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Perceived Psychosocial Learning Environment in Mathematics Classrooms: A Student Perspective

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ABSTRACT: The current research explored the perception of the psychosocial learning environment among the students in the mathematics classrooms in secondary schools, and this research question specifically looked at whether there were gender differences in the perception of psychosocial learning environment. The quantitative and descriptive-comparative design was used, and the sample of 550 Grade 10 students (275 males and 275 females) in District Gujranwala public schools was used. The WIHIC (What Is Happening in This Class) questionnaire was modified to assess six dimensions of psychosocial environment, which were Student Cohesiveness, Teacher Support, Involvement, Task Orientation, Cooperation, and Equity. The analysis of the data with the help of the descriptive statistics and independent samples t-tests showed that the overall perceptions of the students were even higher than it was perceived at the moderate level, and the greatest ratings were given to the Task Orientation and Student Cohesiveness. Gender comparisons revealed that female students had better perceptions on most dimensions especially on Cooperation, Task Orientation and Equity, and no significant difference between genders appeared with regards to Involvement. The research emphasizes the need to have a well-planned, interactive, and balanced classroom setting, and also to take into account gender views in order to increase learning and engagement levels of the students in mathematics.

KEYWORDS: Psychosocial Learning Environment, Mathematics Classroom, Student Perceptions, Gender Differences, WIHIC

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Introduction

Background of the Study

Math is a fundamental subject in the secondary level of studies and is crucial in training students with logical thinking, problem solving, as well as analytical abilities. Mathematics is often viewed by students as a challenging subject, an abstract subject and a cause of anxiety which in turn results in low motivation and low academic achievement despite its importance (Ashcraft and Krause, 2007). Modern studies into education have indicated that the performance of students in mathematics is not just determined by cognitive skills and teaching methods, but also by the psychosocial nature of classroom learning environment (Fraser, 2011).

The psychosocial learning environment can be described as the social, emotional, and relationship aspects of life in a classroom as perceived by students. It includes teacher student interaction, peer interaction,

cooperation, involvement, support, equity and classroom organization (Moos & Trickett, 1974). Based on the constructivist and social learning theories, the concept argues that learning is a socially mediated process that is influenced by the interaction between students, teachers and the wider classroom environment (Vygotsky, 1978). In this view, classrooms are viewed as dynamic social systems, but not just physical areas where the content is delivered.

The psychosocial learning environment is of special concern in the context of mathematics classrooms because of the specifics of the field that often involves a need to work long hours, think abstractly, and make intellectual risks. Studies have shown that students who have a positive perception of the classroom environment in mathematics, including the perceptions of fairness, supportiveness, and engagement, have an increased level of motivation, participation and achievement (Opolot-Okurut, 2010). Good teacher behaviors, including encouragement, approachability and responsiveness, can make students confident and willing to contribute to mathematical discussions and negative behaviors can cause disengagement and anxiety (Wentzel, 2012).

The perception of students towards the psychosocial learning environment is also of great importance as it indicates the subjective experiences of the learners and this directly impacts their attitude and behavior. Although the teacher may be convinced that he/she is creating a conducive environment, students can experience these classroom interactions in very different ways according to their unique experiences and expectations (Dorman, 2008). There is a strong relationship between teacher perceived support, instructional clarity, and equitable treatment and engagement in mathematics and success of students (Patrick et al., 2007). On the same note, good relationships with peers and availability of cooperative learning increases the feelings of belongingness as well as diminishes fear of failure among students (Johnson & Johnson, 2009).

The psychosocial learning environment has been found to be associated to several dimensions that are considered to be specifically pertinent to learning mathematics, through the involvement, task orientation, cooperation, teacher support, and equity (Fraser, 1998). Learners react better to stimulate classroom environments, which are inclusive and appreciate more than one solution techniques and correct errors as learning experiences. Conversely, competitive or authoritarian classroom environments with a high level of classroom participation might deter participation and lead students to develop a negative attitude towards mathematics (Middleton and Spanias, 1999).

The psychosocial learning environment is even more critical at the secondary school level because the adolescents are more sensitive to social relations and the attitude of the teachers. At this age, the academic self-concept of students, and subject related identities are yet to be developed (Eccles &Wigfield, 2002). The adverse experiences of mathematics in the classroom may become persistent attitudes towards low ability, and students will end up not taking higher level mathematics courses, and mathematics related professions (Pekrun, 2006). Accordingly, a favorable psychosocial learning atmosphere is needed to maintain the interest and the interest of students in mathematics during such formative years.

Despite numerous studies of classroom learning settings by scholars around the globe, research that specifically addresses the perceptions of the student towards the psychosocial learning environment in the math classrooms has little coverage in most developing settings. The issues encountered in educational systems in these environments are also enormous classroom sizes, exam-based teaching, insufficient resources, and conventional teacher-centered teaching, which can influence psychosocial processes in the

classroom (Iqbal et al., 2022). Knowledge of the perception of students in such situations is important to know areas that need to be improved and the encouragement of student-centered methodologies in teaching.

Research on how students perceive the psychosocial learning environment can offer useful information to teachers, school administrators, and policy makers. This evidence can be used to design professional development initiatives that help to enhance teacher-student relationships, classroom interaction, and create emotionally supportive learning environments. Finally, a supportive psychosocial climate in the mathematics classrooms could be improved to reduce mathematics anxiety, promote student engagement, and improve academic performance. Considering the dominant role of mathematics subject in the secondary education and the overwhelming psychosocial influence upon the learning, it is evident that there is a need to analyze how students experience the psychosocial learning situation in mathematics classroom. Through preempting the views of students, the given study aims to make a contribution to the expanding number of studies about classroom learning environments and facilitate the creation of more inclusive, supportive, and effective mathematics instructional methods.

Rationale of the Study

Psychosocial learning environment in the mathematics classrooms have an impact on the engagement, attitudes and learning performance of students. Mathematics is a subject that is usually related to anxiety and low confidence, which are highly influenced by the levels of teacher support, peer interactions, and a general classroom atmosphere. A constructive psychosocial environment can foster motivation and participation of the students whereas a poor environment can impede learning. The perception of classroom environment is critical to the students as it represents the real learning experience as opposed to the planned instructional practices. The knowledge of these perceptions can be used to determine the factors associated with effective mathematics learning promotion or inhibition. Although it is important, little has been done in evaluating student perception of psychosocial learning environment in high level mathematics classrooms. This paper fills this gap by presenting the evidence upon which it is feasible to base the teaching practices and also make the contribution to the creation of more supportive and efficient mathematics learning conditions.

Statement of the Problem

Mathematics is a subject of secondary education, but most students find it a challenging subject that causes anxiety and is not easy to engage. According to the research, the academic performance and the attitude of the students towards mathematics do not only depend on the methods of teaching, but the psychological social context of the classroom also contributes significantly. Teacher support, peer interaction, involvement, cooperation and classroom climate are factors that are crucial in determining the learning experience and motivation of students. Nonetheless, the effects of the psychosocial learning environment on students regarding mathematics classrooms are under-researched even though their significance is not undervalued, especially in secondary school settings. How students view the support, equity and social interactions in their mathematics classes and how this influences their engagement and learning is not clearly understood. This loophole restricts the capacity of educators to develop approaches that ensure the establishment of supportive and productive mathematics classrooms. Consequently, the proposed research seeks to explore the perception of secondary school students towards the psychosocial learning climate in mathematics

classrooms to offer insights that may be used to address the teaching practices, increase student engagement, and positive learning outcomes.

Objectives of the Study

1. To investigate the perception of students towards the psychosocial learning setting in mathematics classrooms.
2. To explore the gender disparity on the perceptions of students of the psychosocial learning environment in mathematics classes.

Research Questions

1. How do students perceive psychosocial learning environment in mathematics classes?
2. Do male and female students differ significantly in their perceptions to the psychosocial learning environment in mathematics classes?

Review of Literature

Classroom learning environment is a long-established multidimensional construct that determines cognitive, affective and social outcomes of the learning environment. Studies of the learning environment indicate that it does not only involve physical and teaching aspects but also psychosocial aspects (teacher-student relationships, peer relations, emotional climate, and student engagement) (Jamaluddin et al., 2021). This psychosocial dimension measures the social and emotional aspect of classroom life experienced by the students and has been identified to have the critical outcomes such as motivation, engagement and self-efficacy and academic performance (Wang & Degol, 2016).

The psychosocial learning environment concentrates particularly in the meanings that are provided by individuals to social interactions, emotional support, and interpersonal relationships in the classrooms. Such an environment is determined by teacher behaviors (e.g., supportiveness, communication, instructional clarity), peer relationships (e.g., cooperation, respect), and overall emotional climate (e.g., sense of safety, belonging), etc. Studies have shown that students who feel that classes are friendly and socially inclusive will find it easier to immerse themselves in the course of study and have positive attitudes towards learning (Niu et al., 2022).

There is an increasing amount of literature that examined the effects of perceived classroom environment on affective experiences, also known as enjoyment, anxiety, boredom and anger by students, which affect learning and achievement. As an example, in the learning process of mathematics, the perception of control and value of the students in the learning environment relates to their emotional experiences. In a study published in Learning and Instruction, it was shown that variables of perceived classroom environment had significant relationship with emotional experiences of students in mathematics in terms of enjoyment, anxiety, anger, and boredom, and the relationship was found to be highest at the individual level of student perception (Frenzel et al., 2007). These conclusions are in line with the control value theory, which postulates that control and value communication environments boost positive academic emotions and negative ones, and hence encourage more attention to mathematics content.

In addition, the perceived classroom support has been demonstrated to have positive correlations with

the enjoyment of mathematics among the middle school learners. Evidence suggests that students who experience a greater sense of affective support and an unfavorable learning climate provided by their teachers and peers indicate that they enjoy mathematics class and have greater self-efficacy and a sense of belonging that lead to increased engagement and persistence in mathematics learning (Sakiz et al., 2012). This highlights the importance of the psychosocial factors in shaping not only the academic behaviors but also the emotional involvement of the students in mathematics.

A number of empirical studies have examined the relationship between perceived psychosocial classroom conditions and mathematics achievement, and these studies in many cases have adopted mediating variables like self-efficacy and attitudes. As an illustration, a research study on the relationship between classroom environment, mathematics beliefs, and achievement established a strong connection between desirable classroom environment and improved mathematics beliefs and achievement in university students (Hu et al., 2022). Students with a good view of their learning environments were more likely to demonstrate stronger self-efficacy and more coherent mathematical conceptions which consequently facilitated academic success.

Equally, the study of a large-scale data of UK students revealed that perceptions of the classroom environment were linked to intrapersonal variables, such as self-perceived ability, academic self-concept, and mathematics interest that mediated the correlation between the environment and achievement (Tosto et al., 2016). The study recommended that the direct impact of the environment on performance can sometimes be weak or not significant with consideration of the intrapersonal aspects but its role via self-concept and interest is notable. The findings point to the fact that psychosocial factors of the learning environment are indirect, yet significant in the modeling of academic performance in mathematics.

Studies that have investigated the variations in perceptions of the psychosocial learning environment between genders gave significant information. Indicatively, researchers who investigated inquiry-based mathematics classrooms found that the perceptions of the learning environment scales by students were predictive of enjoyment, self-efficacy, and value in mathematics with strong implications on the engagement of girls (Robinson & Aldridge, 2022). V involvement and investigation dimensions of the classroom environment were important predictors of girls' self-efficacy in mathematics and personal relevance and shared control had significant effects as predictors of task value which indicated that the learning environment where students feel agency and meaningful participation could be important in reducing gender differences in mathematics attitude.

More widespread studies of gender differences in perceptions towards the learning environment have occurred within STEM education. Studies conducted in the upper-primary STEM classroom have revealed that the perceptions of the emotional climate and the quality of the teacher-student relationships are connected with the attitudes of the boys and girls towards the learning of STEM in a different way. These results show that psychosocial conditions in classrooms are not imposed evenly on students and propose the use of gender-specific interventions to improve learning conditions to the benefit of students (Fairhurst et al., 2023).

The importance of peer support in the psychosocial learning environment has become more and more popular in the recent literature. Studies that have investigated the role of peer support and psychological resilience of learning mathematics among rural learners have revealed that peer relationships have a profound effect on the emotional well-being of students and the degree of mathematics anxiety. The positive effects of supportive peer interactions were established as being the buffer of negative feelings, the decrease

in anxiety, and the enhancement of student resilience in learning mathematics. The results indicate that peer relationships are a critical aspect of the psychosocial learning environment and have a significant impact on the emotional and academic experience of students (Shao et al., 2024).

Teacher student relationships have also been closely related to peer support especially in peer-assisted learning. Studies have established that close teacher-student bonds have a positive influence on peer learning and the self-efficacy of students that consequently influence mathematics performance positively. These results highlight the interdependence of psychosocial variables in mathematics classrooms in which individual beliefs, teacher support, and peer interaction are all interdependent and can influence the result of learning (Zhang et al., 2024).

One of the key aspects of the psychosocial climate, supportive learning environments, has been positively associated with motivational and cognitive mathematics learning outcomes. A study examining the effects of perceived supportive learning environment (PSLE) on the mathematical performance of elementary schools' students has shown that PSLE had an indirect effect on the student performance by indirectly impacting their autonomous self-regulation and creative thinking (Niu et a., 2022). These results point to the fact that the psychosocial support in classroom environment leads to the development of inner motivation and thinking, which in turn contribute to the success of students in mathematics.

Although there is a strong support in the research in the connection between classroom psychosocial settings and emotional, motivational outcomes as well as achievement results, there are a few gaps in the literature. To begin with, much of the research that has been done hitherto has focused on upper primary or university environments, and a comparatively small amount of research has focused on secondary mathematics classrooms through the lens of student perspective. The longitudinal reviews of learning environment studies have found decreases in perceived involvement, teacher friendliness, cooperation, and engagement during students moving into secondary schooling, but little has been done to examine the psychosocial perceptions of secondary mathematics students specifically (Tandeep et al., 2022). Second, whereas the gender difference in the attitude to mathematics and in-classroom experience is well-studied, the process by which the psychosocial perceptions facilitate in gendered experience of mathematics, such as the interaction between teacher support, classroom climate, and equity to influence self-esteem and engagement, are mostly under-researched (Gyan & Mensah, 2025). Thirdly, the existing studies do not directly relate the student perceptions with particular psychosocial aspects of involvement, teacher support, cooperation, and equity in mathematics classrooms despite the fact that these variables have been established to be interrelated with motivation and achievement (Nimely, 2023).

The research question of the present study is the filler of these gaps since it explores the perceptions of the psychosocial learning environment in mathematics classes among current students with gender differences, in particular. By so doing, it adds to a more refined comprehension of how a social and emotional classroom interaction may affect mathematics learning in the crucial period of development.

Research Methodology

The research design used in this study was a quantitative, descriptive-comparative research design to examine the perception of the psychosocial environment of mathematics classrooms of secondary school students regarding the learning process. The descriptive part made it possible to collect and summarize the

numerical data about the perceptions of students systematically, and the comparative part made it possible to investigate the possible differences between male and female students. This design was considered to be relevant because it is able to capture the current perceptions and does not manipulate the variables, which will give genuine observations on the experiences in the classroom of students. The sample population was the students in Grade 10, at all the secondary schools in District Gujranwala of Pakistan. Both male and female students were provided with a fair representation to make the sampling technique a stratified random sample. Out of the population, a total of 550 students (Male = 275, Female = 275) were chosen proportionately across various schools and genders, which was balanced and increased the external validity of the results.

Instrumentation

Perceptions of learners on psychosocial learning conditions in mathematics classrooms were measured through an adapted version of WIHIC (What Is Happening In This Class) questionnaire created by Fraser (1998). The WIHIC is a highly validated tool of assessing the classroom environment and it has undergone cross-cultural adaptation in such countries as the United Kingdom, Canada, India, Thailand, China, Pakistan, and Australia (Dorman, 2008; Fraser, 2011). In this study, there was the utilization of six dimensions which were Student Cohesiveness, Teacher Support, Involvement, Task Orientation, Cooperation and Equity. It was measured by a five-point Likert scale with the rating of Almost Never (1) to Almost Always (5), which was used to determine the agreement with each statement (Fraenkel et al., 1990). The instrument was then developed with the view of the expert feedback, so that it is clear and relevant enough to measure students and teachers perceptions of the main psychosocial dimensions in mathematics classes.

Data Collection

This research was based on sample data collected in some of the public secondary schools in District Gujranwala. School authorities were contacted and informed about the purpose of the study and guaranteed confidentiality and voluntary participation. Adapted WIHIC questionnaire was conducted at mathematics class times under the guidance of the researcher so that it would yield consistent and dependable responses. The students were asked to answer truthfully according to their classroom experiences.

Data Analysis

Table 1

Comparison of Students Perceptions about Psychosocial Learning Environment in Mathematics Classes

Dimensions of Psychosocial Learning Environment	Mean	Cut Value	SD	Mean Difference (M.D.)	t-value	Sig. (2-tailed)
Student Cohesiveness	4.22	3	0.57	1.22	36.48	.000**
Teacher Support	4.11	3	0.75	1.11	27.14	.000**
Involvement	3.58	3	0.93	0.58	13.53	.000**
Task Orientation	4.29	3	0.64	1.29	35.39	.000**
Cooperation	4.08	3	0.72	1.08	27.14	.000**
Equity	4.18	3	0.74	1.18	28.18	.000**
Overall Students' Perceptions	4.06	3	0.52	1.06	50.00	.000**

N = 550, df = 549, **p < .01

The comparison of the perceptions of the psychosocial learning environment in mathematics classrooms with students is brought out in Table 1 on a comparison with a moderate cut value of 3. The findings are that students perceived much higher than moderate in all dimensions of study, p <.01. Out of the dimensions, the highest mean scores were received by the Task Orientation (M = 4.29, M.D. = 1.29) and Student Cohesiveness (M = 4.22, M.D. = 1.22) dimensions, indicating that the students view mathematics classrooms as very well-organized and supportive. The Teacher Support (M = 4.11) and Equity (M = 4.18) were also above average meaning that students think that they are supported and treated fairly by teachers. Cooperation (M = 4.08) is a positive interaction with peers, whereas Involvement had the lowest mean (M = 3.58), meaning that the active participation of students in classroom activities is moderate in comparison to other dimensions. The perception of the psychosocial learning environment as a whole was high (M = 4.06), as the students tend to perceive the mathematics classroom in a favorable, well-organized, and supportive way. These results support the need to observe a supportive and task-oriented climate to encourage student involvement and mathematics learning.

Table 2

Comparison of Students' Perceptions about Psychosocial Learning Environment in Mathematics Classes by Gender

Dimensions of Psychosocial Learning Environment	Male		Female		Mean Difference (M.D.)	t-value	Sig. (2-tailed)
	Mean	SD	Mean	SD			
Student Cohesiveness	4.14	0.59	4.28	0.54	-0.14	-3.77	.000**
Teacher Support	4.04	0.72	4.16	0.77	-0.12	-2.45	.015*
Involvement	3.51	0.76	3.63	1.04	-0.12	-1.88	.062
Task Orientation	4.20	0.59	4.37	0.67	-0.17	-4.00	.000**
Cooperation	3.92	0.71	4.19	0.71	-0.27	-5.95	.000**
Equity	4.09	0.80	4.25	0.69	-0.16	-3.38	.001**
Overall Students' Perceptions	3.98	0.47	4.15	0.54	-0.17	-4.92	.000**

N = 550 (Male = 275, Female = 275), df = 548, *p < .05, **p < .01

Comparison between the perceptions of male and female students regarding the psychosocial learning environment in mathematics classrooms are given in table 2. On the whole, female students showed a greater perception on all the dimensions than the male students. There were significant differences in the Student Cohesiveness (M.D. = -0.14, t = -3.77, p = below .01), Teacher Support (M.D. = -0.12, t = -2.45, p = below .05), Task Orientation (M.D. = -0.17, t = -4.00, p = below .01), Cooperation (M.D. = -0.27, t = -5.95, p = below .01), and The Involvement dimension demonstrated no significant difference (M.D. = -0.12, t = -1.88, p =.062), which implied that there was no significant difference in perceiving engagement of both male and female students in classroom activities. The general impression of the psychosocial learning environment too was much greater among female students (M = 4.15) than among male students (M = 3.98, M.D. = -0.17, t = -4.92, p < .01). These results show that female students tend to perceive mathematics classrooms to be more accommodative, collaborative and organized than male students which is significant in the sense that gender views should be taken into consideration when formulating plans to enhance the psychosocial classroom environment.

Conclusion

The research finds that the perceptions of the psychosocial learning environment in mathematics classrooms among school students in the secondary school are generally positive and supportive and well-structured. The highest rated dimensions were Task Orientation and Student Cohesiveness meaning that in this classroom their climate supports the existence of structure, collaboration and focused learning. Involvement was rated relatively lower but still demonstrates the moderate level of student engagement.

Analysis by gender indicated that female students had an increased perception on most dimensions such as Student Cohesiveness, Teacher Support, Task Orientation, Cooperation and Equity. Involvement was the only exemption that there was no gender difference. These findings indicate that female students believe that mathematics classroom is more cooperative, friendly, and equitable than their counterparts (male students). In general, the results highlight the significance of establishing a collaborative, fair, and task-oriented classroom, as well as taking into consideration the gender perspectives in approaches to improving the psychosocial experiences and involvement of students in learning mathematics.

Discussion

The results of this research show that the students usually see the psychosocial learning climate in mathematics classrooms as positive, supportive, and structured. Task Orientation and Student Cohesiveness high mean scores indicate that students feel that their classrooms can be characterized as systematic and collaborative environments, with the objectives of learning established and fellow students cooperating effectively. These findings are consistent with prior studies, which underscore the fact that a highly organized and collaborative classroom culture supports a student through a higher level of engagement, motivation, and achievement of desired grades in mathematics (Fraser, 2011; Dorman, 2008).

Teacher Support dimension was also rated high, and it means that students feel motivated and supported by their teachers. On the same note, Equity dimension indicates that students feel treated fairly and given an equal opportunity in classroom. The results can be aligned with the literature that demonstrates that teacher support and fairness have a positive impact on the psychosocial well-being of students as well as their feeling of belongingness at school (Wang et al., 2022). On the other hand, Involvement scored the least on average, and this indicates that active involvement in learning activities might not be as stressed, which is one of the areas in which teachers can use more interactive and student-centered methods to enhance engagement.

Comparisons between male and female students indicated that the female students had more positive perceptions on most aspects of the psychosocial learning environment, such as Student Cohesiveness, Teacher Support, Task Orientation, Cooperation and Equity. This implies that the female students find mathematics classrooms less threatening and intimidating and more supportive as compared to male students, but both sex groups had the same level of Involvement. These results correspond to the earlier studies, suggesting that those students who are female tend to feel a stronger social cohesion and feel more supported by the teachers in their academic environment, which can have a positive effect on academic performance (Robinson & Aldridge, 2022).

Recommendations

According to the results of this research, teachers of mathematics are encouraged to adopt more interactive and student-oriented activities that would result in increased student involvement and engagement in classroom activities. Schools are also advised to encourage group learning through group work and team tasks that would support the cohesiveness of the students and their peers. Also, the teachers are advised to provide fair attention to all students, focusing on individual learning needs and offering support to develop confidence and motivation especially with male students who were slightly low in the perceptions. Lastly, gender perspectives ought to be an aspect that can be considered when designing instructional strategies to adopt the approach that accommodates both male and female learners to provide an inclusive and conducive psychosocial learning environment.

References

Dorman, J. P. (2008). Use of multitrait-multimethod modelling to validate actual and preferred forms of the what is happening in this class? (WIHIC) questionnaire. *Learning Environments Research*, *11*(3), 179-193. https://doi.org/10.1007/s10984-008-9043-6

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, *53*(1), 109-132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Fairhurst, N., Koul, R., & Sheffield, R. (2023). Students' perceptions of their STEM learning environment. *Learning Environments Research*, *26*(3), 977-998. https://doi.org/10.1007/s10984-023-09463-z

Fraenkel, J. R., & Wallen, N. E. (1990). *How to design and evaluate research in education*. Order Department, McGraw Hill Publishing Co., Princeton Rd., Hightstown, NJ 08520.

Fraser, B. J. (1998). Classroom environment instruments: Development, validity and applications. *Learning environments research*, *1*(1), 7-34. https://doi.org/10.1023/A:1009932514731

Fraser, B. J. (2011). Classroom learning environments: Retrospect, context and prospect. *Second International Handbook of Science Education*, 1191-1239. https://doi.org/10.1007/978-1-4020-9041-7_79

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classrooms. *Learning and instruction*, *17*(5), 478-493. https://doi.org/10.1016/j.learninstruc.2007.09.001

Gyan, R. K., & Mensah, F. S. (2025). Gendered patterns in mathematics self-esteem and student perceptions of teacher dispositions. *Discover Education*, *4*(1). https://doi.org/10.1007/s44217-025-00656-7

Hu, Y., Huang, J., & Kong, F. (2022). College students' learning perceptions and outcomes in different classroom environments: A community of inquiry perspective. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1047027

Iqbal, J., Asghar, M. Z., Asghar, A., & Waqar, Y. (2022). Impact of entrepreneurial curriculum on entrepreneurial competencies among students: The mediating role of the campus learning environment in higher education. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.950440

Jamaluddin, N. S., Abd. Kadir, S., Alias, S. N., & Abdullah, A. (2021). A review of psychosocial learning environment. *International Journal of Academic Research in Progressive Education and Development*, *10*(3). https://doi.org/10.6007/ijarped/v10-i3/11189

Johnson, D. W., & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher (Washington, D.C.: 1972)*, *38*(5), 365–379. https://doi.org/10.3102/0013189x09339057

Middleton, J. A., & Spanias, P. A. (1999). Motivation for achievement in mathematics: Findings, generalizations, and criticisms of the research. *Journal for Research in Mathematics Education*, *30*(1), 65. https://doi.org/10.2307/749630

Moos, R. H., & Trickett, E. (1974). Classroom environment scale.

Nimely, Jr., D. R., & Nyamu, OGW, F. K. (2023). Strategies for inculcating gender equity in mathematics classrooms for enhancement of learners' problem-solving skills. *International Journal of Research and Innovation in Social Science*, *VII*(VII), 1446-1454. https://doi.org/10.47772/ijriss.2023.70814

Niu, W., Cheng, L., Duan, D., & Zhang, Q. (2022). Impact of perceived supportive learning environment on mathematical achievement: The mediating roles of autonomous self-regulation and creative thinking. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.781594

Opolot-Okurut, C. (2010). Classroom learning environment and motivation towards mathematics among secondary school students in Uganda. *Learning Environments Research*, *13*(3), 267-277. https://doi.org/10.1007/s10984-010-9074-7

Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology*, *99*(1), 83-98. https://doi.org/10.1037/0022-0663.99.1.83

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Robinson, J. M., & Aldridge, J. M. (2022). Environment–attitude relationships: Girls in inquiry-based mathematics classrooms in the United Arab Emirates. *Learning Environments Research*, *25*(3), 619-640. https://doi.org/10.1007/s10984-022-09409-x

Sakiz, G., Pape, S. J., & Hoy, A. W. (2012). Does perceived teacher affective support matter for middle school students in mathematics classrooms? *Journal of School Psychology*, *50*(2), 235–255. https://doi.org/10.1016/j.jsp.2011.10.005

Shao, Y., Li, W. H. C., Zhou, R., & Cheung, A. T. (2025). The effects of psychological interventions on fostering resilience in family members of pediatric cancer patients: A systematic review and meta-analysis: A systematic review and meta-analysis. *Cancer Nursing*, *48*(6), 490–500. https://doi.org/10.1097/NCC.0000000000001368

Tandeep, K., Eilish, M., & Grimes, P. (2022). Mathematics and science across the transition from primary to secondary school: a systematic literature review. *International Journal of STEM Education*, *9*(1).

Tosto, M. G., Asbury, K., Mazzocco, M. M. M., Petrill, S. A., & Kovas, Y. (2016). From classroom environment to mathematics achievement: The mediating role of self-perceived ability and subject interest. *Learning and Individual Differences*, *50*, 260–269. https://doi.org/10.1016/j.lindif.2016.07.009

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (Vol. 86). Harvard university press.

Wang, J., Tigelaar, D. E. H., Luo, J., & Admiraal, W. (2022). Teacher beliefs, classroom process quality, and student engagement in the smart classroom learning environment: A multilevel analysis. *Computers & Education*, *183*(104501), 104501. https://doi.org/10.1016/j.compedu.2022.104501

Wang, M.-T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review*, *28*(2), 315–352. https://doi.org/10.1007/s10648-015-9319-1

Wentzel, K. R. (2012). *Teacher-student relationships and adolescent competence at school. In Interpersonal relationships in education: An overview of contemporary research*. SensePublishers.

Zhang, H., Han, X., Zhang, X., Liu, J., & Zhang, M. (2024). The impact of interpersonal relationships on adolescent students' cooperation skills: evidence from SSES 2019 China survey. *Current Psychology*, *43*(40), 31604–31618.