Learning Styles and Motivation: A Cross-Sectional Study

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ABSTRACT

This study aimed to investigate the correlation between learning styles and motivation among Counselling students at a Malaysian university. This study examines the impact of visual, auditory, and kinesthetic (VAK) learning methods on students' motivation levels within an academic setting. A quantitative study design was employed, involving 123 respondents who were Bachelor of Counselling students. The utilized instruments are the Self-Motivation Questionnaire developed by Nasirah Ismail, Norhasliza Abdullah, and Siti Zubaidah Saharudin (Politeknik Sultan Azlan Shah) and the VAK Learning Style Model proposed by Fleming and Mills (1992). This study effectively identifies connections between learning styles and motivation among Counselling students. It shows a significant negative relationship for auditory and kinesthetic styles, while there is no significant relationship for visual learning. Although the study suggests that auditory and kinesthetic learners may have lower motivation, it does not provide direct qualitative insights into the students' experiences to clarify this issue. Further research is warranted to explore the implications of these findings and to investigate additional factors including self-efficacy, curriculum design and the relevance of course content. This will help provide a fuller understanding of student motivation in Counselling programs.

Keywords: Learning Styles, Motivation, VAK Model, Self-Motivation, Counselling Students

INTRODUCTION

Higher education in Malaysia has experienced rapid transformation in recent years, particularly with the integration of digital technology in teaching and learning. Online platforms, interactive multimedia tools, and virtual classrooms have changed the way students interact with academic content. In this modern learning environment, students are expected to take greater responsibility for their own learning, which requires a high level of self-motivation (Neo & Ng, 2020). One key factor that influences students' academic experience is their learning style, which shapes the way they process and retain information. The Visual, Auditory, and Kinesthetic (VAK) model is commonly used to identify students' learning preferences (Fleming & Mills, 1992). Research has shown that when teaching methods align with the learning styles preferred by students, motivation and academic performance tend to improve (Dahliana, Jaelani, & Rokhmah, 2023). In Counselling education, where students also need to develop interpersonal and emotional skills, motivation plays a more critical role. Therefore, understanding the relationship between learning styles and motivation is crucial for developing effective teaching strategies that support student engagement and academic success (Deci & Ryan, 1985).

The field of higher education is undergoing significant transformation, driven primarily by advancements in artificial intelligence (AI) and digital technology. These developments have changed the teaching and learning process, enabling a more personalized, flexible, and interactive educational experience (Keller, 2010). AI-powered tools such as adaptive learning platforms, collaborative tools, and data analytics facilitate customized learning pathways to meet the diverse needs of students. At the same time, digital technology provides new ways for content delivery and collaboration, which have become integral to modern education. This evolving educational environment emphasizes the importance of understanding students' learning preferences to maximize the benefits of technology integration (Neo & Ng, 2020).

One critical factor in effective learning is recognizing the various learning styles of students. The VAK model, which consists of visual, auditory, and kinesthetic learning styles, serves as a valuable framework for categorizing the preferred ways students acquire and process information (Fleming & Mills, 1992). Visual learners absorb information best through images and diagrams. Auditory learners process information through listening and discussion, while kinesthetic learners learn well through practical activities and hands-on experiences. Integrating digital tools that align with these learning preferences can enhance student engagement and improve learning outcomes by delivering content in a manner that suits individual students (Dahliana, Jaelani, & Rokhmah, 2023).

Learning styles are closely related to student motivation, an essential element for academic success. Motivation affects students' readiness to engage, persevere, and achieve their educational goals (Deci & Ryan, 1985). When teaching methods align with the learning modes preferred by students, they are more likely to feel capable and motivated, leading to better academic performance. On the other hand, a mismatch between teaching approaches and learning preferences can reduce motivation and hinder learning (Farah Wazera & Mohammad Mujaheed, 2021). According to Bandura's Social Cognitive Theory, students' self-efficacy their belief in their ability to succeed is shaped by their learning experiences and has a profound impact on their motivation and perseverance (Bandura, 1977; Rumjaun & Narod, 2020). In the context of higher education, especially in professional disciplines such as Counselling, fostering motivation through a student-centered approach is important.

Counselling students must master both theoretical knowledge and practical skills, requiring diverse teaching strategies that address their individual learning styles. Gaining insight into the interplay between learning styles and motivation is crucial for developing pedagogical strategies that promote both academic success and holistic student development in technology-driven educational settings. Therefore, this study aims to examine the relationship between VAK learning styles and academic motivation among Counselling students. The findings of this study are intended to inform the development of teaching strategies that leverage digital technology to support students' learning preferences and enhance their motivation and academic success (Bandura, 1977, Deci & Ryan, 1985).

In higher education, students are expected to develop effective learning strategies that align with their cognitive abilities and academic needs. However, many students face difficulties in achieving optimal learning outcomes due to the mismatch between their preferred learning styles and the teaching methods used at the university (Farah Wazera & Mohammad Mujaheed, 2021). This issue is highly relevant in the field of Counselling education, where students not only need to acquire theoretical knowledge but also develop practical skills, self-awareness, and sustained motivation to actively engage in their learning (Suaib, 2017).

The adaptation of teaching materials according to the students' dominant VAK learning styles has been shown to enhance their motivation and academic performance (Dahliana et al., 2023). Conversely, students whose learning preferences are not recognized may experience reduced engagement, lower levels of interest, and declining academic achievement (Neo & Ng, 2020). This difference highlights a critical gap in understanding how tailored teaching approaches can enhance student motivation in an academic environment.

Although there is a growing interest in learning styles and student motivation, most existing studies have focused on the general university population rather than specifically exploring these variables among Counselling students (Suaib, 2017; Rini, Adisyahputra, & Sigit, 2020). This represents a significant research gap, especially to Counselling students, where no studies to date have directly investigated the relationship between VAK learning styles and student motivation in Counselling programs.

Furthermore, although it is clear that university students in Malaysia generally prefer visual and kinesthetic learning styles over auditory methods (Farah Wazera & Mohammad Mujaheed, 2021), traditional lecture-based teaching strategies that rely primarily on auditory delivery still remain dominant in higher education (Nizam et al., 2021). This separation raises concerns about the effectiveness of current educational practices

in meeting students' learning needs and maintaining their motivation, especially in fields like Counselling that require both theoretical mastery and practical application.

Additionally, there is a lack of empirical evidence on how adapting teaching methods to students' VAK learning preferences can enhance motivation and academic engagement (Dahliana et al., 2023). This absence leaves educators without clear guidelines to plan more responsive teaching strategies that support diverse students and promote sustained motivation.

Therefore, this study aims to address this gap by examining the relationship between VAK learning styles and motivation among Counselling students. This research was conducted by the author as part of an undergraduate project. The findings are expected to provide valuable insights into how learning style preferences influence motivation and to offer guidance for educators in developing more personalized and effective teaching approaches that foster student engagement and academic success.

THEORY

The VAK Learning Style Model is used in this study to classify students based on their dominant learning preferences: Visual, Auditory, or Kinesthetic. This model provides insight into how students absorb, process, and retain information, which can directly impact their motivation to learn. Students taught using methods aligned with their preferred learning styles tend to show higher engagement, better information retention, and increased motivation (Neo and Ng, 2020). For example, visual learners are more likely to remain motivated when exposed to structured notes, diagrams, and written explanations, while auditory learners benefit from lectures and oral discussions, and kinesthetic learners prefer practical activities and hands-on experiences (Farah Wazera and Mohammad Mujaheed, 2021). This study uses the VAK model to investigate whether the learning styles of Counselling students affect their levels of motivation, particularly in academic and practical learning environments.

Meanwhile, Albert Bandura's Social Cognitive Theory (1986) is used to explain the role of self-efficacy in academic motivation. This theory suggests that students who believe in their ability to succeed (high self-efficacy) are more likely to continue their learning, engage in academic activities, and overcome challenges (Bandura, 1997). This study examines how students' confidence in their learning abilities, shaped by the learning styles they choose, affects their motivation to excel academically. Additionally, observational learning, one of the main principles in Bandura's theory, suggests that students may feel more motivated when they see their peers succeed in a similar learning environment (No'u Gusasi et al., 2024). Dahliana et al. 2023 study also considers how verbal persuasion, emotional states, and past experiences influence motivation, as students may respond differently based on their learning preferences and external influences.

This study integrates the VAK Learning Styles Model and Social Cognitive Theory to explore the interaction between learning styles and motivation, specifically how Counselling students effectively practice basic Counselling skills, including active listening, providing appropriate responses, building empathy, and conducting structured session processes. Mastery of these skills is crucial in helping students build self-confidence and professionalism when dealing with clients in real situations. In addition, during the learning process, Counselling students also focus on understanding and applying each Counselling theory they have learned. Therefore, students can enhance their proficiency in case analysis, using appropriate interventions, and establishing strong therapeutic relationships with clients.

METHOD

Study Design

This was a cross-sectional, quantitative study. The cross-sectional design is well-suited for correlational purposes, offering a practical and relevant approach by allowing researchers to examine relationships between variables at a single point in time, which is particularly useful in counselling education to understand

immediate educational impacts. It provides an important preliminary insight into the relationship between learning styles and student motivation, thereby serving as a valuable foundation for future research by identifying key areas for further exploration.

Participants and Sample

This study involved 123 undergraduate Counselling students. The population consisted of 181 students across seven semesters. The sample size was determined using Krejcie and Morgan's (1970) sampling table. A two-stage sampling technique was employed, stratified cluster sampling based on semester level, followed by simple random sampling within each cluster. This approach ensured equal opportunity for all students to be selected and enhanced the generalizability of the findings to the wider student population.

Procedure of Data Collection

Data were collected using a structured questionnaire consisting of two main sections. The first section assessed students' preferred learning styles using the VAK Learning Style Inventory (Fleming & Mills, 1992), which contains 24 items measuring visual, auditory, and kinesthetic modalities. The second questioner measured academic motivation through a 10-item Self-Motivation Questionnaire, taken from the study by Nasirah Ismail, Norhasliza Abdullah, and Siti Zubaidah Saharudin (Politeknik Sultan Azlan Shah). The questionnaire was administered through three methods, via online Google Forms, in-class distribution, and face-to-face distribution across campus. This mixed-mode approach ensured a high response rate and effective data collection.

Data Analysis

Quantitative data were analyzed using SPSS version 29 software. Inferential analysis involved Pearson correlation to examine the relationship between learning styles (visual, auditory, kinesthetic) and motivation. The correlation coefficient (r) determined the strength and direction of relationships. The significance level was set at $p < 0.05$. This analysis provided insights into how specific learning preferences were associated with students' motivational levels in the Counselling program.

RESULT

Normality Test

Before conducting the inferential analysis, a normality test was performed to determine whether the data were normally distributed. This step is essential to ensure the appropriateness of using parametric statistical methods such as Pearson correlation. The assessment of normality was based on skewness and kurtosis values, where values within the range of ±1.96 are considered acceptable for normal distribution (Garson, 2012). The results indicated that the variables visual, auditory, kinesthetic learning styles, and motivation fell within the acceptable range, suggesting that the data were normally distributed and suitable for further parametric analysis.

Table 1. Normality Test Distribution

The Variable	Skewness	Statistic	Kurtosis	Statistic
Visual	-0.443	0.218	0.537	0.433
Auditory	-0.271	0.218	0.312	0.433
Kinesthetic	-0.267	0.218	0.104	0.433
Motivation	-0.255	0.218	0.148	0.433

Table 1. Normality test distribution Based on Table 1 above, it shows that the distribution of data for all study variables was assessed using skewness and kurtosis values to determine whether the data met the assumption

of normality required for parametric analysis. According to Garson (2012), values within the range of ±1.96 indicate a normal distribution. The results showed that the skewness and kurtosis values for all variables, visual (skewness = -0.443; kurtosis = 0.537), auditory (skewness = -0.271; kurtosis = 0.312), kinesthetic (skewness = -0.267; kurtosis = 0.104), and motivation (skewness = -0.255; kurtosis = 0.148), were within the acceptable range. These findings suggest that the data for each variable were normally distributed, fulfilling the assumptions required to proceed with parametric tests such as Pearson's correlation analysis.

Table 2. The relationship between Visual Learning Style and Self-Motivation Among Counselling Students.

The Variable	R	N	Sig. (2tailed)
Visual	-0.119	123	0.191
Motivation	-0.119	123	

Table 2 shows the visual learning style with self-motivation. The Pearson correlation test shows a coefficient value of r = -0.119 with a p-value of 0.191. Since the p-value exceeds the significance level of 0.05, the null hypothesis fails to be rejected. This means there is no significant relationship between visual learning style and student motivation. These findings suggest that students who tend to use visual learning styles do not show significant differences in their levels of motivation.

Table 3. The relationship between Auditory Learning Style and Self-Motivation Among Counselling Students.

The Variable	R	N	Sig. (2tailed)
Auditory	-0.212	123	0.018
Motivation	-0.212	123	

Table 3 shows auditory learning styles with self-motivation. The analysis results show a value of r = -0.212 with p = 0.018. Since the p-value is less than 0.05, the null hypothesis is accepted. This indicates that there is a significant negative relationship between auditory learning style and motivation. These findings reflect that students who are more inclined towards auditory learning styles may exhibit slightly lower levels of motivation, although this relationship is at a weak level.

Table 4. Hypothesis of the relationship between Kinesthetics Learning Style and Self-Motivation Among Counselling Students.

The Variable	R	N	Sig. (2tailed)
Kinesthetics	-0.241	123	0.007
Motivation	-0.241	123	

Table 4 shows the kinesthetics learning style with self-motivation. The analysis found an r value of -0.241 with a p value of 0.007. A (p) value smaller than 0.01 indicates a significant negative relationship. Therefore, the null hypothesis is rejected. This indicates that there is a significant negative relationship between kinesthetics learning style and student motivation. Although the strength of this relationship is also weak, it still indicates a tendency that students who prioritize a kinesthetics learning approach tend to have slightly lower levels of motivation.

DISCUSSION

The findings of this study show that auditory and kinesthetics learning styles have a negative relationship with students' motivation levels. In contrast, the visual learning style does not show a significant relationship. These results indicate that not all learning styles directly affect academic motivation, especially among Counselling students. This matches earlier findings by Neo and Ng (2020), who suggested that a connection between teaching and learning styles does not necessarily improve motivation or academic performance. Instead, it

emphasizes the need for flexible teaching methods. The lack of a significant relationship for visual learners may stem from first and second-semester students preferring visual learning styles and focusing less on practical skills. In comparison, students in higher semesters focus more on mastering Counselling skills in practice.

The strong negative link between the auditory learning style and motivation shows that students who depend on verbal input may struggle in settings that focus heavily on written content or digital materials. Farah Wazera and Mohammad Mujaheed (2021) also found that students with auditory preferences often feel less motivated when learning lacks verbal discussion or communication. This is common in higher education, where more passive or asynchronous formats are used. Because counselling relies on strong listening skills and essential verbal and interactive techniques, teaching methods in counselling programs that mainly focus on visual or textual delivery can hurt the motivation of auditory learners. For example, extensive readings without related discussions or online modules that lack engaging audio elements can significantly reduce their intrinsic motivation.

This mismatch between preferred learning styles and teaching methods can create a significant disconnect. It directly affects the development of counselling self-efficacy, which is key to a counsellor's confidence and ability to use their skills effectively (Bandura, 1997; Larson & Daniels, 1998). According to Self-Determination Theory, intrinsic motivation grows when people feel autonomy, competence, and connection. When the learning environment does not support an auditory learner's natural processing strengths, their sense of competence in developing important verbal-focused counselling skills can weaken. This may lead to less effort, lower persistence, and decreased belief in their ability to succeed in complex counselling tasks (Bandura, 1993; Lent et al., 2009).

For Counselling students, this is not just a matter of preference. It can hinder their basic skill development and ongoing academic motivation. Research shows that higher self-confidence in counselling is connected to greater motivation and perseverance when dealing with tough client situations and setbacks. On the other hand, low self-efficacy can lead to avoiding difficult tasks and losing confidence quickly (Lent et al., 2009). Therefore, it is important for Counselling students, especially those who learn best by listening, to receive teaching that fully engages their listening and speaking skills. This involves including more discussions, verbal feedback, role-playing, and audio-based learning materials. Effective supervision is also key, as it has been shown to significantly improve counselling self-efficacy (Cashwell & Dooley, 2001; Mullen et al., 2015). Making these changes is essential not only for boosting motivation but also for building the strong self-confidence these future professionals need to take on their challenging roles.

While our study focused on Counselling students, which is a social science field, it's important to consider how other disciplines might influence learning styles. Research, such as that by Hu et al. (2021), shows that students majoring in natural sciences have different learning styles. This suggests that the talent development model of 'hard disciplines' in universities might affect students' learning styles more than those in the social sciences. While changes in teaching methods are essential across all areas, the impact of the discipline can differ in its level and type. In Counselling, where both theoretical knowledge and practical interpersonal skills are vital, the negative correlations found for auditory and kinesthetics learning styles may indicate a continued reliance on traditional teaching methods that do not fully address professional needs. Future research could explore how the talent development model in social science fields like Counselling interacts with students' preferred learning styles and motivation, especially in comparison to 'hard science' fields.

The negative link between kinesthetics learning style and motivation suggests that students who learn best through physical activities may become disengaged when instruction is mostly theoretical or lecture-based. This aligns with the findings by Farah Wazera and Mohammad Mujaheed (2021). They found that kinesthetics learners were more motivated when the teaching involved interactive and hands-on strategies. The study shows a strong connection between kinesthetics learning styles and student motivation. This happens because counselling students from mid-4th semester onward focus more on mastering practical skills. These skills

include conducting individual or group counselling sessions and participating in guidance activities outside formal classes.

These findings also support the study by Dahliana et al. (2023). It showed that learning outcomes and motivation improve a lot when teaching methods match students' preferred learning styles. However, when this alignment is missing, students may feel less engaged and motivated, especially in programs like Counselling that need both cognitive understanding and emotional skills. Additionally, Rahmah Wahdaniati Suaib (2017) highlighted the need to recognize students' individual learning needs to keep their motivation strong in academic settings. This is especially important in Counselling education, where learners have to tackle both theoretical concepts and personal development. When teaching styles do not fit students' learning preferences, motivation can drop, which may impact academic performance.

From a theoretical standpoint, the findings of this study are supported by Bandura's (1977) Social Learning Theory. This theory explains how students' beliefs in their own abilities, or self-efficacy, are shaped by their learning experiences. If the learning process does not match their preferences, students might develop a lower sense of self-efficacy, which can reduce their motivation. Similarly, Deci and Ryan's (1985) Self-Determination Theory suggests that intrinsic motivation flourishes when students feel autonomy, competence, and connection. These conditions are more likely to be met when teaching strategies match students' learning styles. While our quantitative analysis showed specific links, it is crucial to understand how students learn. Some studies group individuals by learning styles to highlight shared traits. This helps us understand how each student learns and interacts with different content (Oliveira et al., 2023). This approach becomes even more important when creating teaching strategies for large courses. Because individual attention is limited, having general insights into learning preferences is essential for developing effective curricula.

CONCLUSION

In this study, we collected data on the learning styles and motivation of students in a Counselling course. By categorizing learning styles (Visual, Auditory, or Kinesthetics) using the VAK Learning Style Inventory, we were able to identify that these Counselling students exhibited a significant negative relationship between auditory and kinesthetics learning styles and their motivation levels. Our statistical analysis also reveals that there was no significant relationship found between visual learning style and student motivation. This suggests that for these Counselling students, traditional teaching methods that might not align with auditory and kinesthetics preferences could lead to reduced motivation.

These findings are consistent with previous research that has shown a strong relationship between learning styles and academic success. In particular, studies have demonstrated that when teaching methods align with students' preferred learning styles, motivation and academic performance tend to improve. Conversely, a mismatch between teaching approaches and learning preferences can lead to reduced engagement, lower levels of interest, and declining academic achievement.

However, it is important to note that our study has some limitations. For example, the sample size of 123 undergraduate Counselling students, while determined using Krejcie and Morgan's (1970) sampling table for this specific project, is a specific subset of the larger student population of 181 students across seven semesters. This could potentially limit the generalizability of our findings to a broader population of counselling students or to students in different academic disciplines. Future research would benefit from a larger and more diverse sample to further validate and expand upon these initial insights.

Despite these limitations, our study has important implications on tailoring pedagogical approaches in Counselling education, where educators should diversify their teaching methods to better suit students' varied learning styles, particularly for auditory and kinesthetics learners whose motivation may be negatively impacted by traditional approaches. Furthermore, students should be encouraged to understand their own dominant learning styles, as this self-awareness can lead to more effective self-directed learning and contribute to higher self-efficacy and motivation. Finally, curriculum developers should create content that balances

visual, auditory, and kinesthetics elements, especially given the rise of digital technology, to ensure all students, regardless of their learning style, remain engaged and motivated.

Future research could build on these findings by exploring the effectiveness of different pedagogical approaches, such as incorporating more experiential activities and interactive instructional methods within Counselling programs. Furthermore, it would be beneficial to investigate additional elements that influence student motivation beyond just learning styles. Conducting cross-disciplinary and longitudinal studies would also offer a richer understanding of these dynamics over time. Finally, analysing components of online learning in relation to both motivation and various learning styles presents another valuable avenue for future inquiry.

REFERENCES

1. Amabile, T.M., Hill, K.G., Hennessey, B.A., & Tighe, E.M. (1994). The work preference inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology*, *66*(5), 950-967.
2. Bandura, A. (1977). *Social learning theory*. Prentice-Hall.
3. Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148.
4. Cashwell, T.H., & Dooley, K. (2001). The impact of supervision on counselor self-efficacy. *The Clinical Supervisor, 20*(1), 39-47.
5. Creswell, J.W., & Plano Clark, V.L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Sage Publications.
6. Dahliana, L.H., Jaelani, A., & Rokhmah, U.N. (2023). The impact of the visual, auditory, and kinesthetic model on motivation and learning outcomes of Islamic elementary school students. *Journal of Integrated Elementary Education*, *3*(2), 150-163.
7. Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.
8. Dewan Bahasa dan Pustaka. (2020). *Kamus Dewan* (4nd ed). Dewan Bahasa dan Pustaka.
9. Dunn, R., & Dunn, K. (1993). *Teaching secondary students through their individual learning styles*. Allyn & Bacon.
10. Fleming, N.D., & Mills, C. (1992). Not another inventory, rather a catalyst for reflection. *To Improve the Academy*, *11*(1), 137-155.
11. Honey, P., & Mumford, A. (1986). *The manual of learning styles*. Peter Honey.
12. Keller, J.M. (2010). *Motivational design for learning and performance: The ARCS model approach*. Springer.
13. Kolb, D.A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.
14. Larson, L.M., & Daniels, J.A. (1998). Review of the counseling self-efficacy literature. *The Counseling Psychologist, 26(*2), 179-218.
15. Lent, R.W., do Céu Taveira, M., Sheu, H.-B., & Singley, D. (2009). Social cognitive predictors of academic adjustment and life satisfaction in Portuguese college students: A longitudinal analysis. *Journal of Vocational Behavior, 74*(2), 190-98.
16. Lukman, L., Jamaludin, J., Misnah, M., & Ratu, B. (2024). Pemanfaatan multimedia dan gaya belajar dalam meningkatkan motivasi belajar siswa kelas IV SD Negeri Larobenu. *Jurnal Ilmiah Dikdaya*, *14*(1), 71-76.
17. McLeod, S. (2011). Albert Bandura's social learning theory. *Simply Psychology*, 694-695.
18. Mullen, P.R., Uwamahoro, O., Blount, A.J., & Lambie, G.W. (2015). Development of counseling students' self-efficacy during preparation and training. *The Professional Counselor, 5(*2), 175-184. Retrieved from digitalcommons.unomaha.edu.
19. Neo, S.L., & Ng, L.L. (2020). Learning style and teaching style preferences in a foreign language classroom in Malaysia. *Moderna Språk*, *114*(2), 139-160.

20. Nizam, N.A.Y.M., Norazizi, N.A.N., Kasman, N.A., Nazaruddin, N.A. P., Samat, F., & Muda, T.E.A.T. (2021). Understanding pre-university students' learning styles and motivation during online environment. *e-BANGI, 18*(9), 278-285.
21. Oliveira, A., Spinola, V., Garrido, D., Teixeira, M.M., Salles, C., & Haddad, A.E. (2023) Influence of learning styles on student performance in self-instructional courses. *PLoS ONE 18(*7), 1-14.
22. Rini, D.S., Adisyahputra, D.V.S., & Sigit, D.V. (2020). Boosting student critical thinking ability through project-based learning, motivation, and visual, auditory, kinesthetic learning style: A study on ecosystem topic. *Universal Journal of Educational Research, 8*(4), 37-44.
23. Rumjaun, A., & Narod, F. (2020). Social learning theory Albert Bandura. In *Science education in theory and practice: An introductory guide to learning theory* (85-99).