeneous, or the variance of the learning conception population is declared homogeneous. Thus, the two prerequisite assumptions of multivariate analysis have been met. Next, we look at the results of the test of between-subjects effects shown in Table 4. It is stated that our participants' conceptions of learning based on major differences are not significantly different. In contrast, the results of the post hoc analysis showed that the testing aspect only differed significantly between biology education and educational administration and between educational technology and educational administration. Meanwhile, for the calculating and practicing aspect, there is only a significant difference between veterinary education and educational technology (see Table 5).

Table 1: Descriptive analysis results

	VE		*BE*		*ET*		*EA*	
Conception of learning	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Memorizing	9.91	1.78	9.82	1.57	9.62	1.70	10.33	1.28
Testing	10.76	2.15	10.29	2.58	10.15	3.02	11.94	2.23
Calculating and practising	10.50	1.56	10.16	1.98	9.38	2.00	9.94	1.11
Increase of knowledge	10.67	1.36	10.45	1.99	10.42	1.77	10.44	1.58
Application	10.44	1.91	10.63	1.38	10.38	1.50	10.22	1.93
Understansing and seeing in a new way	10.13	1.74	10.32	1.43	10.27	2.01	10.17	1.85

Note: VE: Veterinary education; BE: Biology education; TE: Educational technology; EA: Educational administration

Discussion

As mentioned above, this study aims to identify and explain the students' conceptions of learning based on differencecs in majors and to determine whether students from different majors have different conceptions of learning. For research question number 1, we can answer from the descriptive analysis shown in Table 1 that students majoring in veterinary and educational administration tend to think that learning is related to the process of remembering. Likewise, the testing aspect tends to be students majoring in veterinary education and education administration. For aspects of calculating and practicing, increase of knowledge, and application, tends to be for students of veterinary education and biology education. Meanwhile, for the aspect of understanding and seeing in a new way, it tends to be students majoring in biology education.

Then to answer research question number 2, we can see the test of between-subjects effects shown in Table 4 and the post hoc analysis shown in Table 5. The information obtained from Table 4 shows that the conception of learning from different majors does not show significant differences. In other words, major differences do not affect our participants' conceptions of learning. However, some aspects of the conception of learning have significant differences, such as testing. There is a significant difference between students of biology education and educational administration, students of educational technology and education administration. There is a significant difference between veterinary education and educational technology in calculating and practising aspect. This result is relatively the same as Sadi and Çevik (2016) findings that the

Tabel 2: Box's test equality of covariance metrices[a]

Box's M	83.295
F	1.174
df1	63
df2	15670.969
Sig.	.163

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Major

Table 3: Levene test of equality of variancesa

Conception of learning	*F*	*df1*	*df2*	*Sig.*
Memorizing	1.109	3	132	.348
Testing	.832	3	132	.479
Calculating and practising	1.975	3	132	.121
Increase of knowledge	1.364	3	132	.257
Application	1.250	3	132	.294
Understanding and seeing in a new way	1.501	3	132	.217

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Major

Table 4. Test of between-subjects effets

Source	*Dependent Variable*	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
Intercept	Memorizing	11334.857	1	11334.857	4151.485	.000
	Testing	13407.611	1	13407.611	2206.697	.000
	Calculating and practising	11515.595	1	11515.595	3841.918	.000
	Increase of knowledge	12693.074	1	12693.074	4575.513	.000
	Application	12513.096	1	12513.096	4307.654	.000
	Understanding and seeing in a new way	12036.479	1	12036.479	4012.986	.000
Major	Memorizing	5.716	3	1.905	.698	.555
	Testing	42.095	3	14.032	2.309	.079
	Calculating and practising	22.467	3	7.489	2.499	.062
	Increase of knowledge	1.697	3	.566	.204	.894
	Application	2.295	3	.765	.263	.852
	Understanding and seeing in a new way	.898	3	.299	.100	.960

Table 5. Post hoc analysis (LSD)

		Sig.			
Conception of learning	*Major*	*VE*	*BE*	*TE*	*EA*
Memorizing	VE		.794	.460	.345
	BE			.634	.276
	TE				.159
	EA				
Testing	VE		.370	.338	.080
	BE			.877	.021
	TE				.019
	EA				
Calculating and practising	VE		.352	.008*	.241
	BE			.082	.667
	TE				.294
	EA				
Increase of knowledge	VE		.535	.541	.625
	BE			.954	.995
	TE				.967
	EA				
Application	VE		.605	.883	.633
	BE			.570	.403
	TE				.756
	EA				
Understanding and seeing in a new way	VE		.613	.736	.937
	BE			.916	.764
	TE				.847
	EA				

Based on observed means.
*. The mean difference is significant at the .05 level

conceptions of learning biology for male and female students are not significantly different. Cai et al. (2022) also showed that the learning conceptions of male and female students did not differ significantly, and the conceptions of learning based on the academic level did not show a significant difference. Morgan and Beaty observed students' conception of learning up to the seventh year, finding that there was no significant difference between academic level and conception of learning (Loyens, 2009).

Although our participants come from different majors, in the methodological aspect, both the method of acquiring knowledge and the method of learning is not much different. The only difference is the material they study. Therefore, regarding the conception of learning, anyone may have their conception or beliefs about the nature of learning. Or in other words, every student who comes to study on campus brings their ideas or beliefs about learning (Ashong & Commander, 2017). Some come with the belief that learning is a process of remembering, and some come with their initial beliefs and knowledge to understand the material to be studied (Zain et al., 2013). The impact of students bringing their conceptions to campus to study, of course, there will also be a polarization of learning conceptions, or students from various majors certainly have different conceptions and approaches to learning (Richardson, 2007), so it does not rule out that there are also several aspects of the conception of learning that lead to one or several aspects of the conception of learning. Especially in this research, namely in the aspects of memorizing, testing, calculating and practising.

For the memorizing aspect, our participants from the educational administration tend to think that learning is related to remembering. Memorizing is related to storing and recalling information that has been obtained. Memorizing is at a low level in the classification of learning conceptions. Students who use memorizing in learning become passive in the learning process (Marouchou, 2012a, 2012b). Consequently,

they believe lecturers are the only source of knowledge (Entwistle & Peterson, 2004). However, on the other hand, we must remember the role of memorizing with understanding, so Lee et al. (2008) stated that memorizing has two opposite directions. Memorizing will be very meaningful if it is related to factual questions and very weak when dealing with questions that require higher-order thinking, such as critical thinking and problem-solving. Memorizing, although weak in higher-order thinking questions, still requires remembering to carry out the thinking process effectively (Murawski, 2014). In addition, memorizing is a bridge to understanding, or remembering is the basic process for gaining understanding (Cooper et al., 2002). In other words, memorizing and understanding cannot be separated but complement each other (Purdie & Hattie, 2002).

In the aspect of testing, there are significant differences between students of biology education and educational administration, between students of educational technology and education administration. For this aspect, educational administration students tend to think that learning is related to the exam process. These results are relatively similar to the findings of Tsai and Kuo (2008), the students interviewed about the concept of learning. Most respondents said that learning was related to the exam preparation. Lin et al. (2012), Tsai (2004), and Tsai et al. (2011) that students in Taiwan believe that testing is closely related to the examination because grades are the only thing that can represent student performance, and usually parents and teachers always pay attention to their children's grades. Thus, the tendency of educational administration students to consider learning is related to the examination, and the learning conceptions like this reflect their future living conditions (Ali et al., 2018), such as wanting to continue their studies to higher education and enter the work environment. Therefore, educational administration students consider learning meaningless if it is not to get maximum test results, so they will study optimally during exams.

Furthermore, for the calculating and practising aspects, there are only significant differences between students of veterinary education and educational technology (see Table 5). Descriptively, students of veterinary education tend to think that learning involves a series of calculations and that good learning is done continuously. In a study by Tsai and Kuo (2008), of 45 students interviewed, as many as 21 considered learning related to calculating and practising. This shows that the conception of learning is striking in several specific domains (Chiou et al., 2013). Therefore, from these results, it can be claimed that perhaps the courses of veterinary education students contain a lot of calculating and practicing.

Veterinary education students believe that doing calculations and practising is the essence of learning (Wong et al., 2021). They believe that calculating and practising is part of an active process to acquire knowledge (Ashong & Commander, 2017) and believe that knowledge can be obtained by performing a series of calculating and practising (Sadi & Dağyar, 2015). This can be seen from the analysis shown in Table 1. For the aspect of increase of knowledge, veterinary education students have the highest average score compared to students from other majors. In general, this aspect (increase of knowledge) is not significantly different (see Table 5). However, it can be understood that they learn through calculating and practising to increase their knowledge (Sadi & Dağyar, 2015), or their knowledge will also increase by calculating and practising every day (Wong et al., 2021).

Increase of knowledge, understanding and seeing in a new way, and application is included in the qualitative group or constructive profile (Chiou et al., 2013; Lin et al., 2012; Purdie et al., 1996; Tsai, 2004; Tsai & Kuo, 2008). In the aspect of understanding and seeing in a new way, and application, biology education students have the highest average compared to students of other majors. This indicates that biology education students tend to have student-centred learning (Lee et al., 2008). They realize that they must be active in the learning process (Duarte, 2007), can guide the learning process independently, direct their minds to knowledge, skills, and understanding (Vermunt & Vermetten, 2004), can connect previous knowledge with the knowledge being studied, so that they can form a complete understanding (Zhao, 2022). Several studies have shown that students with a constructive profile have high motivation, understand their learning orientation, and usually use a deep strategy approach (Entwistle & Peterson, 2004; Lee et al., 2008; Soltani & Askarizadeh, 2021). However, in this study, we did not attempt to examine the relationship between the conception of learning and the learning approach, nor the motivation to learn. This is one of the limitations of this study, and it is our responsibility to examine it in future research.

Conclusion

Based on the results of the analysis that has been carried out and the limitations of the discussion, our participants' conceptions of learning from different majors do not show significant differences. However, some aspects of the learning conceptions are significantly different, such as testing (between biology education students and educational administration, between educational technology and educational administration). Then the aspect of calculating and practising, there is a significant difference between veterinary education students and educational technology students.

The learning conception of veterinary education students is memorizing, testing, calculating and practising, and increase of knowledge. Thus, veterinary education students have a mixed conception of learning (reproductive and constructive). The learning conception of biology education and technology education students tends to increase of knowledge, application,

and understanding and seeing in a new way, or the learning conception of biology education and educational technology students a constructive profile. Meanwhile, the learning conception of educational administration students tends to be memorizing and testing, or in other words, education administration students have a reproductive profile.

Although the concept of learning is more emphasized to students, in the context of learning, the interaction between lecturers and students cannot be separated. In this case, the role of lecturers in shaping student learning conceptions is also crucial and fundamental (Ashong & Commander, 2017), or students' conceptions of learning can also be formed during the learning process (Cai et al., 2022). The role of lecturers in shaping student learning conceptions is to establish constructive learning conditions through student-centred learning, helping students to increase student learning motivation (Vermunt & Vermetten, 2004), and paying attention to student learning developments (Richardson, 2007). Therefore, in the future, learning for educational administration students will put more emphasis on student-centred learning, which can be done by combining constructivism-based learning models with metacognitive strategies (Campos et al., 2018)experimental sciences, arts and humanities and social sciences.\nResults: The present study demonstrates that a set of factors may influence conception of learning of health sciences postgraduate students, with learning as gaining information, remembering, using, and understanding information, awareness of duty and social commitment being the most relevant. For these students, learning as a personal change, a process not bound by time or place or even as acquisition of professional competences, are less relevant. According to our results, this profile is not affected by gender differences.\nConclusions: Our results show that the overall conceptions of learning differ among students of health sciences and non-health sciences (experimental sciences, arts and humanities and social sciences. The combination, individually and in groups, can change the student's conception of learning. Through reflection activities, they can realize the importance of understanding the nature of learning. Ultimately, they can change their conception of learning from productive to constructive (Vermunt & Vermetten, 2004). Likewise, with learning for veterinary education students, in the future, try to reduce student learning conceptions that tend to memorize and testing, then improve constructivist learning conceptions.

Limitation and Suggestion

We have to acknowledge our limitations in this study. We could only collect data from four departments (veterinary education, biology education, educational technology, and educational administration), so the results we get are very likely to be different if done involving various departments. Therefore, the conclusions of this study cannot be applied in general. The research that we do only focuses on identifying and explaining the learning conceptions of prospective teacher students based on differences in majors. In contrast, both theoretically and empirically, it shows that the conception of learning is a very influential factor in learning outcomes. Therefore, for further research, we are interested in examining the relationship between learning conceptions and learning outcomes, especially those related to higher-order thinking processes, such as critical thinking skills, or modelling psychological factors with critical thinking skills.

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