Classroom Climate among Teacher Education Mathematics Students

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Abstract - *Classroom climate has gained prominence as recent studies revealed its potentials as an effective mediator in the various motivational factors as well as an antecedent of academic performance outcome of the students. This descriptive-correlational study determined the level of classroom climate dimensions among teacher education students specializing in Mathematics at Mindoro State College of Agriculture and Technology. Employing a self-structured questionnaire adapted to the WIHIC (What Is Happening In this Class) questionnaire, the surveyed data were treated statistically using Pearson's r. Result showed that there was high level of classroom climate among the respondents in their Mathematics classes in both teacher-directed and student-directed dimensions specifically in terms of equity, teacher support, cohesiveness, involvement, responsibility and task orientation. Also, it revealed that equity and teacher support were both positively related to the students-directed classroom climate dimensions. With these results, teachers are seen to be very significant determinants of the climate in the classroom. Relevant to this, the study recommended that faculty should develop effective measures to enhance classroom climate dimensions such as equity and teacher support to address the needs of diverse studentsdespite large size classes. Moreover, faculty should provide greater opportunitiesfor the students to achieve higher level of responsibility, involvement, cohesiveness, and task orientation as these could motivate them to develop positive learning attitude, perform to the best of their ability, as well as maximize their full potential in school.*

Keywords – *classroom climate, Mathematics, teacher education, academic performance, motivational learning factors*

INTRODUCTION

One of the many great accomplishments of human beings is the discovery of Mathematics. Mathematics has been an indispensable tool in man's life. Not only has it contributed to the enlightenment to many questions and wonders in the natural world but also more importantly, Mathematics has been a formula to open our minds to the world of possibilities around us.

Anywhere in the world, Mathematics is employed as a key instrument in a diversity of fields. Application of mathematical knowledge in every field of study and industry produces new discoveries and advancement of new disciplines. All innovations introduced worldwide and every product that man gets pleasure from are by-products of Science and Mathematics. The ease and convenience that people enjoy today from the discoveries of computers, automobiles, aircraft, household and personal gadgets would never happen if it were not for this tool used in technology.

Since Mathematics encompasses all aspects of human life, it is unquestionably important in education to help students and all people from different walks of life perform daily tasks efficiently and become productive, well-informed, functional individuals and members of the society where Mathematics is a fundamental concept.

These perspectives have prompted educational researchers nationwide and worldwide to continuously identify factors that can account for Mathematics achievement. Psychologists and educational experts have conducted studies on factors related to academic achievement and they have identified numerous reasons for students' success. However, classroom climate in Mathematics has not yet been thoroughly explored as a special field.

Classroom climate is a mood or atmosphere formed after the teacher and students are learning together in the same class, affecting each member's thoughts, emotions, attitude style, learning style and motivation [1]. It is a collective perception by the students of what it feels like, in intellective, motivational and emotional terms, to be a student in any particular teacher's classroom, where those perceptions influence every student's motivation to learn and perform to the best of his or her ability [2]. Classroom climate can be of two types: teacher-directed and student-directed climate. Teacher-directed climate such as equity and teacher support are dimensions where the teachers are the ones directly influencing the classroom atmosphere. On the other hand, student-directed climate like cohesiveness, responsibility, involvement and task orientation are dimensions in which students are the ones controlling the atmosphere in the classroom [3].

Several literatures and studies revealed that classroom climate is a potent mediator in the various motivational factors as well as antecedents of academic performance outcome of students [4 – 8]. There is also significant link between classroom climate dimensions and learning attitude of students [9]. Furthermore, studies noted that classroom climate and self-efficacy predict mathematics achievement [10,11]. In addition to this, classroom climate dimensions also have direct and indirect influence on students' achievement goals and reflective thinking practice [4].

With a prime focus on the potential application of classroom climate measures to enhance student's motivation and academic performance, which several local and foreign studies have already proven, the purpose of this study was to increase what is known about classroom climate by investigating the relationship between teacher-directed classroom climate dimensions and students-directed classroom climate dimensions in Mathematics classes.Moreover, this study would give teacher education students substantial insights on creating an excellent classroom climate in Mathematics as they would soon be prime movers in the achievement of quality education.

In the light of the foregoing perspectives, the researcher felt the need to conduct this study.

OBJECTIVES OF THE STUDY

The study determined the level of classroom climate among teacher education Mathematics students of Mindoro State College of Agriculture and Technology.

Specifically, it aimed to: determine the level of teacher-directed classroom climate in terms of equity and teacher support; determine the level of students-directed classroom climate in terms of cohesiveness, involvement, responsibility and task orientation and determine the relationship between teacher-directed classroom climate dimensions and students-directed classroom climate dimensions.

FRAMEWORK

This study was anchored on the following theories: connectionism and association theory, social cognitive theory, cognitive behavioral theory, constructivism theory and motivational theory.

According to Thorndike [12], in his Connectionism and Association Theory, human activity is based on association between stimulus and response. An activity is seen as situation which influences or affects the individual, a response which the individual makes to the situation and a connection between the situation and response by means of which the former is enabled to produce is called the S – R bond. The term signifies a predisposition to the response in particular manner to a given stimulus.

In Social Cognitive Theory (SCT), Pajares [13] viewed that three (3) variables such as behavioral factors, environmental factors and personal factors are said to be interrelated with each other, causing learning to occur.

Beck [14] developed Cognitive Behavioral Theory (CBT) which describes the role of cognition (knowing) to determining and predicting the behavioral pattern of an individual. The Cognitive Behavioral Theory states that individuals tend to form self-concepts that affect the behavior they display. These concepts can be positive or negative and can be affected by a person's environment.

Likewise, in Bruner's [15] Constructivism Theory, it stated that the central theme behind the constructivism theory is that learning is a process where individuals create meaning from his or her own experiences with the world. The focus is on the individual, and how one interacts with the environment developing its own meaning and knowledge based on this experience.

Maslow's Motivational Theory considered motivation a force of external environmental factor. Maslow also believed that human behavior is

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controlled by internal unconscious forces, since he rejected the idea that only internal or external forces control human behavior. He then submitted that both are determinants for motivation. In addition, he also emphasizes that humans have unique ability to make choices and exercise free-will. .

METHODS

This study employed descriptive - correlational method of research to determine the relationship among the variables. Respondents of the study were 90teacher education Mathematics students of the three campuses of Mindoro State College of Agriculture and Technology whowere selected using non-proportional stratified random sampling technique.

A self-structured questionnaire adapted to the WIHIC (What Is Happening In this Class) questionnaire was the main instrument of the study. The questionnaire was subjected to validation by tapping experts in the field such as deans and professional education subject professors. Test-retest method was used to determine the reliability of the research instrument.

The researchers secured informed consent from the respondents before administering the questionnaires. A coding system was implemented to preserve anonymity of the respondents. Questionnaires were personally administered by the researchers. Retrieval followed immediately after the respondents have completely answered the survey instruments.

Descriptive statistics such as mean and rank were utilized to describe the gathered data. The magnitude of relationships between variables was measured using Pearson's r.

The level of classroom climate practices of the teachers was described using a five-point Likert scale with its statistical limits, description and interpretation: 4.50 – 5.00: Always; Very High Level; 3.50 – 4.49: Often/ High Level; 2.50 – 3.49: Sometimes/ Moderate Level; 1.50 – 2.49: Seldom/ Low Level; 1.00 – 1.49: Never/ Very Low Level.

RESULTS AND DISCUSSION

As indicated in the Table 1, it could be noted that giving equal opportunity to every student to answer questions obtained the highest mean score of 4.55, described as very high level. On the other hand, giving as much attention to their questions as to other students' questions obtained the lowest mean score of 3.83, described as high level.

The overall mean perception of 4.29 was described as high level. This means that teachers have manifested fairness and equality among students by providing each of them equal opportunity to participate in class discussions and activities, to ask questions, to be given encouragement and support and to be given equal amount of say in the class.

Table 1.Level of Classroom Climate in Mathematics Subjects in Terms of Equity

Item	Mean	Rank	Description
1. Gives as much attention to my questions as to other students' questions.	3.83	10	High
2. Gives every student the same amount of help.	4.13	8.5	High
3. Gives every student the same amount of say in the class.	4.13	8.5	High
4. Gives the same encouragement and support to every students.	4.34	5	High
5. Gives equal opportunity to every student to share their ideas to the class.	4.40	4	High
6. Gives equal opportunity to use instructional materials	4.23	7	High
7. Gives equal opportunity to solve problems during boardwork activities.	4.45	3	High
8. Gives equal opportunity to every student to answer questions.	4.55	1	Very High
9. Gives equal opportunity to every student to explain their answers.	4.53	2	Very High
10. Rates students' work based on the given criteria.	4.28	6	High

Overall Mean : 4.29   **Description : High**

Table 2 Level of Classroom Climate in Mathematics Subjects in Terms of Teacher Support

Item	Mean	Rank	Description
1. Takes a personal interest in us.	4.07	9	High
2. Goes out of his/her way to help each of us.	4.20	6	High
3. Considers our feelings.	4.08	8	High
4. Helps us when we have trouble with the work.	4.28	4	High
5. Continues teaching until all students learn the lesson.	4.20	6	High
6. Encourages us to do our best.	4.65	1	Very High
7. Encourages us to ask questions.	4.49	2	High
8. Gives remedial classes for students having difficulties in Math.	3.40	10	Moderate
9. Praises us when performing well in class.	4.20	6	High
10. Considers students' individual differences	4.30	3	High

Overall Mean : 4.19   **Description : High**

As reflected in the Table 2, it can be noted that encouraging us to do our best gained the highest mean score of 4.65, described as very high level. However, giving remedial classes for students having difficulties in Math obtained the lowest mean score of 3.40, described as moderate level.

The overall mean perception of 4.19 was described as high level. This finding implies that teachers manifested high teacher support practices in mathematics subjects. This further means that students are well supported by the teachers personally, emotionally and academically. This is because teachers know well that students are more intrinsically motivated to learn when they see and feel being supported by others especially the teachers being looked up to as second parents of the students in the classroom.

This finding is inconformity with Rosenshine's [16] point of view which cited that the most important aspect of classroom climate is the relationship between the teacher and the students. There must be an element of caring, trust and respect in the interpersonal relationships between the teacher and the students.

As shown in the Table 3, it can be noted that considering teamwork important in achieving class goals obtained the highest mean score of 4.58, described as very high level. Conversely, preferring collaborative activities than individual activities gained the lowest mean score of 3.78, described as high level.

The overall mean perception was 4.21, described as high level. This means that teacher education students major in mathematics manifested a very high level of cohesiveness. This is attributed to the fact that major mathematics subjects are taken in the higher years where the students have already known each other for a long time and have already created friendship with each other.

Table 3 Level of Classroom Climate in Mathematics Subjects in Terms of Cohesiveness

Item	Mean	Rank	Description
1. Makes friendships easily among students in this class.	4.29	4	High
2. Knows each student in this class.	4.51	2	Very High
3. Cooperates with other students when doing group activities.	4.40	3	High
4. Works well in group activities.	4.07	8	High
5. Prefers collaborative activities than individual activities.	3.78	10	High
6. Works with my classmates to achieve class goals.	4.26	5.5	High
7. Helps other class members who are having trouble with their work.	3.92	9	High
8. Gets help from other students when encountering difficulties in the lessons.	4.08	7	High
9. Enjoys the company of others in this class.	4.26	5.5	High
10. Considers teamwork important in achieving class goals	4.58	1	Very High

Overall Mean : 4.21   **Description : High**

Table 4 Level of Classroom Climate in the Major Mathematics Subjects in Terms of Involvement

Item	Mean	Rank	Description
1. Shares ideas in class during class discussion.	3.92	5	High
2. Solves problems during boardwork activities.	4.20	4	High
3. Explains solutions in large group discussions.	3.77	8	High
4. Participates in group activities actively.	4.27	2	High
5. Leads group members during collaborative activities.	3.42	10	Moderate
6. Makes class assignments.	4.21	3	High
7. Makes class projects.	3.85	7	High
8. Helps other class members who are having difficulty in the lesson.	3.88	6	High
9. Volunteers to answer teacher's questions.	3.56	9	High
10. Does all exercises during classes.	4.31	1	High

Overall Mean : 3.94   **Description : High**

As gleaned in the table 4, it can be noted that doing all exercises during classes obtained the highest mean score of 4.31, described as high level followed by participation in group activities actively (4.27); making class assignments (4.21) and solving problems during board-work activities (4.20).

However, leading group members during collaborative activities gained the lowest mean score of 3.42, described as moderate level. The overall mean score was 3.94, described as high level.

The finding further shows that students are aware of the importance of active involvement in the class activities to enhance performance in their subjects. This is because as would-be teachers, they are knowledgeable in the effective and proven practices in the teaching-learning process as these are taught in their professional subjects.

As shown in table 5, it can be seen that making sure I understand each lesson in Math, obtained the highest mean score of 4.27 which is described as high level followed by considering asking for other's help in lessons I find difficult as a last resort (4.16); giving extra time in understanding math lesson I find difficult (4.13) and doing what they have to accomplish for each math lesson (4.08).

However, preferring individual activities than group activities got the lowest mean score of 3.64, described as high level. The overall mean perception score was 3.93 described as high level.

The finding tends to show that students in manifested high level of responsibility in their Mathematics classes. This is because students exert more time and effort in studying these subjects since Mathematics is their major field of specialization and failure in these major subjects maybe a ground for shifting to other field of specialization.

Table 5 Level of Classroom Climate in the Major Mathematics Subjects in Terms of Responsibility

Item	Mean	Rank	Description
1. Makes sure I understand each lesson in Math.	4.27	1	High
2. Sees to it that I ask my teacher things I can't understand about the lesson before class dismisses.	3.87	6	High
3. Studies my lesson after classes.	3.66	9	High
4. Does all assignments on my own.	3.93	5	High
5. Gives extra time in understanding math lesson I find difficult.	4.13	3	High
6. Does what I have to accomplish for each math lesson.	4.08	4	High
7. Does research in topics I find difficult.	3.74	8	High
8. Keeps on solving problems in each lesson at home.	3.78	7	High
9. Considers asking for other's help in lessons I find difficult as a last resort.	4.16	2	High
10. Prefers individual activities than group activities.	3.64	10	High

Overall Mean : 3.93   **Description : High**

Table 6 Level of Classroom Climate in Mathematics Subjects in Terms of Task Orientation

Item	Mean	Rank	Description
1. Considers getting a certain amount of work done important.	3.94	9	High
2. Considers patience important in any task undertaking.	4.19	4.5	High
3. Does as much as I set out to.	3.95	8	High
4. Listens attentively to the teacher's instructions	4.47	1	High
5. Knows the goals in this class.	4.23	2.5	High
6. Helps formulate class goals.	3.93	10	High
7. Knows what I am trying to accomplish in this class.	4.19	4.5	High
8. Makes sure I understand the activities in this class.	4.23	2.5	High
9. Knows what I am going to do before undertaking any activity in this class.	4.16	6	High
10. Knows the importance of the activity before the tasks are undertaken.	4.13	7	High

Overall Mean : 4.14   **Description : High**

As reflected from the table 6, it can be noted that listening attentively to the teacher's instructions gained the highest mean score of 4.47, described as high level. On the other hand, helping formulate class goals obtained the lowest mean score of 3.93, described as high level. The overall mean perception was 4.14, described as high level.

The finding implies that teachers of the major mathematics subjects showed high level task orientation practices to their students. This is attributed to the students' inquisitiveness to the tasks being undertaken in the class and to the teachers' skills in bringing clarity to the activities as well as to the lessons being studied in the major mathematics subjects.

Table 7 Correlational Analysis between Level of Equity and Level of Students-Directed Classroom Climate Dimensions

Level of Equity vs…	r - value	Result
Level of Cohesiveness	0.686	Significant
Level of Involvement	0.690	Significant
Level of Responsibility	0.634	Significant
Level of Task Orientation	0.730	Significant

Critical r- value at 0.05 = 0.205

As indicated in table 7, results showed that there was a significant relationship between level of equity and level of cohesiveness. This was attested to by the computed r-value of 0.686 which exceeded the critical r-value of 0.205 using 0.05 level of significance.

Result tends to show that students' level of cohesiveness is dependent on the level of equity directed by the teachers.Thus, when teachers practice fairness among students, a harmonious learning environment between and among students is created.

Similarly, there was a significant relationship between level of equity and level of involvement since the computed r-value of 0.690 exceeded the tabular r-value of 0.205 using 0.05 level of significance. This finding implies that level of equityis associated with students' levelof involvement in Mathematics. This means that when teachers give students give equal opportunities to participate and learn, students tend to respond positively and actively to the activities in the class.

Likewise, there was a significant relationship between level of equity and level of responsibility since the computed r-value of 0.634 exceeded the critical r-value of 0.205 using 0.05 level of significance. This means that students' sense of responsibility is enhanced when they see that teachers treat them equally by providing equal opportunities to learn.

There was also a significant relationship between level of equity and level of task orientation since the computed r-value of 0.730 exceeded the critical r-value of 0.205 using 0.05 level of significance. This tends to show that when teachers treats students fairly by giving them equal opportunities to ask and understand class activities, students tend to become more clarified and oriented with the lessons and activities in the class.

Table 5 Correlational Analysis between Level of Teacher Support and Level of Students-Directed Classroom Climate Dimensions

Level of Teacher Support vs…	r - value	Result
Level of Cohesiveness	0.665	Significant
Level of Involvement	0.696	Significant
Level of Responsibility	0.587	Significant
Level of Task Orientation	0.615	Significant

Critical r- value at 0.05 = 0.205

As reflected in table 4, there was a significant relationship between level of teacher support and level of cohesiveness since the computed r-value of 0.665 exceeded the critical r-value of 0.205 using 0.05 level of significance. This means that when teachers show interest in students' learning, students tend to feel cared for and loved which made them more cohesive towards each other.

Similarly, there was a significant relationship between level of teacher support and level of involvement since the computed r-value of 0.696 exceeded the critical r-value of 0.205 using 0.05 level of significance. This tends to show when students feel supported by the teachers, they tend to become motivated to participate in the activities in the class.

Correspondingly, there was a significant relationship between level of teacher support and level of responsibility since the computed r-value of 0.587 exceeded the critical r-value of 0.205 using 0.05 level of significance. Thus, when students feel that teachers support them and are interested to help them learn, it inspires them to and study well in the subject and become more responsible students.

Likewise, there was a significant relationship between level of teacher support and level of task orientation since the computed r-value of 0.615 exceeded the critical r-value of 0.205 using 0.05 level of significance. This means that when teachers help and support the students, students become more aware and clarified of the goals and activities in class because they feel free to ask anything about the lesson to the teachers.

CONCLUSIONS

The results of this study have potential implications for all schools, classrooms, and educators. Determining which climates are the most suitable for a positive impact on student achievement is critical. Classroom climate can be a stimulus which will drive the learners to respond positively or negatively. For effective and positive learning to occur, an individual should have positive personal characteristics, exhibit appropriate behavior and stay in a supportive environment. This is one of the main reasons why the purpose of this study is to supplement what is known about classroom climate by investigating how teachers influence and impact classroom climate measures.

The results of this study indicated that students manifested high level of teacher-directed classroom climate in their Mathematics subjects in terms equity and teacher support. Likewise, students also perceive high level of students-directed classroom climate in terms of equity, order and teacher support. Moreover, teacher-directed classroom climate dimensions such as equity, order and teacher support were all positively related with students-directed classroom climate dimensions such as equity, order and teacher support. With these results, teachers are seen to be highly significant determinants of what kind of climate transpires in the classroom. Teachers' practices of fairness and support positively influence how students exhibit responsibility in the classroom, how students participate and engage themselves in classroom tasks and activities, how the students cohesively interact with one another and how they keep focused and task-oriented. Teachers' positive classroom climate practices create an atmosphere which directly shapes students' motivational behavioral causing them to respond positively, help each other, love their own learning environment and establish positive interpersonal relationship with one another. On the contrary, teachers' negative classroom climate practices will result negative influence on students' behavioral pattern.Because climate influenced the affective domain, it will be difficult to isolate from skills, knowledge, and attitudes that students gained during their academic studies, thus affecting student academic outcomes.

RECOMMENDATIONS

It is recommended that faculty should develop effective measures to enhance classroom climate dimensions such asequity and teacher support to further improve classroom practices by integrating technology in the class to address the problem of equity on large size classes, by individualizing instruction to address the needs of the diverse

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students, and by maintaining good rapport to studentsto create harmonious learning environment.

Furthermore, faculty should provide greater opportunities for the students to achieve higher level of responsibility, involvement, cohesiveness and task orientation as these could motivate them to develop positive learning attitude, perform to the best of their ability, as well as maximize their full potential in school by demonstrating acceptance of students' divergent ideas, posing challenging and interesting questions, projecting positive attitude about students' ability to do mathematics, teaching self-regulated learning strategies, encouraging students to work cooperatively with others, and providing activities that will make students actively engaged in doing mathematics.

Parallel studies on classroom climate in other classes should also be conducted to generalize the findings at hand.Other classroom climate measures such as innovation, safety, excellence, interest, rewards and order may be considered by future researchers as significant classroom climate dimensionsthat can further be investigated.

REFERENCES
[1]   Fang, R-J. (2006). A Study on Teacher's Knowledge Management, Classroom Climate and Learning Attitude. Retrieved on July 5, 2012 from http://dl.acm.org/.cfm?id=1576690
[2]   Wei, L. S. (2011). Relationship between Students' Perceptions of Classroom Environment and their Motivation in Learning English Language. *International Journal of Humanities and Social Sciences.*
[3]   Rivera, T. C. (2008). Classroom Psychosocial Environment". *International Online Journal of Science and Mathematics Education.*
[4]   Phan, H. P. (2008). Achievement Goals, The Classroom Environment and Reflective Thinking: A Conceptual Framework. *Electronic Journal of Research in Educational Psychology.* pp. 571-602.
[5]   Chen, N-S. (2006). Classroom Climate and Learning Effectiveness in Holistic Blended Learning Environments. Master's Thesis, National Sun Yat-Set University, Taiwan
[6]   Li, C-J, et al. (2006). Teacher's Knowledge Management, Classroom Climate and Learning Attitude. *World Scientific and Engineering Academy and Society Journal.* pp. 188-193.
[7]   Dilay, N. B. (2009). Factors Affecting the Mathematics Achievement of Fourth Year High School Students at Divine Word College of Calapan: A Basis for Action Plan. Master's Thesis, Divine Word College of Calapan, Calapan City, Oriental Mindoro
[8]   Bermundo, C. J. (2008). Classroom Climate in Catholic Elementary Schools.Unpublished Master's Thesis.University of the Philippines-Diliman, Quezon City, Philippines.
[9]   Taylor, B. A. (2004). The Influence of Classroom Environment on High School Students' Mathematics Anxiety and Attitudes, Retrieved on April 4, 2012 from http://goo.gl/CTDh0R
[10]   Peters, M. L. (2013). Examining the Relationships among Classroom Climate, Self-Efficacy, and Achievement in Undergraduate Mathematics: A Multi-Level Analysis. *International Journal of Science and Mathematics Education.* 11(2), 459-480.
[11]   Cheema, J. R., et al. (2014). Influences of Disciplinary Classroom Climate on High School Student Self-Efficacy and Mathematics Achievement: A Look at Gender and Racial–Ethnic Differences. *International Journal of Science and Mathematics Education.* 12(5), 261-1279