P-ISSN 2664-0422	Pakistan Social Sciences Review	October-Dec 2024, Vol. 8, No. 4
O-ISSN 2664-0430	https://doi.org/10.35484/pssr.2024(8-IV)24	[303-313]

Pakistan Social Sciences Review
www.pssr.org.pk

RESEARCH PAPER

Learning Styles of Students and their Effect on Academic Achievement

[1]Dr. Muhammad Amin*, [2]Dr. Ijaz Ahmed Tatlah and [3]Ghulam Ali Akbar

1. Associate Professor, Division of Education, University of Education, Lahore, Punjab, Pakistan
2. Associate Professor, Division of Education, University of Education, Lahore, Punjab, Pakistan
3. Ph.D. Scholar, Division of Education, University of Education, Lahore, Punjab, Pakistan

***Corresponding Author:** amin@ue.edu.pk

ABSTRACT

This study has been conducted to investigate the effects of different learning styles on students' achievement. The objectives of the study were to investigate the effect, if any of the learning styles of students on their achievement. Second to point out which learning style performs better on achievement tests. This study is motivated by the work of Kolb (1984) and Mecleod (2017) as they provided the characteristics of learning with certain learning styles and how they prefer to learn. Four learning styles i.e. convergent, divergent, assimilators and accommodators have been identified using Kolb's learning style inventory. This study was conducted using a true experimental research design. A post-test-only control group design has been used. Two groups experimental and control were developed. This experiment was conducted with 80 participants of grade 7th in the subject of general science. Each group i.e. experimental and control consisted of 40 participants. The participants were assigned to the groups based on their learning style and previous class results Through a matching technique. The experimental group was taught through differentiated/ tired lesson plans while the control group was taught through existing traditional teaching methods i.e. lecture method and sometimes questioning from teachers and students. The data were analyzed using IBM SPSS statistics. The results indicated that in the control and experimental group's assimilators outperform other learning styles i.e. convergent, divergent, and accommodators. Students with different learning styles did not show significant differences on achievement tests either in the experimental or in the control group. However overall participants of the experimental group performed better than the control group. Hence it was concluded that learning styles make no difference in the achievement of the participants within the experimental and control group. But all the participants with different learning styles performed better when they were taught based on their learning styles. Hence more studies are recommended to test if learning styles have any effect on students' academic achievement. It is also recommended that learning styles-based teaching should be adopted as it increases the achievement of all the participants with any learning styles.

KEYWORDS Kolb's Learning Styles, Learning Style-Based Teaching, Learning Styles, Students' Achievement

Introduction

Different environment impacts differently on the learner's mind. The learning process is not identical in people with varied backgrounds and social norms. Research shows that biological context impacts most of the people involved in the learning process. This phenomenon is elaborated by Pask (2021) in his study. Other researchers like Rahal (2010) and Qureshi et al. (2023) found that individuality has been the main factor defining learning outcomes. Others, like Felder (1993), conclude that an instructor's previous knowledge sets the tone of their teaching style and instruction. Such situations create

pessimism among the students. They are forced to ingrain the thinking that their skills are not processed into the learning process.

This scenario emerges in specific situations where learners have multi-colored backgrounds and orientations (Tabbasam et al., 2023; Tabassum et al., 2024). Deep research has been carried out to assess approaches and teaching systems. However, the special domain of the classroom environment has been consistently overlooked. The learning process has little to do with the nature of a subject, As pointed out by Karatas and Yalin (2021) learning is linked with the nature of the instruction method and mental capabilities of the persons involved in the process i.e. teachers and students. Furthermore, teaching outcomes change considerably when the learning style is focused (Amjad et al., 2023, a, b, c). Dune (1983) concluded that content matters less than the teaching approach in the teaching process. Quality of learning is enhanced with the strategy of instruction. Therefore, a teacher with a keen interest in the learner's understanding and requirements of mind helps achieve great results for the whole process.

Tomlinson (2014) focused on the differentiated teaching. He has pointed out the certain basis of different ion i.e. socio-economic status, interest, intelligence, and learning styles. Scholars have focused on learning methods and teaching styles to understand the process. Learning styles provide insights into the learners' mindset and the learning process's prerequisites (Kolb, 1984). The literature is keen on learning style-based teaching. There is a need to test if learning styles are associated with students' academic achievement (Amin et al., 2024; Ong et al., 2024). Some studies are found in the literature that studied the relationship of learning styles with the achievement of students (Ha, 2021; Mubeen,2018; Rogowosky et. al., 2020). However, they were not at the classroom level and had not been conducted through true experimental design. Hence this study has been conducted to test if certain students with specific learning styles perform better on achievement tests.

Literature Review

Students have different mindsets due to diverse backgrounds and this impacts their learning behavior. Research studies carried out to grasp the factors responsible for unsatisfactory learning outcomes have found some important reasons. Different research studies aimed at understanding the learning outcome are; demographic status (O'Sullivan, 2009), intelligence (Deary et al., 2007), behavioral characteristics (Ergul, 2004), and psychological factors, namely, attitudes (Olatunde, 2009), self-esteem (Reasoner, 2005), self-efficacy (Onyeizugbo, 2010) and self-concept (Holliday, 2009).

Apart from the students' capability and contrasting aspects, the instruction method also impacts the academic results (Malik et al., 2024). Methods and modes of learning can be transformed because they have social aspects (Sternberg, 1997). Hence, educational scholars, academics, and instructors must know the importance of learning style and its forms. Educational psychologists have a great interest in the behavioral aspect of styles. Learners' achievements or lack thereof is dependent on the learning style, though this phenomenon is country-specific. Outcomes vary from country to country as per the studies.

Countries cope with educational challenges and adapt to the changing realities of the time. As the new age brings new issues in the educational sphere, a country develops learning styles best suited to its socio-cultural demands (Yamazaki, 2005). If the example of the US is quoted, there is a difference in behavior in communities. For example, Black

people in America practice different learning styles than the rest of the country. Ethnic blacks have contrasting techniques vis a vis white Americans (Bennett, 1993). Different schools have different methods. Therefore, an efficient learning style and its utility by the instructor helps students retain the knowledge for a long time. Students can apply it more beneficially and productively, and develop a good understanding after the completion of a course.

This strategy puts them at a greater advantage than those who face learning issues and inefficient learning styles (Felder, 1993). Simply put, learning styles have differences so do individual learners and teachers. Changing the educational data according to the difference-mitigating strategy is useful for enhancing the outcomes and achievements. This method can also be helpful "especially for low and moderate achieving students". It can be posited that the main objective must be to understand the learners' behavior and assimilate it with the teachers' learning style. This is necessary for the better educational achievements. Many models explain the learning style in different ways. The Kolb model is one of those approaches aimed at understanding the learning process. It is a scientific method to look at the nature of the academic process. This model has been widely applied in different countries. Educational psychology is its main beneficiary. The Kolb's Learning Styles Inventory (LSI) is utilized globally and acknowledged for its significance (Cano-Garcia and Hughes, 2000). According to Kolb, practical work and scientific understanding are helpful in the birth of ideas and shaping of mindsets.

Hence, an idea can be practiced and absorbed into the realm and it gives birth to new ideas and concepts. The learning process is a whole exercise of the conception of ideas and the outcome of knowledge, concludes Kolb. Knowledge creation is an important achievement. Kolb has defined the phenomenon of learning in four stages which he ultimately converted into his four learning styles Kolb (1984). Studies prove that individuals have innate differences. This difference impacts their cognitive skills which impact the learning process. Hence no single educational style is the standard one for all (Paul, Bojanczy & Lanphear, 1994). Teaching and analyzing processes change according to time and space. Different countries have varying degrees of styles. But there is one similarity achievements and style have a positive relationship. The converging learning style and academic improvement have a relationship (Rutz,2003). Some other studies prove educational achievement privileges for converging and assimilating learning styles (Malcom, 2009; Kolb, 1984). Others like Oughton and Reed (2000) opined that assimilating and diverging learners were the most productive on concept mapping.

Taking a broad view of the discussion and after the assessment of the previous research, it is pertinent to take utmost care in applying a single strategy. Each learning style possesses its own merits and techniques. In consequence, the researcher designed this study in true experimental design to add to the theory and practice.

Learning style and achievement

Students' learning outcomes have always been a serious concern. Numerous attempts at the betterment of learning and enhancing skills have been made. Education is a social need of the students which is why teachers and parents always strive to lace them with skills and training. It has proven that an optimistic mindset and positive attitude towards education are necessary for better achievements. Generally, a single learning style is pointed out to assess the learning process.. Dunn, Beaudry, and Klavas (1989) are of the opinion that deep research studies indicate that all the students, low scorers, and high scorers, perform better under a specifically set style and testing process.

But it makes their learning manner more important than how they learn and which style they prefer. Chuah Chong-Cheng (1988) describes the importance of learning styles in the educational system. Learning styles are necessary as well as essential for the individuals in the educational system. Some learners prefer the style of their own choice.

Students' favorite style contributes to the learning process and retention of knowledge. Research provides interesting data about the learning style and practical outcomes. every style has its benefits and demerits. Learners have a preference for their own choice. Some students would like one style others would show a liking for many styles. But one thing is also clear students who learn in many styles can absorb more skills and perform better (Dunn, Beaudry & Klavas 1989).

Furthermore, the outcome of the learning style is also linked with the nature of the individual learner. Some gifted students favor practical instruction like experimental activity and practical hands-on work, whereas others like speech and demonstration (Dunn 1991). Dunn and Dunn (1986) think that those who have unsatisfactory outcomes have weak memory to retain. Such students have a will to perform better and learn but their incapacity for retention does not help them. This issue becomes more severe when they are unable to remember class discussions, lectures, and readouts. In a traditional environment, teachers lecture without student participation hence aggravating the student's plight. Low achievers and high scorers differ from each other in behavior and other supporting factors. Students with creative and critical mentalities differ from those who either rote learn or don't learn at all, impulsive students are different from patient ones (Kagan and Kagan, 1970).

In other research, it is proven that students with independence learn more than those who are dependent on certain environments (Chapelle 1995). Education at early stages like primary and secondary level can be achieved in a better way with the harmonization of teachers' roles and students' demands (Smith & Renzulli 1984). Felder (1995) correctly observes that learners achieve more when the knowledge is made available to them in different ways and diverse forms. This is not so when a certain style is imposed. A learning style, in its capacity or incapacity, can either help the educational process or hamper it. There is a need though for research on the instructional design of learning materials and learning styles (Riding & Cheema 1991). To conclude, authentic research data has been acquired through works on learning styles. However, the data has not been utilized by the formulators of the instructional programs. After utilizing that data, a general assessment of the student's mind can be achieved.

In the literature, as per the knowledge of the researcher, most of the studies have been conducted in higher classes. They were not experimental at the classroom level. This study was experimental and conducted at the classroom level, adding to the literature and theory. Thus, the present study was carried out with the research objectives to investigate the effect of students' learning styles on their achievement and to point out the students with which learning styles perform better on academic achievement. We designed the research questions like, how do students' learning styles affect their academic achievement? And which learning style helps students to perform better on academic achievement? We also tested the hypothesis that students with different learning styles perform differently on their academic achievement.

Material and Methods

Kolb (1984) describes four stages of learning which he has associated with four learning styles i.e. Convergent, Divergent, Assimilators, and Accommodators. After

pointing out these learning styles he discussed how the individuals with these learning styles prefer to learn. The researcher assumed these preferences of learners to be associated with certain teaching methods and developed tired/differentiated lesson plans based on the work of Kolb (1984) and Macleod (2017). And used these tired lesson plans as an intervention for the experimental group. This study was conducted under a true experimental research design. A post-test-only control group design was used. The participants were divided into two groups i.e. control and experimental. Each group consisted of 40 participants. The learning styles of the participants were identified using Kolb's learning style inventory. Four learning styles given by Kolb were used. 10 participants with each learning style i.e. assimilator, convergent, divergent, and accommodator were assigned to each group. Experimental groups were taught through differentiated/tired lesson plans and the control group was taught traditional teaching methods i.e. lecture method and occasional questioning from both sides. This experiment was carried out with 80 participants of grade 7th in the subject of general science. post-test was conducted after 8 weeks from both the experimental and control group. The data were analyzed using IBM SPSS statistics.

Sample

As experimental research design allows us to use small sample size. Hence 171 students of grade seven of a public sector school were taken as the population of the study conveniently. 80 students were selected from 171 based on their learning style and previous class results as a sample of the study. They were assigned to the experimental and control group randomly. Each group consisted of 40 participants.

Data Analysis

The data were the post-test scores of the 80 participants divided into two groups i.e. experimental and control 40 participants each. It was analyzed using IBM SPSS statistics. Independent sample t-tests were applied to compare the groups. ANOVA was applied to compare the achievement of students with different learning styles within the experimental and control groups.

Limitation and delimitations

As this study is experimental it has been delimited to the grade 7th students in a public sector school hence it has the limitation of generalization because of the small sample size. As Kolb's learning style inventory has been translated to the students and their responses have been recorded students' learning styles can be subject to individual interpretation.

Data analysis and interpretation

This section discusses the analysis and interpretation of data. For analysis, an independent sample t-test was conducted to compare the experimental and control groups. ANOVA was conducted to compare students with different learning styles within the experimental and control groups.

Table. 1
Frequency of presence of Learning styles in the population

Total	Convergent	Divergent	Assimilators	Accommodators
171	41	49	34	47

Table 1.1 indicates that the learning styles of a total of 171 students of grade seven were investigated using Kolb's Learning Styles Inventory. All the four learning styles

given in Kolb's learning style inventory i.e. Convergent, Divergent, Assimilators, and Accommodators were present among grade seven students. As per the ratio given in the table above

Table 2
Comparison of Achievement Scores of Assimilators in the Experimental and the Control Group

Learning Style	Groups	*N*	*Mean*	*SD*	*t*	*P*
Assimilators	Experimental	10	66.50	13.12	1.42	.172
	Control	10	57.90	13.92		

*p < .05

Table 1.2 presents that there was no statistically significant difference between participants with the assimilator learning style of the experimental group (M =66.50, SD = 13.12) and the control (M =57.90, SD = 13.92) groups at p .172 > .05. Hence the students with assimilator learning style in both the experimental and control group were approximately got equal score on achievement test.

Table 3
Achievement of the Participants with Convergent Learning Styles

Learning Style	Group	N	Mean	SD	T	Sig.
Convergent	Experimental	10	61.40	6.76	3.49	.003
	Control	10	49.90	7.89		

*p < .05

Table 1.3 Presents that there was a statistically significant difference between the experimental group (M =61.40, SD = 6.76) and the control group (M = 49.90, SD = 7.89) at p .003 < .05. So participants with convergent learning style performed better in the experimental group

Table 4
Achievement of Participants with Divergent Learning Styles

Learning Style	Groups	N	Mean	SD	T	Sig.
Divergent	Experimental	10	64.80	5.20	3.69	.002
	Control	10	47.80	13.59		

*p < .05

Table 4 shows there was a statistically significant difference between the experimental (M = 64.80, SD = 5.20) and the control (M =47.80, SD =13.59) groups at p .002 < .05. hence the students with divergent learning styles performed better in the experimental group on achievement tests.

Table 5
Achievement of Participants with Accommodator Learning Style

Learning Style	Groups	N	Mean	SD	T	Sig.
Accommodators	Experimental	10	66.20	6.26	4.82	.001
	Control	10	44.30	12.83		

*p < .05

Table 5 shows there is a statistically significant difference between the experimental (M = 66.20, SD = 6.26) and the control (M = 44.30, SD = 12.91) groups at p

.001 < .05. hence students with accommodator learning styles performed better in the experimental group on achievement tests.

Table 6
Comparison of the Performance of the Participants with Different Learning Styles within the Experimental Group

Exp. Group	Assimilator		Convergent		Divergent		Accommodator		F	Sig.
	M	SD	M	SD	M	SD	M	SD		
	66.50	13.12	61.40	6.76	64.80	5.20	66.20	6.26	.768	.519

*p < .05

Table 6 shows there was no statistically significant difference among the achievement scores of Assimilators (M = 66.50, SD = 13.12) Convergent (M = 61.40, SD = 6.76) Divergent (M = 64.80, SD = 5.20), and Accommodator (M = 66.20, SD = 6.26) at the p = .519.

Table 7
Comparison of the Performance of the Participants with Different Learning Styles within the Control Group

Cont. Group	Assimilator		Convergent		Divergent		Accommodator		F	Sig.
	M	SD	M	SD	M	SD	M	SD		
	57.90	13.92	49.90	7.89	47.80	13.59	44.40	12.83	2.17	.108

*p < .05

Table 7 shows that there was no statistically significant difference among the achievement scores of the Assimilator (M = 57.90, SD = 13.92) Convergent (M = 49.90, SD = 7.89) Divergent (M = 47.80, SD = 13.49), and Accommodator (M = 44.40, SD = 12.83) at p.108 > .05. Hence within the control group there was no significant difference among the achievement of participants with different learning styles.

Discussion

- All the four learning styles given by Kolb in his inventory i.e. assimilator, accommodator, divergent, and convergent were present in the conveniently selected population.
- the students with assimilator learning styles in both the experimental and control groups had approximately equal scores on achievement tests.
- participants with convergent learning styles performed better in the experimental group
- students with divergent learning styles performed better in the experimental group on achievement tests.
- hence students with accommodator learning styles performed better in the experimental group on an achievement test.
- The participants with all four learning styles, assimilator, convergent, divergent, and accommodator, performed approximately the same on the achievement test in the experimental group.
- The participants with all four learning styles i.e. assimilator, convergent, divergent, and accommodator performed approximately the same on the achievement test in the experimental group

Based on the findings, it has been concluded that all four learning styles given by Kolb are present in the population. Students with different learning styles perform better

if they are taught with differentiated/ tired lesson plans corresponding to students' learning styles. However, as there was no statistically significant difference among the achievement scores of the participants with different learning styles in both the experimental and control groups it shows it is hard to report that students with different learning styles perform differently on achievement tests. In conclusion, the learners with different learning styles as a result of this study are not significantly different on their achievement tests. Though the students in the experimental and control groups did not show a significant difference in their achievement scores the participants of the experimental group performed better than the participants of the control group. If compatible teaching methods are used the learners perform better on achievement tests.

Recommendations

Based on the findings and conclusion of the study following recommendations are being made

- Compatible teaching methods should be used with students' learning styles as the participants of the experimental group in this study performed better than the control group.
- For future researchers it is recommended that studies should be conducted to dig out the phenomenon of learning styles and their effect on students' achievement as this study did not show any significant difference between learning styles and students' achievement.

References

Amin, M., Davis, C. J., Amjad, A. I., Parveen, S., & Naqvi, S. A. A. (2024). Identifying Acoustic Variability Patterns in Spoken English of Fricative Consonants Among Pakistani Native Punjabi Speakers. *Journal of Asian Development Studies*, *13*(3), 1036-1046. https://doi.org/10.62345/jads.2024.13.3.84

Amjad, A. I., Batool, N., & Tabassum, U. (2023c). Modulating inclusive education in early childhood: The role of teachers' attitude and self-efficacy in shaping their awareness and readiness. *Journal of Early Childhood Care and Education, 7*(2), 55-76.

Amjad, A. I., Habib, M., Tabbasam, U., Alvi, G. F., Taseer, N. A., & Noreen, I. (2023). The impact of brain-based learning on students' intrinsic motivation to learn and perform in mathematics: A neuroscientific study in school psychology. *International Electronic Journal of Elementary Education*, *16*(1), 111–122.

Amjad, A. I., Ishaque, M. M., & Rafique, M. U. (2023a). Unravelling the psychological underpinnings of classroom dynamics: A study on teacher-student interaction. *Journal of Development and Social Sciences*, *4*(3), 239–250.

Amjad, A. I., Tabassum, U., & Habib, M. (2023b). Uncovering teachers' concerns and multi-dimensional attitude towards inclusive education: Who's included and who's excluded. *Journal of Contemporary Trends and Issues in Education, 3*(1), 1-22.

Bennett, M. J. (1993). Towards ethnorelativism: A developmental model of intercultural sensitivity. *Education for the intercultural experience/Intercultural Press*.

Cano-Garcia, F. and Hughes, E. H. (2000). Learning and Thinking Styles: an analysis of their inter-relationship and influence on academic achievement. *Educational Psychology, 20*(4), 413-430. http://dx.doi.org/10.1080/713663755

Chapelle, C. (1995). Field-dependence/field-independence in the second language classroom. In J. Reid (ed.), Learning styles in the ESL/EFL classroom. Boston: Heinle and Heinle Publishers.

Chuah Chong-Cheng. (1988). Sinar Cendekia. Malaysia, Penang: Universiti Sains Malaysia (USM). Claxton, C. S. & Murrel, R. (1987). Learning styles. ASHE_ERIC higher education report # 4.

Deary, I.J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. Intelligence, 35:1, 13-21. http://dx.doi.org/10.1016/j.intell.2006.02.001

Dunn, R. (1991). Do students from different cultures have learning styles? *InterEd*, 15, 12-16.

Dunn, R., & Dunn, K. (1986). The Dunn and Dunn learning style model of instruction

Dunn, R., Beaudry, J. S., & Klavas, A. (1989). Survey of research on learning styles. *Educational leadership*, *46*(6), 50-58.

Ergul, H. (2004). Relationship between student characteristics and academic achievement in distance education and application on students of Anadolu University. *Turkish Online Journal of Distance Education*, *5*(2).

Felder, R.M. & Henriques, E. R. (1995). Learning and teaching styles in foreign and second language acquisition. *Foreign Language Annuals, 28*(1), 21-31.

Felder, R.M. (1993). Reaching the Second Tier: Learning and Teaching Styles in College Science Education, An updated presentation of the Felder-Silverman model. *College Science Teaching, 23*(5): 286-290

Ha, N. T. T. (2021). Effects of learning style on students' achievement: experimental research. *Linguistics and Culture Review*, *5*(S3), 329-339

Karatas, E., & Yalin, H. I. (2021). The Impact of Matching Learning-Teaching Styles on Students' Academic Achievement. *Eurasian Journal of Educational Research*, *92*, 377-402.

Kolb, D. A. (1984). Experiential learning. *Experience as the Source of Learning and Development*, *41*

Malik, M. A., Amjad, A. I., Aslam, S., & Fakhrou, A. (2024). Global insights: ChatGPT's influence on academic and research writing, creativity, and plagiarism policies. *Frontiers in Research Metrics and Analytics, 9*, 1-12. 1486832.

Mcleod, S. A. (2017). *Kolb - learning styles* https://www.simplypsychology.org/learning-kolb.html

Mubeen, M. (2018). *Effect of Students learning Styles on their Academic Achievement at Higher Secondary School Level* University of Education Lahore

O'Sullivan, E. M., (2009). The demographic and academic profile of Irish dental school faculty members. *Journal of the Irish Dental Association, 55* (6), 296-301

Olatunde, P. (2009). Students Attitude Towards Mathematics and Academic Achievement in Some Selected Secondary Schools in Southwestern Nigeria. *European Journal of Scientific Research, 36* (3): 336-341

Ong, D. J., Aslam, S., & Amjad, A. I. (2024). Interactive Tablets: Catalyzing Engaged Science Learning in English Instruction. *World Journal of English Language, 14*(5), 413-423

Onyeizugbo, E. U. (2010). Self-Efficacy and test anxiety as correlates of academic performance. *Educational Research, 1*(10) 477-480.

Pask, J. M., & Smith, D. E. (2021). Knowledge-based instruction for lifelong learning. In *Integrating Library Use Skills Into the General Education Curriculum* (pp. 187-198). Routledge

Qureshi, N. S., Iqbal, M. Z., & Amjad, A. I. (2023). Revitalizing Ancient Tales: Unleashing the Impact of Digital Storytelling on Self-Awareness and Transformation of Aspiring Teachers. *Pakistan Social Sciences Review*, *7*(4), 458-471.

Rahal, T. (2010). Learning styles: Learning that empowers students?. *Learning and Teaching in Higher Education: Gulf Perspectives*, *7*(2), 33-51.

Reasoner, R. (2010). The true meaning of self-esteem. *National association for self-esteem*.

Rezaei Fard, Z., Mansouri, Z., & Aghashiri, S. (2022). A study of Iranian technical students' motivational strategies across their learning styles. *Journal of new advances in English Language Teaching and Applied Linguistics*, *4*(2), 991-1001

Riding, R. & Cheema, I. (1991). Cognitive styles: An overview and integration. Educational Psychology, 11(3&4), 193-215.

Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2020). Providing instruction based on students' learning style preferences does not improve learning. *Frontiers in Psychology*, *11*, 511773

Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2020). Providing instruction based on students' learning style preferences does not improve learning. *Frontiers in Psychology*, *11*, 511773

Smith, L. & Renzulli, J. (1984). Learning style preference: A practical approach for classroom teachers. Theory into Practice, 23(10), 45-50.

Sternberg, R. J. (1997). Thinking Styles. Cambridge, Cambridge University Press.

Tabassum, U., Qiang, X., Abbas, J., Amjad, A. I., & Al-Sulaiti, K. I. (2024). Students' help-seeking mediates the relationship between happiness and self-strength: a comparative study on Chinese and Pakistani adolescents. *Kybernetes*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/K-09-2023-1706

Tabbasam, U., Amjad, A. I., Ahmed, T., & Qiang, X. (2023). Comparison of self-strength, seeking help and happiness between Pakistani and Chinese adolescents: a positive psychology inquiry. *International Journal of Mental Health Promotion 25*(3), 389-402. https://doi.org/10.32604/ijmhp.2023.024130

Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners*. Ascd.

Yamazaki, Y. (2005). Learning styles and typologies of cultural differences: A theoretical and empirical comparison. *International Journal of Intercultural Relations, 29*, 521–548.

Zin, N. A., Zaman, H. B., & Noah, S. A. (2002). *Multimedia Mathematics Tutor: Matching Instruction to Student's Learning Styles*. ICCE, 1433.