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Improving Science Attitude and Character of High School Students Using the INSETS Learning Model Based on Local Wisdom Sopi of East Nusa Tenggara

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ABSTRACT

Objective: This study examines the success of the INSETS model learning tool based on the local wisdom of Sopi culture of the Dawan tribe of East Nusa Tenggara to improve the science attitude skills and character of high school students. **Method:** This study applies the Instructional Design Model (IDM). Data were obtained from two observers who provided an assessment of the science attitude and character behavior of students shown by students during teaching and learning activities. **Results:** The results showed that the INSETS learning model based on the local wisdom of Sopi culture of the Dawan tribe of East Nusa Tenggara was effective in improving the science attitude skills and character of students, as evidenced by the results of the assessment of science attitudes and character of students during learning took place in the good to very good category. **Novelty:** Students' science attitude skills and character can be trained by integrating the INSETS learning model based on the local wisdom of Sopi culture of the Dawan tribe of East Nusa Tenggara to equip students in 21st Century education.

INTRODUCTION

21st Century Education requires educational institutions to produce quality resources. 21st Century Education emphasizes the importance of developing students scientific attitudes and character as part of efforts to prepare a generation that is able to compete in an increasingly dynamic world (Maison et al., 2021). To achieve this, science attitudes are important for learners to have. Science attitudes, which include curiosity, perseverance, conscientiousness, are essential to prepare learners to face global challenges in the era of Industrial Revolution 4.0 and towards the era of Society 5.0 (Sakurai et al., 2019). Science attitudes, which include curiosity, openness to evidence, and critical thinking ability, are very important skills in science learning (Maison et al., 2021). Science is a basic knowledge that includes products, processes, and applications (Retnowati et al., 2021).

Science attitude is one of the important aspects in science education, which includes students' interest, motivation, and ability to think critically about scientific concepts (Gordon et al., 2020). At the high school level, this attitude plays a significant role in determining the success of science learning, which not only affects the understanding of scientific concepts, but also the application of the scientific method in everyday life (Wang et al., 2021). In addition, learners' character, such as integrity, responsibility and ethics, is also important in education. Strong character building at the high school level is essential to form individuals who are ready to face future social and academic challenges (Snyder et al., 2019). Natural Sciences (IPA), especially biology, plays an important role in developing a positive attitude towards science (Rakhmawan et al.,

2019). Science education in senior high school (SMA) has an important role in shaping students' scientific attitudes and character (Sugiyanto, 2020).

Learning models such as inquiry and SETS (Science, Environment, Technology, and Society) have proven effective in developing science attitude skills. The inquiry model emphasizes critical and analytical thinking processes in solving problems, while the SETS model links learning to real situations involving science and technology (Rahayu, 2019; Dewi et al., 2020). Liu et al (2021) stated that inquiry learning significantly improved students' science attitudes and academic achievement by involving students in investigation and analysis activities. Local wisdom encompasses traditional knowledge, culture, and practices that develop within a particular community and can provide valuable insights in the context of science education (Sari et al., 2021). By utilizing local wisdom as a background for learning, the INSETS model aims to link science concepts with students' daily lives, increase environmental awareness, and enrich the learning process (Widodo et al., 2023).

By integrating local wisdom, it is expected that high school students can develop positive science attitudes and strong character, which will be useful in their future lives (Kurniawan et al., 2022). Sopi, as part of the culture of the Dawan tribe in North Central Timor District, East Nusa Tenggara, has high social and ritual values. Sopi is an alcoholic drink that contains addictive substances that can cause addiction and dependence so that sopi drinks are favored by teenagers and the general public. In addition, the presence of sopi is a symbol for the Dawan tribe to be able to act and build communication with ancestors. The integration of local wisdom such as Sopi in learning can help learners understand and appreciate culture and develop their science attitude skills and character (Ma'rit, 2019).

An approach that integrates local wisdom, such as the traditional drink sopi from the Dawan tribe in North Central Timor District, East Nusa Tenggara, in science learning at the high school level. This research focuses not only on conceptual understanding of science, but also on developing students' science attitudes and character through appreciation of local culture. By bringing in cultural elements that have high social and ritual values, this research seeks to build a bridge between modern science and local cultural practices (Lake et al., 2020). This integration is expected to create a more relevant and meaningful learning experience, thereby raising awareness of the addictive effects of substances such as alcohol in sopi while respecting ancestral traditions. Not many studies have explicitly linked local wisdom with the aim of developing science character and cultural understanding in high school students, making this approach new and unique in the Indonesian educational context. This study aims to test the INSETS learning model based on the local wisdom of Sopi culture of the Dawan tribe of NTT in improving the science attitude skills and character of high school students.

RESEARCH METHOD

This type of research is development research, this research design applies the Instructional Design Model (IDM) model. This research was conducted at the S3 Science Education Study Program FMIPA Surabaya State University. The implementation of the research consisted of 6 stages, namely: 1) needs analysis, 2) prototype design and development, 3) Validation of socio-scientific issues, 4) Testing of prototype socio-scientific issues, 5) evaluation of socio-scientific issues, 6) revision of socio-scientific issues (Ituma, 2015). The flow of the research is presented in the Figure 1.

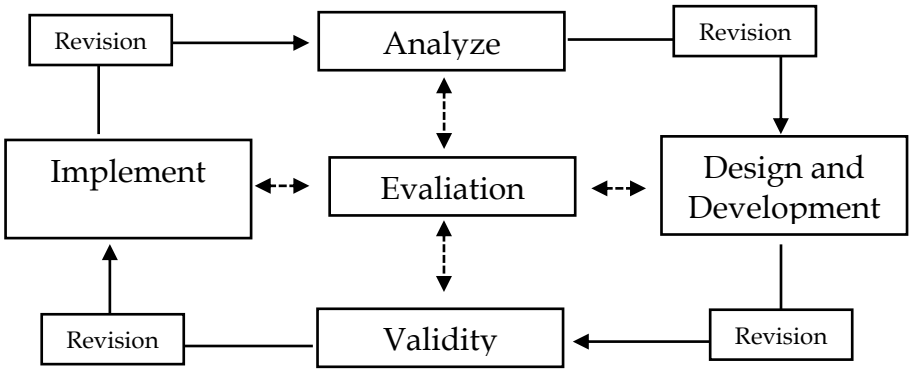


Figure 1. Flowchart of the research (Ituma, 1025)

However, this article presents the results of the implementation of the research, namely data on the achievement of the learning model developed obtained from the assessment of science attitudes and character behavior of students obtained from two observers who gave an assessment of the science attitudes and character behavior of students shown by students in teaching and learning activities. Data on the assessment of science attitudes and character behavior of learners are then analyzed to be used as a contribution to the learning model. Data from the assessment of the attitude and behavior of learners' attitudes during the process of learning activities were analyzed by comparing the average of the rating scale distributed to the two observers. Each observer gets a score: 4 categories = very good, 3 categories = good, 2 categories = quite good, and 1 category = not good. The effectiveness assessment category criteria can be seen in some of the tables below.

Table 1. Attitude Assessment Criteria in Learning Activities

Interval Score	Assessment Criteria
$3{,}65 \leq P \leq 4.00$	Very Good
$2.65 \leq P < 3.65$	Good
$1.33 \leq P < 2.65$	Quite Good
$1.00 \leq P < 1.33$	Less Good

(Source: Arikunto, 2012)

RESULTS AND DISCUSSION

Results

Data on the achievement of the INSETS learning model is obtained from the results of observations. The following will describe the achievement of the INSETS learning model through observations of science attitudes and student character behavior. Data from the assessment of science attitudes obtained by students during the learning process by applying the INSETS learning model in limited trials are described in Figure 2.

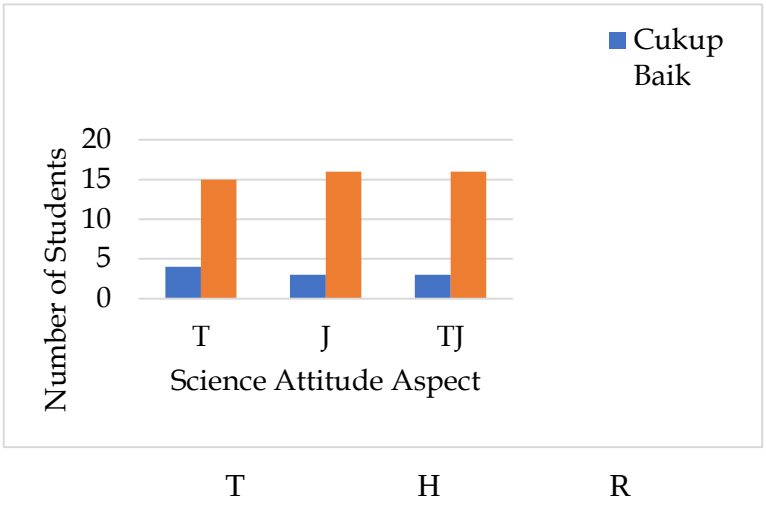
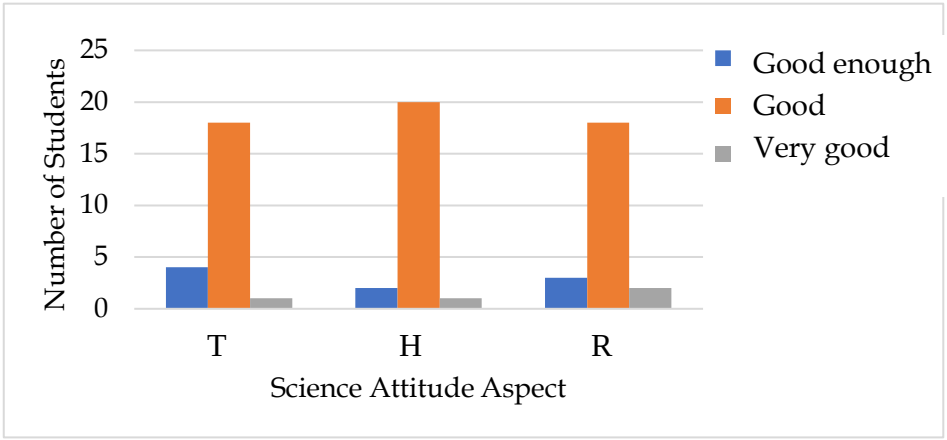


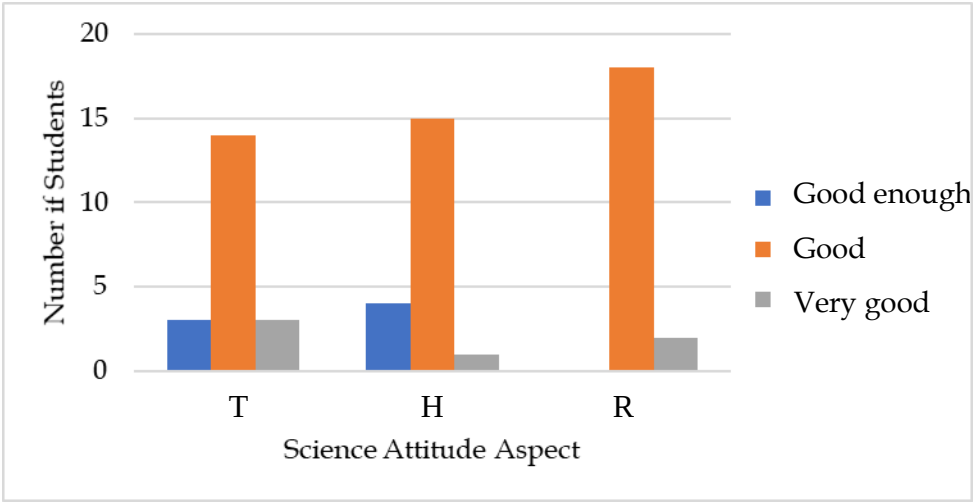
Figure 2. Graph of Students Science Attitude Assessment in the Limited Pilot Test

Information: T = Thorough; H = Honest; R = Responsibility

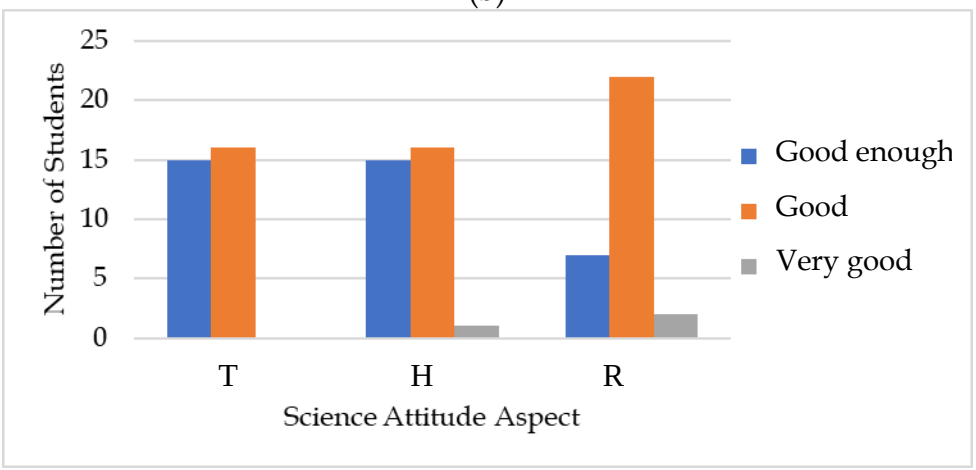
Based on Figure 2, it is obtained that in general the assessment for all aspects of science attitudes is in the good enough and good categories. Data from the assessment of science attitudes obtained by students during the learning process by applying the Insets learning model in the broad trial are described in Figure 3 (a, b, c).



(a)



(b)



(c)

Figure 3. Graph of Student Science Attitude Assessment in the Broad Test on Aspects: (a) Thorough, (b) Honest, (c) Responsibility

From Figure 3a, it can be seen that the assessment of science attitudes for the aspect of rigor in classes B1, B2, and B3 in the category of good enough was 8.69% (2 students), 15.00% (3 students), and 16.12% (5 students), respectively. In the aspect of accuracy with a good category, 91.30% (21 students), 85.00% (17 students) and 83.87% (26 students) respectively. In the excellent category for classes B1 4.34% (1 student), B2 by 10.00% (2 students) and B3 0.00% (0 students). From these data, it can be concluded that the majority of students for the accuracy aspect are in the good category.

Furthermore, from Figure 3b, it can be seen that the assessment of science attitudes for the aspect of honesty in classes B1, B2, and B3, respectively, with a fairly good category of 13.04% (3 students), 10.00% (2 students), and 12.90% (4 students). In the honesty aspect, the good category was 86.95% (20 students), 90.00% (20 students), and 87.09% (27 students) respectively. In the excellent category for respectively 0.00% (0 students), 0.00% (0 students), and 9.67% (3 students). From these data, it can be concluded that the majority of students for the honesty aspect are also in the good category.

Science attitude assessment for the aspect of responsibility seen from Figure 3c in classes B1, B2, and B3, respectively, with a fairly good category of 8.69% (2 students), 20.00% (4 students), and 6.45% (2 students),. In the aspect of responsibility with a good category successively amounted to 8.69% (2 students), 80.00% (16 students), and 93.54%

(29 students). Meanwhile, in the very good category, it was 4.37% (1 student), 0.00% (0 students), and 0.00% (0 students) respectively. From these data, it can be concluded that the majority of students for the responsibility aspect are also in the good category.

The character behavior assessment aims to evaluate the emergence of character behavior caused by the application of the Insets learning model during the learning process. The character behavior assessment is based on the indicators developed in designing the learning. Data from the assessment of character behavior in the limited trial is presented in the following Figure 4.

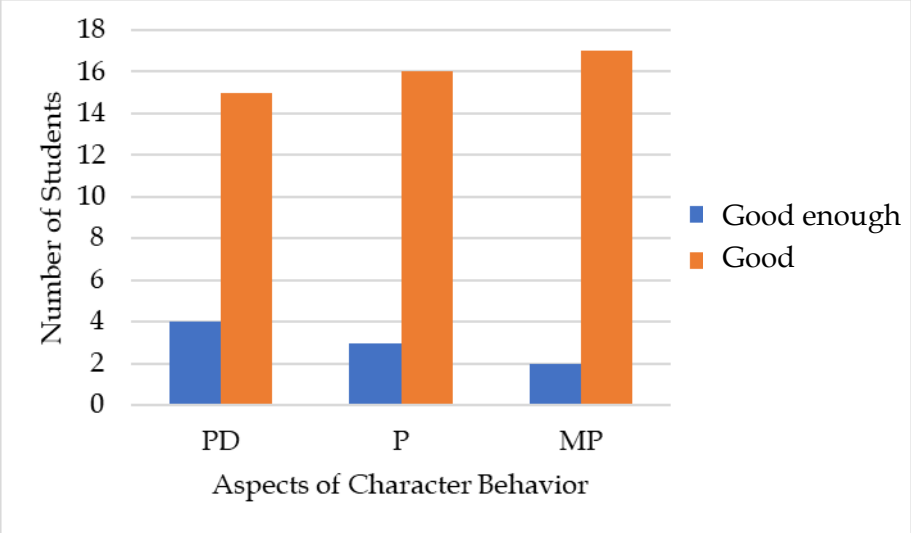
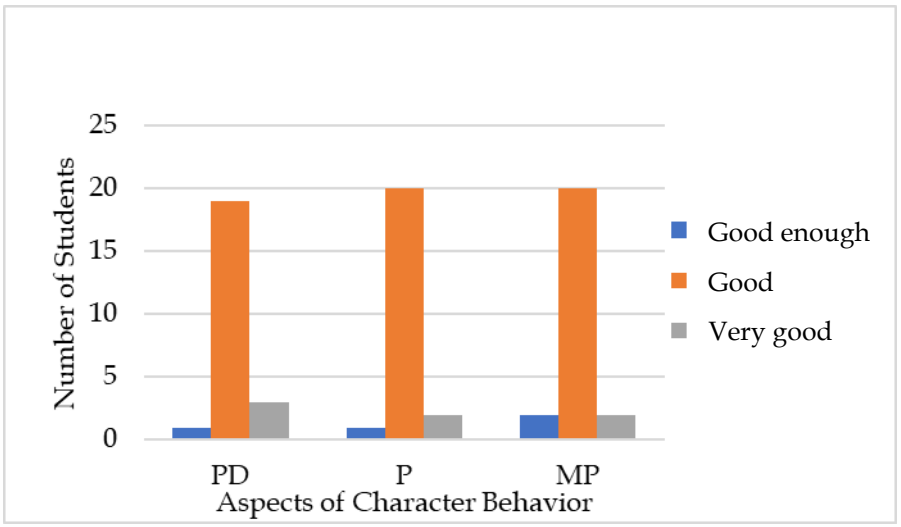


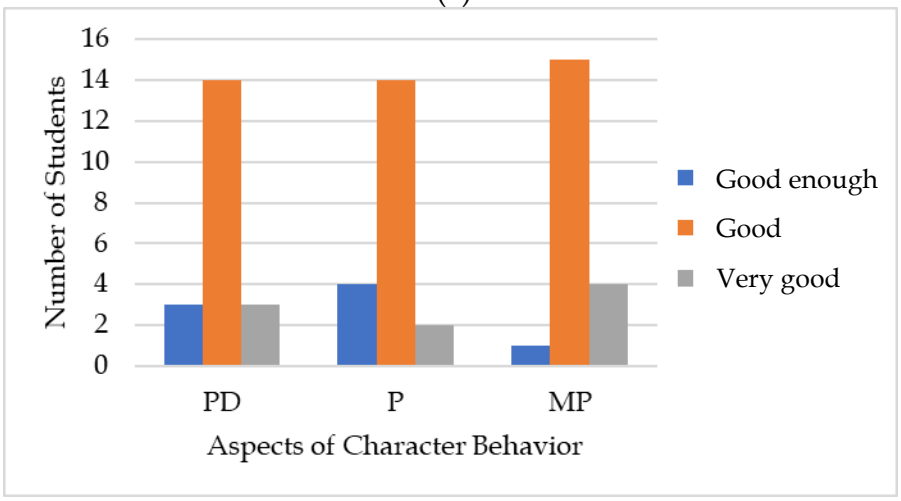
Figure 4. Graph of Student Character Behavior Assessment in Limited Trial

Information: PD = Confidence; P = Care; MP = Respect Opinions

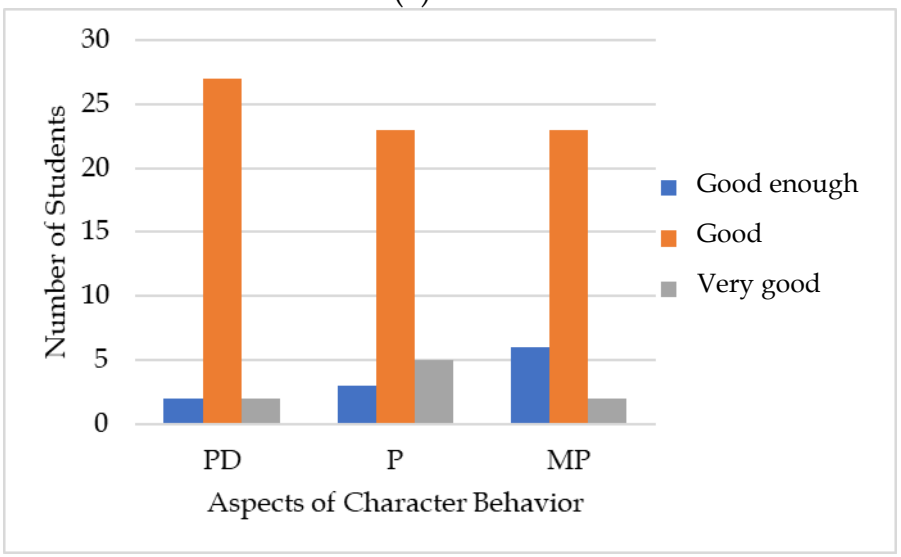
Based on Figure 4. obtained information that in general the assessment for all aspects of character behavior is in the sufficient and good categories. The character behavior assessment for the self-confidence aspect shows that 21.05% (4 students) are in the sufficient category, and 78.94% (15 students) are in the good category. The character behavior assessment for the caring aspect shows that 10.52% (2 students) are in the moderate category, and 89.47% (17 students) are in the good category. While the assessment of character behavior for the aspect of respecting opinions shows that 10.52% (2 students) are in the sufficient category, and 89.47% (17 students) are in the good category. Data from the assessment of character behavior obtained by students during the learning process by applying the Insets learning model in the broad trial are described in Figure 5 (a, b, and c).



(a)



(b)



(c)

Figure 5. Graph of Student Character Behavior Assessment in the Broad Test: (a) Confidence, (b) Caring, (c) Respect for Opinions

Information: PD = Confidence; P = Care; MP = Respect Opinions

From Figure 5a, it can be seen that the assessment of student character behavior for the aspect of self-confidence in classes B1, B2, and B3, respectively, in the category of good enough is 4.34% (1 student), 15.00% (3 students), and 6.45% (2 students). In the aspect of self-confidence with good categories in classes B1, B2 and B3 respectively amounting to: 95.65% (22 students), 85.00% (17 students), and 90.32% (28 students), In the very good category for classes B1, B2 and B3 respectively by: 13.04% (3 students), 15.00% (3 students), and 93.54% (2 students). From these data, it can be concluded that the majority of students for the self-confidence aspect are in the good category.

Furthermore, from Figure 5b, it can be seen that the assessment of students' character behavior for the caring aspect in classes B1, B2, and B3, respectively, with a fairly good category of 4.34% (1 student), 15.00% (3 students), and 9.67% (3 students). In the aspect of self-confidence with good categories in classes B1, B2 and B3 respectively amounting to: 95.65% (22 students), 85.00% (17 students), and 90.32% (3 students), In the very good category for classes B1, B2 and B3 respectively by: 8.69% (2 students), 10.00% (2 students), and 12.90% (4 students). From these data, it can be concluded that the majority of students for the aspect of self-confidence are in the good category.

The assessment of student character behavior for the aspect of respecting opinions seen from Figure 4c is in the quite good category of 0.00% (0 students), 10.00% (2 students), and 22.58% (7 students). In the aspect of self-confidence with a good category in classes B1, B2 and B3 respectively amounting to: 8.70% (2 students), 13.64% (3 students), and 13.64% (3 students), In the very good category for classes B1, B2 and B3 respectively by: 4.34% (1 student), 20.00% (4 students), and 6.45% (2 students). From these data, it can be concluded that the majority of students for the self-confidence aspect are in the good category. From the data, it can be concluded that the majority of students for the aspect of respecting opinions are also in the good category.

Discussion

The INSETS learning model is proven to improve students' science skills, attitudes and character behaviors. One important aspect of this improvement is the integration of local wisdom, which makes learning more contextual and relevant to learners. In this case, local wisdom such as Sopi, which has high social and ritual values among the Dawan tribe in East Nusa Tenggara, plays an important role in helping learners relate science concepts to their daily lives. Widodo et al. (2023) stated that by using the cultural context around learners, such as rituals and social values associated with sopi, learning becomes more relevant and meaningful. By understanding local wisdom, learners more easily internalize positive values in themselves, such as accuracy, honesty, and responsibility. This is in line with the research of Kurniawan et al. (2022) stated that learning that incorporates local wisdom can significantly improve students' character, especially in terms of respecting other people's opinions and working together in groups.

Based on the data obtained from Figures 2 and 3, the application of the INSETS model succeeded in improving students' science attitudes in the aspects of accuracy, honesty, and responsibility. These results show that most learners reached the moderate and good categories, with some learners reaching the excellent category in the broad trial. This is due to the integration of Sopi local wisdom in the Learning Implementation Plan (RPP) which links contextual issues with science learning, so that students more easily understand and appreciate the learning process (Anggraisa et al., 2024; Muyassaroh et al., 2024). Suryaningsih et al. (2022) stated that the inquiry model is able

to develop students' science literacy skills. Barton et al. (2020) SETS approach that integrates science with environmental and technological issues can improve students' science attitudes. This is in line with Parker et al. (2022) state that learning that integrates science with contextual knowledge and learner involvement is effective in improving science attitudes. According to Sari et al. (2021), effective learning models not only improve cognitive abilities but also learners' science attitudes, including rigor, honesty, and responsibility, which are important for optimal inquiry outcomes and learner character building.

In addition, the data in Figures 4 and 5 show that the INSETS learning model can also improve learners' character behaviors, such as self-confidence, caring, and respect for friends' opinions. The INSETS model, which combines the inquiry approach with SETS (Science, Environment, Technology, and Society), has been proven to develop learners' science attitude skills and character. This approach allows learners to actively engage in the learning process through exploration and investigation, which strengthens scientific attitudes such as curiosity, rigor, and honesty. In accordance with Yager et al. (2022) state that the SETS approach in science education not only improves scientific understanding but also strengthens learners' social engagement and environmental awareness, which contributes to character development such as responsibility and concern for others. Through the integration of science with environmental, technological, and societal issues, learners learn to appreciate the importance of cooperation, responsibility, and concern for others. This is in line with Barton et al. (2020), which shows that the integration of science with contextual issues in the SETS model provides a more meaningful learning experience, so that students can more easily internalize scientific values and positive characters (Irsan et al., 2024). In the broad trial, some learners achieved very good categories in these aspects. This is because the aspects of character behavior are always scheduled in the lesson plan, which supports learners in collaborating and respecting friends' opinions during group discussions. Gunawan et al. (2022) suggested that the implementation of a structured learning model can significantly improve learners' character behavior, both in individual and group contexts.

Thus, the INSETS model integrated with Sopi local wisdom in lesson plans has an important role in achieving science attitudes and learner character. Nugroho et al. (2023) emphasized that consistency in integrating aspects of science attitude and character in lesson plans ensures that learners are constantly directed to develop positive attitudes and good behavior. In addition, increased confidence in learning allows learners to more actively express their ideas and participate in class discussions, which is important for the development of critical thinking and collaboration skills (Prasetyo et al., 2021). Research by Shohib et al. (2021) states that there is an effect of the application of learning models, the quality of teaching materials, and learning methods on students' science literacy skills. Thus, the INSETS learning model based on Sopi local wisdom supports the development of science attitudes and positive character behavior.

CONCLUSION

Fundamental Finding: Based on the results of the study, the INSETS learning model learning device based on the local wisdom of Sopi NTT is able to improve science attitude skills in the good enough to good category. The aspects of accuracy, honesty, and responsibility of the percentage of students who are in the good category. While the character behavior of students, the data shows that the aspects of confidence, care, and

respect for opinions are also in the good category. This is supported by the overall average of the results of the assessment of science attitudes and character behavior of the two observers. **Implication:** The INSETS model learning tool can be used by teachers in practicing science attitude skills and student character through science learning by integrating the local wisdom of Sopi NTT. **Limitation:** This research was conducted in a relatively short time. Future Research: Research is needed on the effect of the INSETS Sopi NTT learning model on long-term learning outcomes, including academic achievement and relevant skills.

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