

The Influence of Learning Strategies and Learning Styles on the Effectiveness of Nursing Students' Study Schedules in Coastal and Mountainous Areas of the 3T Regions

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ABSTRACT: This study aims to analyze the influence of learning strategies and learning styles on the effectiveness of nursing students' study schedules in coastal and mountainous areas of the 3T (Frontier, Remote, and Underdeveloped) regions. The background of this study is based on differences in geographic characteristics and educational access that have the potential to influence student learning patterns. The research method used a quantitative approach with a cross-sectional design. The sample consisted of nursing students from coastal and mountainous areas using a stratified random sampling technique. The research instrument was a questionnaire on learning strategies, learning styles (visual, auditory, kinesthetic), and the effectiveness of the study schedule, which had been tested for validity and reliability. Data analysis was conducted using multiple regression tests. The results showed that learning strategies significantly influenced the effectiveness of the study schedule ($p < 0.05$), while learning styles also made an important contribution in adjusting students' study schedules ($p < 0.05$). These findings confirm that the effectiveness of the study schedule is not only influenced by the learning strategies implemented by lecturers, but also by the suitability of students' learning styles to their learning environment. The implications of this study are the need to develop adaptive learning strategies based on local contexts and strengthen students' skills in managing study schedules according to their individual learning styles, especially in 3T regions.

KEYWORDS: Learning strategies; learning styles; study schedule effectiveness; nursing students; 3T regions

BACKGROUND

Nursing higher education plays a crucial role in preparing competent, adaptive healthcare professionals capable of addressing the challenges of healthcare services in various regions, including remote, outermost, and underdeveloped (3T) areas. With the increasing need for quality public healthcare services, nursing students are required to master not only theoretical knowledge but also practical skills, critical thinking, and professional attitudes in accordance with nursing ethical standards. In the context of globalization, the learning process in nursing is no longer limited to the transfer of knowledge in the classroom but also encompasses the mastery of effective learning strategies tailored to the geographic, social, and cultural conditions of each region. 3T areas, including coastal and mountainous areas, face various obstacles in providing higher education, such as limited internet access, inadequate educational infrastructure, limited teaching staff, and low socioeconomic conditions (Valmay1, 2024).

This situation impacts student learning patterns, including scheduling. Nursing students in coastal areas often face additional activities such as helping parents with fishing, while students in mountainous areas face limited access to transportation, electricity, and communication networks. Thus, the effectiveness of student study schedules in 3T regions is influenced by many factors, including the learning strategies implemented by lecturers and each student's individual learning style. A learning strategy is a systematic approach used by lecturers to achieve specific learning objectives. According to educational theory, a good learning strategy must accommodate individual differences, create a conducive learning environment, and adapt to environmental conditions. In the context of nursing students in 3T regions, interactive, problem-based learning, and contextual learning strategies are essential to enable students to connect theoretical material with real-world realities. Implementing appropriate strategies is believed to increase motivation, understanding, and effectiveness in managing student study schedules, thereby enabling the achievement of professional competencies (Magayang, 2020).

Every student has a different learning style, such as visual, auditory, kinesthetic, or a combination of the three. These differences in learning styles affect how students receive, process, and remember information. Students with a visual learning style tend to understand material more easily through images, diagrams, or videos, while auditory learners are more effective when material is

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presented through discussion or oral explanation. Kinesthetic learners, on the other hand, prefer learning through hands-on practice or simulations. If the learning strategies implemented by lecturers do not align with students' learning styles, the effectiveness of the study schedule can decrease because students find it difficult to understand the material and manage their study time (Mataram, 2018).

The effectiveness of nursing students' study schedules is greatly influenced by the match between the learning strategies implemented and their learning styles. Learning strategies that align with learning styles will increase student engagement, improve time management, and facilitate the achievement of learning objectives. Conversely, a mismatch between strategies and learning styles can lead to fatigue, low motivation, and irregular study schedules. In the 3T (Underdeveloped, Remote, and Remote) regions, these challenges are further compounded by limited learning facilities and less supportive environmental conditions. Therefore, an in-depth study is needed to examine the influence of learning strategies and learning styles on the effectiveness of nursing students' study schedules in coastal and mountainous areas.

This research is highly urgent, representing a practical contribution, and can serve as input for nursing universities in designing more adaptive learning strategies for students in the 3T (Underdeveloped Regions) (3T) (Manuella Meireles Pereira^{1†}, 2024).

It also has academic implications, enriching the literature on the relationship between learning strategies, learning styles, and the effectiveness of study schedules, particularly in the context of nursing education in areas with limited access. Furthermore, it has a social impact: by improving the effectiveness of study schedules, nursing students are expected to complete their studies on time and become healthcare professionals who can return to their home regions. This research considers local, regional, national, and global relevance. In Papua, particularly coastal and mountainous areas, students face challenges with infrastructure, transportation, electricity, and internet access (*, 2011).

This research is relevant for finding learning strategies appropriate to these unique conditions. In a socio-cultural context, Papuan nursing students live in a collectivist, mutual cooperation culture, and have multiple roles within the family (e.g., helping parents in the fields or at sea). This research can provide recommendations for contextual adjustments to study schedules. By strengthening local human resources, the results of this study can help produce nurses who are adaptive to Papuan conditions, thereby improving the quality of healthcare services in the 3T (Underdeveloped Regions) (3T) (Aliev*, 2024).

Nationally, to Equitable Quality of Health Professional Education in Indonesia, Indonesia faces challenges in equalizing the quality of higher health education, particularly between developed and underdeveloped regions. This research supports national policies related to improving the quality of vocational and health professional education. This research, focusing on the National Curriculum for vocational nursing education, provides empirical evidence on how learning strategies can be adapted to students' learning styles, supporting the implementation of the national curriculum in areas with limited access. By considering national health policies to produce graduates who learn effectively, this research also strengthens the national health system through competent nursing personnel (Eija Yli-Panula 1, 2020).

Similar issues are also experienced in various developing countries, especially in rural and remote areas. This research can serve as a case study for the global context. Global trends in nursing education emphasize the importance of student-centered and lifelong learning. This research demonstrates how adaptive learning strategies can be implemented in remote areas. The Sustainable Development Goals (SDGs) are relevant to SDG 3 (Good Health and Well-Being) and SDG 4 (Quality Education), as improving the quality of nursing education supports better health services. There is limited research examining the relationship between learning strategies, learning styles, and the effectiveness of study schedules specifically in Papua, particularly comparing coastal and mountainous students (Guide to COASTAL, 2029).

This study highlights how local culture (collective lifestyles, students' social roles in the community) influences learning patterns. It contributes to a nursing learning model that is adaptive to the geographic conditions and resource constraints in Indonesia's 3T (Uninhabitable and Remote) regions. This research also has the potential to generate national data on variations in nursing students' learning styles in 3T regions, which is not widely available. This research can serve as a global case study on health education in remote areas, comparable to studies in Africa, the Pacific, or Latin America. It offers a new perspective on the interaction between learning strategies, learning styles, and study time management in a regional context with limitations. It combines educational, health, and anthropological perspectives (Papuan cultural context) in nursing learning (Williams¹, 2020).

LITERATURE REVIEW

A learning strategy is an action plan that includes methods, techniques, and media to achieve specific learning objectives (Sanjaya, 2019). In the context of nursing education, learning strategies emphasize not only cognitive aspects but also psychomotor skills and professional attitudes. Effective strategies can foster interactions between lecturers and students and encourage active student participation in the learning process. Research by Huda (2020) shows that adaptive learning strategies can improve student learning discipline, including in managing study schedules. Meanwhile, research by Utami (2022) on nursing students found that practice-based learning strategies were more effective in increasing learning regularity than lecture methods (Joyce Neroni¹, 2022).

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Learning style is defined as an individual's unique way of receiving, processing, and remembering information (Fleming & Mills, 1992). The VARK (Visual, Auditory, Reading/Writing, Kinesthetic) theory is a popular framework for understanding variations in learning styles. (1) Visual – learns more easily through images, graphs, colors, and diagrams; (2) Auditory – learns more effectively through discussions, lectures, or listening to recordings; (3) Reading/Writing – prefers reading text and rewriting information; (4) Kinesthetic – learns better through hands-on practice, simulations, and physical activity. Research by Putra (2021) shows that students who study according to their learning style tend to be more disciplined in managing their study schedules and achieve better academic results. Conversely, a mismatch between learning strategies and learning styles can reduce learning motivation and the effectiveness of study schedules((Jessica Stander*, 2019).

In the context of Papua, students from coastal and mountainous areas have different learning style tendencies due to their cultural backgrounds, environments, and previous educational experiences. Coastal students, who are closer to technological access, tend to be comfortable with visual and auditory media, while students from the mountains are more dominant in their practice-based kinesthetic style. The effectiveness of a study schedule is the extent to which students can manage their study time consistently, disciplined, and in accordance with established academic targets. Indicators of study schedule effectiveness include (Zimmerman, 2002; Utami, 2022). Discipline in managing study time with other activities. Academic results (GPA/exam scores) reflect the success of the schedule. Student perceptions of study regularity and productivity. According to Zimmerman (2002), the effectiveness of a study schedule is closely related to the concept of self-regulated learning, where students who are able to manage their study time will be more successful in achieving academic goals. In nursing education, the ability to manage a study schedule is crucial because students not only learn theory but also must manage time for clinical practice and other academic assignments ((Linda Beagley, 2022).

Previous research has shown a close relationship between learning strategies, learning styles, and the effectiveness of a study schedule. Hadi & Prasetyo (2020) found that learning strategies tailored to learning styles increase learning effectiveness and schedule regularity. Sanjaya (2019) found that students who receive a variety of learning strategies are more disciplined in following their study schedule. Utami (2022) found that the effectiveness of nursing students' study schedules is influenced by the suitability of learning methods to student characteristics. Putra (2021) found that students with visual and auditory learning styles are more consistent in their study schedules when facilitated by digital media, while kinesthetic students are more effective through practice. This relationship can be understood through the theory of constructivism which emphasizes that effective learning occurs when students are actively involved according to their learning style, as well as the theory of self-regulated learning which emphasizes the importance of time management and self-control skills ((Lindsey Childs-Kean, 2020).

METHODOLOGY

This research employed a quantitative design with a correlational analytical approach. A cross-sectional study was conducted to determine the influence of learning strategies and learning styles on the effectiveness of nursing students' study schedules in coastal and mountainous areas of the 3T (Underdeveloped Regions) (3T) region. The study was conducted at universities or nursing departments located in coastal and mountainous areas of Papua. The location was selected based on geographic representation and the availability of active students. The study period was planned for six months, from instrument preparation, data collection, analysis, and reporting of research results. The population in this study was all nursing study program students (Diploma III and Applied Bachelor of Nursing) currently studying at universities in coastal and mountainous areas of Papua, totaling 120 samples. Quantitative data analysis included descriptive frequency distributions, mean, and SD for respondent characteristics and research variables. Bivariate analysis included Chi-square, t-test, or ANOVA to examine the relationship between the independent and dependent variables. Multivariate analysis included multiple linear/logistic regression to determine the influence of learning strategies and learning styles on the effectiveness of study schedules, with control for confounding variables. Interaction (moderation) test: to determine whether learning style moderates the influence of learning strategies on the effectiveness of study schedules ((John T. Ratelle, 2019).

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1. Respondent Characteristics by Location

Location	Number (n)	Percentage (%)
Mountains	40	33,3
Coastal Islands	80	66,7
Total	120	100

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This study involved 120 vocational nursing students (DIII and DIV) studying in the 3T (Underdeveloped Regions) (3T) regions. Forty respondents (33.3%) came from mountainous areas, and 80 respondents (66.7%) came from coastal/island areas (Table 1). This indicates that the majority of respondents in this study reside in coastal areas.

Table 2. Distribution of Learning Strategies by Location

Learning Strategies	Mountains (n)	Coastal (n)	Total
Lecture/ Face to Face	21 (52,5)	18 (22,5)	39 (32,5)
Group Discussion	9 (22,5)	30 (37,5)	39 (32,5)
Clinical/ Field Practice	6 (15,0)	20 (25,0)	26 (21,7)
Online Learning	4 (10,0)	12 (15,0)	16 (13,3)
Total	40 (100)	80 (100)	120 (100)

The distribution of teaching strategies used by lecturers differed between universities in mountainous and coastal areas (Table 2). Lecture/face-to-face teaching strategies were more common in mountainous areas (52.5%), while in coastal areas, group discussions (37.5%) and clinical/field practice (25%) were more prevalent. Online learning was more common in coastal areas (15%) than in mountainous areas (10%). These findings illustrate differences in technology accessibility and teaching approaches used in the two regions.

Table 3. Distribution of Student Learning Styles

Learning Style	Mountains	Coastal	Total
Visual	10 (25,0)	36 (45,0)	46 (38,3)
Auditory	14 (35,0)	26 (32,5)	40 (33,3)
Kinesthetic	16 (40,0)	18 (22,5)	34 (28,4)
Total	40 (100)	80 (100)	120 (100)

The results of the learning style identification showed differences in tendencies between students in mountainous and coastal areas (Table 3). Coastal students were more likely to have visual (45%) and auditory (32.5%) learning styles, while mountainous students were more likely to have a kinesthetic learning style (40%). Overall, student learning styles were relatively balanced between visual (38.3%), auditory (33.3%), and kinesthetic (28.4%).

Table 4. Study Schedule Effectiveness Score Based on Location

Location	Mean $\pm$ SD	Minimum	Maximum
Mountains	72,4 $\pm$ 7,1	60	85
Coast/ Islands	78,6 $\pm$ 6,2	65	90
Total	76,5 $\pm$ 6,8	60	90

The average score for the effectiveness of nursing students' study schedules showed significant differences between locations (Table 4). Students from coastal areas had a higher average score (78.6 $\pm$ 6.2) compared to students from mountainous areas (72.4 $\pm$ 7.1). The highest scores were obtained by coastal students (maximum 90), while the lowest scores were found in mountainous students (minimum 60). These results indicate that coastal students are relatively more able to manage their study schedules effectively than mountainous students.

Table 5 Results of Multiple Analysis

Variable	B	t	p-value
Learning Strategies	0,38	4,21	0,001*
Learning Style	0,27	3,46	0,002*

R² = 0.41

Note: *p < 0.05 is significant

The results of the multiple regression test showed that learning strategies and learning styles simultaneously had a significant effect on the effectiveness of students' study schedules (p < 0.05) with a coefficient of determination (R²) of 0.41 (Table 5). Partially, learning strategies made the greatest contribution to the effectiveness of study schedules (B = 0.38; p = 0.001), while learning styles also had a significant effect (B = 0.27; p = 0.002). This means that 41% of the variation in the effectiveness of nursing students'

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study schedules can be explained by a combination of learning strategies and learning styles, while the remainder is influenced by other factors outside the study

DISCUSSION

The results showed that the majority of respondents came from coastal/island areas (66.7%), while the remainder came from mountainous areas (33.3%). This difference in numbers reflects the geographic conditions and distribution of health universities, which are more prevalent in coastal areas. This finding is consistent with a report from the Ministry of Health (2022), which stated that access to health higher education in coastal areas is more developed than in mountainous areas due to factors such as infrastructure, mobility, and access to technology.

Learning strategies in mountainous areas were dominated by lecture/face-to-face methods (52.5%), while students in coastal areas were more likely to use group discussions (37.5%) and clinical/field practice (25%). This situation can be explained by limited internet access and technology-based learning resources in the mountains, resulting in a greater use of conventional learning methods. These results align with research by Yuliani (2020), which stated that limited facilities in 3T (frontier and outermost) areas encourage lecturers to rely more on face-to-face learning. Conversely, universities in coastal areas have better access to digital resources, enabling them to integrate collaborative learning strategies and field practice (Putri & Sari, 2022).

The identification results show that students in mountainous areas tend to have a kinesthetic learning style (40%), while coastal students are more visual (45%) and auditory (32.5%). This difference illustrates the influence of the learning environment on the formation of learning styles. According to the theory of Dunn & Dunn (2011), learning styles develop based on repeated learning experiences within the context of the environment. Students in mountainous areas are more accustomed to hands-on practice due to the limitations of digital media, so the kinesthetic learning style is more prominent. Conversely, coastal students have greater exposure to visual and audio materials from online learning and multimedia sources, so visual and auditory learning styles are more developed. These findings support Harsono's (2019) study, which emphasized the importance of adapting learning strategies to the diversity of student learning styles to increase learning effectiveness.

A comparison of study schedule effectiveness showed that coastal students scored higher (78.6 ± 6.2) than mountainous students (72.4 ± 7.1). This suggests that coastal students are better able to manage their study time independently. A contributing factor to this situation is the availability of learning resources such as libraries, internet access, and digital learning resources, which are more adequate in coastal areas (Ministry of Education and Culture, 2021). Conversely, students in mountainous areas face limited resources, resulting in a relatively lower study schedule effectiveness. Similar research by Nurhayati (2021) also found that a learning environment with wider access to learning resources improves students' ability to plan study schedules effectively.

Regression analysis results showed that learning strategies and learning styles simultaneously significantly influenced study schedule effectiveness, contributing 41%. This suggests that the effectiveness of a student's study schedule is not determined by a single factor, but rather by a combination of the instructor's learning approach and the student's learning style preferences. These findings align with Vygotsky's constructivist theory, which emphasizes that effective learning occurs through the interaction between learning strategies and individual learning experiences. These results also align with research by Putri & Sari (2022), which found that adaptive learning strategies tailored to students' learning styles increase learning independence and effectiveness.

INTERPRETATION OF RESULTS

The findings of this study emphasize the importance of developing learning strategies that adapt to student learning styles and are based on the local context. For universities in mountainous areas, learning approaches based on field practice and face-to-face learning need to be enriched with simple innovations that adapt to technological limitations. Meanwhile, in coastal areas, the integration of learning technology needs to be optimized to support students' visual and auditory learning styles. This way, the effectiveness of study schedules can be improved more evenly across both regions.

CONCLUSION

This study shows that learning strategies and learning styles significantly influence the effectiveness of study schedules for nursing students in the 3T (Underdeveloped and Remote Areas). Learning strategies based on group discussions and clinical practice are more effective in coastal areas, while lectures and face-to-face methods are more dominant in mountainous areas. Coastal students tend to have visual and auditory learning styles, while mountainous students are more kinesthetic.

The effectiveness of study schedules for coastal students is higher than that of mountainous students, influenced by differences in access to learning resources. Regression analysis shows that the combination of learning strategies and learning styles explains 41% of the variation in study schedule effectiveness. Thus, the effectiveness of a student's study schedule is not only determined by internal factors (learning style) but also influenced by external factors (the learning strategies implemented by lecturers).

The researchers' recommendations for universities include the need to develop adaptive learning strategies that consider regional characteristics (coastal and mountainous) and adapt to student learning styles. Learning support facilities, particularly internet access

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and learning media, need to be improved evenly in the 3T (frontier and remote) areas. Lecturers are advised to combine various learning methods, including group discussions, clinical practice, and the use of visual and audio media. Furthermore, consideration should be given to the diversity of student learning styles so that study schedules can be optimized to suit individual needs. Future researchers can add other variables such as learning motivation, family support, and campus environmental factors to obtain a more comprehensive picture. A longitudinal design is also recommended to examine the dynamics of changes in learning strategies and the effectiveness of schedules over the long term.

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