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Cultural Literacy in Ethnoscience Learning: Perseption of Science Teacher Candidate

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Abstract — This study aims to explore the perceptions of prospective science teacher students regarding cultural literacy in science learning. This study is an exploratory research with research subjects as many as 28 biology education students. This research uses a research instrument in the form of a closed questionnaire with answers using a Likert scale and has been validated by experts. This research data was analyzed using quantitative descriptive statistics and inferential statistics of the t-test and Anova test. The results of this research are (1) male students have an average score of 3.00 in the Tall category and female students have an average score of 2.79 in the Tall category; (2) students from Mataram have an average score of 2.79 in the Tall category, West Lombok is 2.93 in the Tall category, Central Lombok is 2.95 in the Tall category, East Lombok is 2.88 in the Tall category , North Lombok at 2.78 in the Tall category; (3) students' perceptions of the indicator of understanding the value of diversity have an average score of 2.40 in the Low category, sensitivity to culture is 3.22 in the Tall category, and Interaction with culture is 3.23 in the Tall category; (4) there is no significant difference in the perceptions of male and female students regarding cultural literacy in ethnoscience learning as evidenced by a significance value of 0.384 which is greater than 0.05 (>0.05); (5) there is no significant difference in students' perceptions of cultural literacy in ethnoscience learning based on their region of origin as evidenced by a significance value of 0.914 which is greater than 0.05 (>0.05).

Keywords — cultural literacy, ethnoscience learning, perseption
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1. Introduction

Indonesia is a country with a diversity of ethnicities, languages, cultures and customs, which have become the characteristics or identity of the Indonesian nation (Sahira et al., 2023; Sarini & Selamet, 2019). Indonesia has a pluralistic society because of the diversity in social life (Zubari et al., 2019; Herimanto, 2010). According to Pingge (2017), cultural diversity in each region makes Indonesia a country with a high level of diversity. The diversity of local traditions and culture between regions contains noble values which is typical and becomes local wisdom (Battiste, 2005). The unique local wisdom of each region is part of the daily social and cultural activities of society as inherited by previous generations (Arlinovita, Setiawan & Sudibyo, 2015). Thus, this diversity must be preserved to maintain the cultural heritage of this country (Sahira et al., 2023). Cultural preservation in the era of globalization is important because the current flow of globalization can have a negative influence on the sustainability of local culture, so that it can become a threat to Indonesia's cultural diversity (Wang, 2018; Nahak, 2019). This was emphasized by Robertson (1994) that the current era of globalization has influenced local and national culture significantly and is difficult to control.

Cultural preservation in the era of globalization has complex challenges due to developments in information technology and global connectivity which can threaten local culture (Smith, 2019). The era of globalization brings many changes in people's social life and can have a direct impact on cultural preservation nation (Aulia et al., 2022). According to Suradi (2018), information openness in the current era of globalization has provided significant changes to the social system of everyday society because everyone can easily access information about foreign cultural practices. This condition is a consequence of the very rapid development of information technology today, where everyone can access information quickly through various social media platforms (Safitri & Ramadan, 2022). The development of information and communication technology globally has forced people to adapt social interaction patterns in everyday life (Cahya et al., 2022). Pratiwi & Asyarotin (2019) explained that students as the young generation have now made information and communication technology a primary need.

Maimun et al (2020) explained that the current era of information openness has influenced people's culture of life in all fields. Today's young generation easily adopts foreign culture through various social media platforms (Safitri & Ramadan, 2022). Very fast access to information can lead to rapid and extensive cultural exchange, which will influence the way the younger generation views and adopts various aspects of foreign culture (O'Reilly, 2019). According to Setiawan (2018), the massive influence of foreign culture can have a negative impact in the form of acculturation to local culture. This condition is possible because the current young generation prefers to imitate foreign cultural traditions and tends to abandon local cultural traditions (Andika, 2021; Setyaningrum, 2018). This was confirmed by Muniroh, Khasanah & Irsyad (2020) that the current young generation tends to

idolize foreign culture and almost does not recognize local culture. This social phenomenon must be used as an important lesson for everyone, so that they are wiser in accessing information about foreign cultures from social media (Kurniawan, 2023). To build a young generation that is adaptive and wise in responding to cultural diversity in the current digital era, it is necessary to strengthen cultural literacy skills. Cultural literacy is an important competency to avoid the negative influences of the current era of information openness (Prasetya et al., 2022; Mardhiyah et al., 2021).

Cultural literacy is an individual's ability to understand and appreciate various aspects of culture in society, including its values, norms, traditions and practices (Ongunloye, 2015; Kroeber & Kluckhohn, 1952). Cultural literacy is an important competency for everyone, in order to continue to love and preserve local culture (Pratiwi & Asyarotin, 2019). Developing cultural literacy can increase students' understanding of local cultural values, so that they feel proud of their own culture and contribute to its preservation (Ongunloye, 2015; Pratiwi & Asyarotin, 2019; Sudarmin, et al., 2019). Cultural literacy is an important effort in preserving local and national culture (Kurniawan, 2023), so that it cannot be replaced by foreign culture (Malik, 2020). Thus, cultural literacy skills are important for every student to have in order to know and love their own culture, so that the character of cultural preservation is formed (Yudin, 2019; Sibarani, 2004). This is in accordance with the aim of cultural literacy to save, preserve and develop local culture as the identity of the Indonesian nation in the midst of a global society (Pratiwi & Asyarotin, 2019). The cultural literacy skills possessed by students will foster an attitude of tolerance (Akmal et al., 2020) and protect against acculturation to foreign cultures (Parmin, et al., 2017).

The Ministry of Education and Culture (2017) emphasized that cultural literacy is the ability to understand and behave towards Indonesian culture as a national identity. Another opinion expressed by Wong (2007) is that cultural literacy is a person's ability to understand, appreciate and participate in various cultural practices in society. Cultural literacy involves understanding the meaning, context, and values contained in culture as well as the ability to interpret and express oneself creatively through culture (King, 2005). Cultural literacy skills are not limited to cognitive abilities alone but are complex social-psycho-linguistic activities and influence the social aspects of students' daily lives (Pratiwi & Asyarotin, 2019). Thus, strengthening cultural literacy skills needs to be instilled as early as possible and must receive special attention from all parties, starting from the family environment, the world of education, and the community environment (Cahya et al., 2022). Developing cultural literacy in the world of education can build students' awareness of the importance of preserving local culture and playing an active role in maintaining and developing their cultural heritage (Wang, 2018). According to Suradi (2018), higher education is important for developing cultural literacy skills so that students have sufficient intellectual intelligence about Indonesian culture, so they are wiser in responding to local cultural diversity.

Higher education has an important role in developing cultural literacy through a holistic and personality-oriented educational approach to students (Jackson, 2015). The development of cultural literacy in higher education can shape students into individuals who are more open, tolerant and knowledgeable about cultural diversity (UNESCO, 2009; Hall, 2012). According to Banks (2008), developing cultural literacy can facilitate students to understand cultural diversity and be able to apply it in everyday life. The development of cultural literacy for students can be carried out in a structured and systematic manner in the learning process (Giroux, 2011; Safitri & Ramadan, 2022). Thus, the implementation of cultural literacy in higher education can be realized by developing a curriculum that includes cultural studies in learning (Jones, 2013). According to Helaluddin (2018), strengthening cultural literacy can be done through content integration, adapting learning models, and strengthening campus culture (Rosmawaty, 2015). The integration of cultural literacy in the learning process in higher education can build an attitude of respect and tolerance for cultural diversity (Giroux, 2011).

Strengthening cultural literacy in learning is important to develop in order to face the challenges of the digital era which facilitates intercultural interaction through very fast access to information (Banks, 2014; Nieto, 2010). Developing cultural literacy through learning can facilitate students to learn about their own culture and the culture of others, so that they have sufficient understanding of the values, norms and practices of that culture (Nieto, 2004). The integration of cultural studies in learning can foster an attitude of respect for cultural diversity and have the awareness to actively participate in cultural activities (Bucholtz & Hall, 2005; Gay, 2010). Thus, the development of cultural literacy can be carried out in a structured manner by integrating cultural values in learning content (Rokhmawan & Firmansyah, 2017; Damaianti, Damaianti & Mulyati, 2017). Science learning in higher education can be developed based on ethnoscience, where scientific concepts are integrated with indigenous science contained in community traditions and culture (Hadi et al., 2019; Khoiri & Sunarno, 2018; Toharudin et al., 2017). Ethnoscience-based learning can improve scientific literacy skills as well as cultural literacy for students (Arlianovita, Setiawan & Sudibyo, 2015). This was emphasized by Sudarmin & Sumarni (2018) that ethnoscience-based learning is very important to develop in universities as an effort to preserve local cultural values and traditions.

Ethnoscience-based learning is a system of knowledge and cognition typical of a given culture (Sudarmin, Sumarni & Mursiti, 2018). Ethnoscience-based learning will present local traditional and cultural values (Puspasari et al., 2019), so that it can build an effective and enjoyable learning environment (Wahyu, 2017), as well as the realization of meaningful learning (Akmal et al., 2020; Sudarmin, et al., 2017). Ethnoscience-based learning is relevant to the main goal of science education set by UNESCO, namely to create a young generation who is scientifically and culturally literate (Sudarmin & Asyhar, 2012). Ethnoscience-based learning is important for strengthening students' cultural literacy skills and fostering an attitude of love for local culture (Parris & Linder-VanBerschot, 2010). Ethnoscience learning can protect students from acculturation to foreign cultures which are massively transformed through electronic media (Mardianti, Kasmantoni & Walid, 2020). Kasa (2011) emphasized that ethnoscience-based learning is important for building conservation attitudes and preventing the loss of local cultural characteristics and traditions. This is possible because ethnoscience-based learning can construct students' knowledge comprehensively about their own traditions and culture (Wahyu, 2017; Listyawati, 2012). Thus, science learning in higher education must be developed by relying on the unique traditions and local culture of the community (Kartono, Hairida & Bujang, 2010), so that it can improve students'

cultural literacy skills (Emdin, 2011). This was confirmed by Dewi (2016) that the learning process is an important factor in growing students' knowledge, perceptions and attitudes (Antoncic & Hisrich, 2003; Fiet, 2001).

It is important for prospective science teacher students to have cultural literacy skills (Banks, 2008), in order to develop learning based on cultural diversity (Bennett, 2009; Livingstone & Helsper, 2007). Prospective science teacher students who have cultural literacy skills are expected to be able to design and implement learning processes that are integrated with community traditions and culture (Nudiati & Sudiapermana, 2020). This was emphasized by Azizah, Pebriyenni & Ridwan (2022) that teachers as teachers and role models must be able to provide a correct understanding of cultural values, so that students can respond wisely to the massive influence of foreign culture through social media (Kurniawan, 2023). According to Villegas & Lucas (2002), teachers who have cultural literacy skills will be able to create a classroom environment that respects diversity, understands the needs of students from various cultures, and can apply ethnoscience-based learning. Good cultural literacy skills will make it easier for teachers to develop an inclusive learning environment and strengthen intercultural relationships in the science learning process (Gay, 2010; Villegas & Lucas, 2007). Thus, prospective science teacher students are expected to have cultural literacy skills so they can design and implement ethnoscience-based learning (Sudarmin & Asyhar, 2012).

According to the World Economic Forum's view in 2015, cultural literacy is one of the basic literacies that students must have in the 21st century (Helaluddin, 2018). This is because cultural literacy is not just about protecting the nation's culture, but rather shaping the individuality of the nation's generation so that they continue to love and preserve literacy culture (Sari & Supriyadi, 2021). Nevertheless, Safitri & Ramadan (2022) emphasized that students as part of the current millennial generation have low interest in cultural literacy due to their lack of understanding and knowledge about culture. This is in accordance with the research results of Arditama & Lestari (2020) that teachers consider cultural literacy not very important and students do not understand the culture in their own environment. Another phenomenon is that the younger generation tends to like foreign culture and seems to use local culture as a joke (Amini et al., 2020; Ghozali, 2020; Indriati, Nurasiah & Nurmeta, 2022). Thus, it is necessary to carry out an exploratory study to map the perceptions of prospective science teacher students regarding cultural literacy in ethnoscience learning.

2. Method

This study is an exploratory descriptive research (Kerlinger & Lee, 2000; Fraenkel, Wallen & Hyun, 2012), to describe the perceptions of prospective science teacher students regarding cultural literacy in ethnoscience learning (Muliadi, Mirawati & Prayogi, 2021). This study uses an ex post facto approach because researchers only study and measure existing student attitude data without carrying out manipulation or treatment (Creeswell, 2012; Borg & Gall, 2003). The research respondents were 28 biology education students at the Mandalika University of Education who were obtained through convenience sampling techniques taking into account accessibility and students' willingness to fill out questionnaires distributed online (Fink, 2011; Babbie, 2016; Cohen, Manion & Morrison, 2007).

This research uses an instrument in the form of a closed questionnaire with answers according to the Likert scale (Likert, 1932; Muliadi, et al., 2022) which uses a degradation of the attitude scale, namely Strongly Agree, Agree, Disagree, Disagree (Creeswell, 2014). The questionnaire about cultural literacy is presented in online media in the form of a Google form (Adha, et al., 2020). The questionnaire was developed referring to indicators of cultural literacy, namely understanding the value of diversity, sensitivity to culture, and interaction with culture (Mahmudah, 2021). The questionnaire has been prepared into 9 statement items and has been validated by experts and declared valid.

Research data was analyzed using quantitative descriptive statistics and inferential statistics. Quantitative descriptive analysis was used to describe data on prospective science teacher students' perceptions of cultural literacy. Average student perception data is interpreted in the form of categories using assessment criteria developed by Nugroho et al (2023) as presented in table 1.

Table 1. Conversion criteria for average student perception scores

Average Score	Category
$3.25 < X \leq 4.00$	Very High
$2.50 < X \leq 3.25$	Tall
$1.75 < X \leq 2.50$	Low
$1.00 < X \leq 1.75$	Very Low

The inferential statistical analysis used is (1) t-test at a significance level of 5% to determine differences in students' perceptions of cultural literacy based on gender with the formulation of a statistical hypothesis, namely H0: $\mu 1 = \mu 2$ (there is no significant difference in the perceptions of male and female students regarding cultural literacy in ethnoscience learning) and H_1 : $\mu 1 \neq \mu 2$ (there is a significant difference in the perceptions of male and female students regarding cultural literacy in ethnoscience learning); (2) Anova test at a significance level of 5% to determine differences in students' perceptions of cultural literacy based on their region of origin and culture with the formulation of a statistical hypothesis, namely H_0 : $\mu 1 = \mu 2$ (there is no significant difference in students' perceptions of cultural literacy in ethnoscience learning based on their region of origin) and H_1 : $\mu 1 \neq \mu 2$ (there are significant differences in students' perceptions of cultural literacy in ethnoscience learning based on region of origin). If the analysis results are significant or p-value t-test and test Anova is smaller than 0.05, then H_0 is rejected and H_1 is accepted or vice versa.

3. Result and Discussion

Data on the perceptions of prospective science teacher students regarding cultural literacy in ethnoscience learning were analyzed using descriptive statistics based on gender, students' area of origin, and indicators of cultural literacy. The results of the

analysis are presented in table 2 below.

Table 2. Description of student perception data regarding cultural literacy

Variable Group		N	Σ Score	Variant	Standard Deviation	Mean	Category
Gender	Man	9	27.00	0.08	0.28	3.00	Tall
	Woman	19	53.13	0.15	0.39	2.79	Tall
Place of Origin	Mataram	9	25.11	0.17	0.41	2.79	Tall
	West Lombok	5	14.67	0.29	0.54	2.93	Tall
	central Lombok	5	14.79	0.14	0.37	2.95	Tall
	East Lombok	5	14.44	0.08	0.28	2.88	Tall
	North Lombok	4	11,12	0.05	0.23	2.78	Tall
Cultural Literacy Indicators	Understanding the Value of Diversity	28	67.25	0.21	0.46	2.40	Low
	Sensitivity to Culture	28	90.32	0.23	0.48	3.22	Tall
	Interaction with Culture	28	90.50	0.23	0.48	3.23	Tall

Based on the results of data analysis in table 2, it can be explained that the perceptions of prospective science teacher students regarding cultural literacy in ethnoscience learning are (1) male students have an average score of 3.00 in the Tall category and women are 2.79 in the Tall category. Tall; (2) students from Mataram have an average score of 2.79 in the Tall category, West Lombok is 2.93 in the Tall category, Central Lombok is 2.95 in the Tall category, East Lombok is 2.88 in the Tall category , North Lombok at 2.78 in the Tall category; (3) students' perceptions of the indicator of understanding the value of diversity have an average score of 2.40 in the Low category, sensitivity to culture is 3.22 in the Tall category, and Interaction with culture is 3.23 in the Tall category. The data description is emphasized in the following Figure 1 presentation.

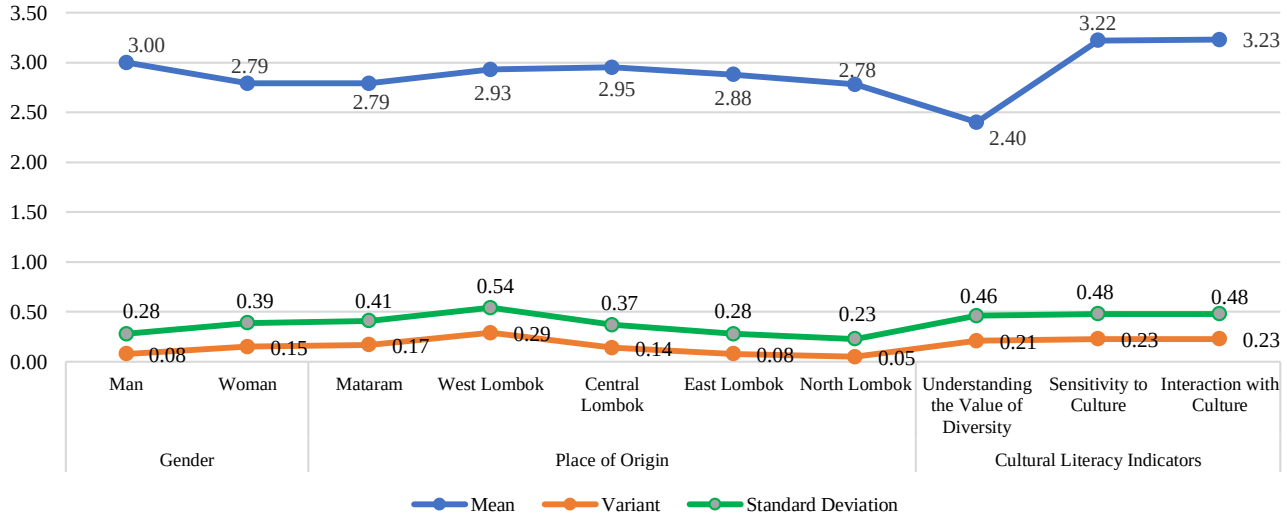

Fig. 1. Students' perceptions of cultural literacy

Data on prospective teacher student perceptions regarding cultural literacy in ethnoscience learning were analyzed using parametric statistics, after fulfilling the prerequisite tests, namely the homogeneity test and normality test as presented in table 3 below.

Table 3. Homogeneity and normality test results

N	Homogeneity		Normality	
	Levenes Statistical test scores	Sig.	Kolmogorov-Smirnov's test scores	Sig.
35	0.783	0.384	0.557	0.916

The homogeneity test results in table 3 explain that the significance value of 0.384 is greater than 0.05 (>0.05), which means that the data variance is homogeneous, while the normality test results show a significance value of 0.916, which is greater than 0.05 (>0.050), which is meaning the data is normally distributed.

Analysis of differences in student teachers' perceptions regarding cultural literacy in ethnoscience learning based on gender was carried out using the t-test (independent sample t-test) at a significance level of 5% with the results of the analysis as presented in table 5 below.

Table 4. T-test results (independent sample t-test)

Variances	t-test for Equality for Means			
	t	df	Sig.	Mean diff.
Gender	1,374	26	0.384	0.20368

The results of the t test in table 4 explain that the significance value of 0.384 is greater than 0.05 (>0.05), so H_1 is rejected and H_0 is accepted, which means that there is no significant difference in the perceptions of male and female students regarding cultural

literacy. in ethnoscience learning.

Analysis of differences in student teachers' perceptions regarding cultural literacy in ethnoscience learning based on the student's region of origin was carried out using the Anova (Analysis of Variance) test at a significance level of 5% with the results of the analysis as presented in table 5 below.

Table 5. Anova test results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.149	4	0.037	0.238	0.914
Within Groups	3,592	23	0.156		
Total	3,741	27			

The results of the Anova test in table 5 explain that the significance value of 0.914 is greater than 0.05 (>0.05), so H_1 is rejected and H_0 is accepted, which means that there is no significant difference in students' perceptions of cultural literacy in ethnoscience learning based on region. origin.

The results of the research explain that (1) prospective science teacher students have a good perception of cultural literacy in ethnoscience learning; (2) there are no differences in the perceptions of prospective science teacher students regarding cultural literacy in ethnoscience learning based on gender and region of origin. These findings confirm that student science teachers have good knowledge of cultural literacy and its integration in ethnoscience learning. This is in accordance with the opinion of Lee & Kim (2018) that student perceptions will bridge their attitudes and knowledge towards science learning. Students' positive responses regarding cultural literacy in ethnoscience learning confirm that prospective science teacher students support the integration of cultural values in science learning concepts (Astalini et al., 2019). Thus, prospective science teacher students have quite good self-efficacy in strengthening cultural literacy skills through ethnoscience learning (Hacieminoglu, 2016). This is possible because the ethnoscience learning process presents local traditional and cultural values (Puspasari et al., 2019), so that it can build an active and enjoyable learning environment (Revelation, 2017), as well as realizing meaningful learning for students (Akmal et al., 2020; Sudarmin, et al., 2017).

The positive perception of prospective science teacher students regarding cultural literacy indicates that there are cultural literacy development activities that have been carried out within the Mandalika University of Education both in the learning process and other activities by presenting traditional and cultural values (Kartono, Hairida & Bujang, 2010; Emdin, 2011). This is because learning is an important factor in growing students' knowledge, perceptions and attitudes towards culture (Antoncic & Hisrich, 2003; Fiet, 2001). The findings of this research explain the existence of student self-efficacy regarding the important role of ethnoscience learning in fostering cultural knowledge and love (Parris & Linder-VanBerschot, 2010), as well as cultural conservation attitudes to prevent the loss of local cultural characteristics and traditions (Mardianti, Kasmantoni & Walid, 2020; Kasa, 2011). The development of ethnoscience learning allows students to understand science concepts in local cultural contexts (Salman, 2018; Rikizaputra et al., 2021). This supports the main goal of science education set by UNESCO to create a young generation who is scientifically and culturally literate (Sudarmin & Asyhar, 2012). Activities in ethnoscience learning can facilitate students to actively construct their knowledge comprehensively about local traditional and cultural values (Wahyu, 2017; Listyawati, 2012).

Students gave positive answers to the three indicators of cultural literacy, so it can be seen that students have sufficient understanding of the value of diversity, are sensitive to culture, and actively participate in cultural activities. This confirms that prospective science teacher students understand cultural literacy and have an attitude of loving culture (Pratiwi & Asyarotin, 2019), and have played an active role in preserving local cultural values (Sudarmin, et al., 2019). Students' understanding of cultural literacy is very important in preserving local and national culture so that it is not replaced by foreign culture (Kurniawan, 2023; Malik, 2020). Yudin (2019) emphasized that students' good understanding of cultural literacy can foster the character of cultural preservation (Sibarani, 2004). Thus, the development of cultural literacy at the Mandalika University of Education has facilitated prospective science teacher students to become individuals who are more open, tolerant and knowledgeable about cultural diversity (Hall, 2012; Giroux, 2011). This was emphasized by Banks (2008) that developing cultural literacy can facilitate students to understand cultural diversity and be able to apply it in everyday life. The development of cultural literacy for students can be carried out in a structured and systematic manner in the learning process (Giroux, 2011; Safitri & Ramadan, 2022). According to Helaluddin (2018), strengthening cultural literacy can be done through ethnoscience learning and strengthening culture in the campus environment (Rosmawaty, 2015). Developing cultural literacy in higher education can involve local communities in the learning process and other activities, so that students can understand cultural practices directly from practitioners or members of local cultural communities (Archer et al., 2010).

Ethnoscience learning can facilitate students in a structured way to develop cultural literacy in higher education (Hadi et al., 2019; Khoiri & Sunarno, 2018; Toharudin et al., 2017). Ethnoscience-based learning can improve scientific literacy skills as well as cultural literacy for students (Arlianovita, Setiawan & Sudibyo, 2015). This was emphasized by Sudarmin (2014) that ethnoscience learning is very important to be developed in universities as an effort to preserve local cultural values and traditions. Strengthening cultural literacy in ethnoscience learning is important to develop in order to face the challenges of the digital era which facilitates intercultural interaction through very fast access to information (Banks, 2014). Developing cultural literacy through ethnoscience learning can facilitate students to learn about their own culture and the culture of others, so that they have sufficient understanding of the values, norms and practices of that culture (Nieto, 2004). A good understanding of one's own culture can prevent student behavior from idolizing foreign cultures (Muniroh, Khasanah & Irsyad, 2020). Thus, the positive perception of prospective science teacher students in this research is an important finding which confirms that the younger generation has cultural literacy knowledge and is wise towards cultural diversity (Prasetya et al., 2022; Mardhiyah et al., 2021).

4. Conclusion

Based on the results of the research above, it can be concluded that (1) male students have an average score of 3.00 in the Tall category and women have an average score of 2.79 in the Tall category; (2) students from Mataram have an average score of 2.79 in the Tall category, West Lombok is 2.93 in the Tall category, Central Lombok is 2.95 in the Tall category, East Lombok is 2.88 in the Tall category , North Lombok at 2.78 in the Tall category; (3) students' perceptions of the indicator of understanding the value of diversity have an average score of 2.40 in the Low category, sensitivity to culture is 3.22 in the Tall category, and Interaction with culture is 3.23 in the Tall category; (4) there is no significant difference in the perceptions of male and female students regarding cultural literacy in ethnoscience learning as evidenced by a significance value of 0.384 which is greater than 0.05 (>0.05); (5) there is no significant difference in students' perceptions of cultural literacy in ethnoscience learning based on their region of origin as evidenced by a significance value of 0.914 which is greater than 0.05 (>0.05).

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