Development of the classroom climate measurement model

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Abstract

A significant factor that enhances student engagement in learning, in addition to teachers’ instruction and classroom activities, is the classroom climate. This study aims to develop the measurement model of the classroom climate as perceived by students. Based on a theoretical and literature review, the measurement model of the classroom climate consists of three components: managing the learning activity by teachers to respond to individual learning needs, encouraging students to participate in learning activities and supporting students to achieve their learning. The classroom climate instrument was developed with 17 items. Using data from 355 junior high school students, the reliability and validity of the instrument were examined. It was found that the instrument had content validity (indices of item objective congruence range from 0.714 to 1.000), suitable discrimination indices (item-total correlations range from 0.756 to 0.894) and high internal consistency reliabilities (Cronbach’s α coefficients range from 0.818 to 0.904). Confirmatory factor analysis was conducted by means of Mplus version 7.2 to examine the construct validity of the instrument. Results suggest that the instrument has a high level of construct validity ($\chi^2 = 0.001, df = 1, p = 0.985$). Evidence shows that the measurement model and instrument were appropriate and are recommended for use in further study of teachers’ instructional designs to promote the classroom climate.

1. Introduction

Classroom climate is important for learners’ development. It helps students engage and succeed in learning (Reyes, Brackett, Rivers, White, & Salovey, 2012). The classroom climate results from teachers’ management...
efforts and students’ participation (Brekelmans, Broken, Tartwijk, & Wubbels, 2005). The classroom climate can be used as a method to enhance students’ knowledge.

For classroom management and classroom climate enhancement to be most effective, teachers must consider the students’ needs and background (Land & Hannafin, 2000; Narum, 2004). This is consistent with the learner-centered teaching concept (Khammanee, 2004). In Thailand, this concept has been prevalent in educational reform for over 10 years; however, present learning management has not changed (Sengdonpai, 2007), possibly because of teachers’ preference for traditional learning management, which is generally known as teacher-centered learning management (Chaokiratipong, Namfa, & Thaithae, 2002).

Learner-centered learning management and classroom climate enhancement are different from the traditional concept of teacher-centered learning management. For example, according to the traditional concept, the teacher’s role is to teach whilst, according to the new concept, teachers give advice, mediate and learn together with the students. Similarly, students in the past passively received knowledge whilst nowadays they create their own knowledge. As a result, learning management has changed accordingly. In the past, teachers gave lectures and assigned tasks but nowadays, students work and learn together. Evaluation in the past was based on student performance that showed they had acquired new knowledge whilst nowadays, evaluation helps to develop and diagnose student learning and identify components that need to be improved (Allen, 2004; Huba & Freed, 2000).

The two different concepts show that learning management and learner-centered classroom climate enhancement are more important for effective, continuous and sustainable learning than traditional learning management.

This research is interested in developing a measurement model of the classroom climate based on a learner-centered learning management concept. The results of this research are part of a study concerned with the “development of a measurement model of effective classroom climate enhancement: design-based research and MMSEM analysis”. The research results will be used as a guideline to study the classroom climate and enhance the classroom climate in the future.

2. Objectives of the study

The objectives of this study were to develop the measurement model of the classroom climate as perceived by students.

3. Concepts of learner-centered classroom climate enhancement

The classroom climate is a combination of the feelings of teachers and students during a learning session as a result of teacher behavior (i.e., teaching methods, expressions) and student behavior (e.g., cooperation, continuous involvement in activities, etc.) whilst learning activities are practiced. The construction of the classroom climate is an ongoing process. At the beginning of a learning activity, the teacher who organizes the activity triggers the classroom climate. Later, the teacher controls the classroom climate by stimulating student behavior. Following this, students contribute to the classroom climate so student learning is effective (Brophy-Herb, Lee, Nievar, & Stollak, 2007; McCombs & Whisler, 1997; Saft & Pianta, 2001, cited in Buyse, Verschueren, Doumen, Damme, & Maes, 2008).

Another factor in addition to teacher and student behavior creating the learning climate is the classroom environment (such as light, sound, space, etc.). However, sometimes teachers cannot control the environment due to limited budgets or because of school policy (Allodi, 2002; Sprott, 2004). Therefore, this measurement model of the classroom climate focuses on the emotions and behavior of teachers and students that enhance the learning climate.

As stated above, the classroom climate is partially a result of the organisation of the learning processes of teachers and students. The learning concept guidelines recommended for teacher implementation recommend the learner-centered learning concept, which has been used in Thailand since 1999. However, research results published in 2007 revealed that only a small number of teachers applied this method (Sengdonpai, 2007). When the learner-centered learning concept is implemented, the classroom climate will change accordingly, i.e., when teachers place importance on the needs, differences and feelings of students, opportunities for students to participate in making decisions on designing learning activities, the learning activities and the learning plan, evaluation and assessment (Burton, 2012). The classroom climate enhances positive interaction amongst students and between students and teachers. This results in students paying attention to their studies and being engaged in the learning process at all
times.

Actual learning conditions focus on the fact that students in each class differ in their ideas, intelligence, knowledge, behavior, desires and attitudes towards learning. Therefore, the above factors should be taken into consideration when designing learning plans. Teachers must organise a learning process and create a classroom climate that responds to each student’s needs, encourage student participation and support students’ learning at all times (Attard, Iorio, Geven, & Santa, 2012; Bennett, Davis, & Weddel, 2010; Bista, 2011; Garrett, 2008; Gregory & Chapman, 2007; Jones, 2007; McCombs & Whisler, 1997; Norman & Spohrer, 1996; Schiller, 2009). Additionally, the learner-centered learning concept has been formulated in different ways that are independent of or do not depend on what subject is being taught (Ambrose et. al., 2010, cited in Cornell University, 2012; Brophy-Herb, Lee, Nievar, & Stollak, 2007; Zahn, Kagen, & Widaman, 1986). This concept derives from the self-learning concept by taking into consideration the interaction between students and content, contexts, understanding of subject matter and knowledge creation (James & Pollard, 2006; Land & Hannafin, 2000; Narum, 2004).

Based on the theoretical and literature review, it was found that learner-centered learning enhancement refers to the arrangement of classrooms and the emotional and social conditions of teachers and students in order to facilitate student learning. Three components of classroom climate enhancement are: managing the learning activity by teachers to respond to individual learning needs, encouraging students to participate in learning activities and supporting students in their learning.

![Classroom climate Enhancement Principles](image)

**Fig. 1. Classroom climate Enhancement Principles**

Each learner is different in terms of ideas, behavior and learning ability. This makes each learner different. Their internal feelings refer to emotions, desires, perception of strengths, ability, their preferred methods of learning and their desire for attention from teachers (Jones, 2007; Ledesma, 2012; Massouleh, 2012; Wolf, 2012). Teachers must organize the classroom climate that it corresponds to the feelings of each learner. One important component of learner-centered learning enhancement is teaching without definite formulas. Students must have options and opportunities to choose several learning activities (Attard, Iorio, Geven, & Santa, 2012; Garrett, 2008; Jones, 2007; Schiller, 2009), which will motivate them to engage in the classroom. As well as student engagement, teachers also have to encourage learning outside the classroom. However, teachers must consider the individual capacities of students so they can support them in the most appropriate way. Teachers must try to collect information about each student in their classroom in order to identify their weaknesses and strengths and give them appropriate support (Jones, 2007; Maher & Kellaher, n.d.; McCombs & Whisler, 1997).
From the above statement, a measurement model of the classroom climate as perceived by students can be created using the following research concept:

Fig. 2. Measurement Model of Classroom Climate

4. Scope of the study

Classroom management based on the learner-centered teaching concept includes many elements, such as the learning management process, classroom climate enhancement and learning process evaluation, etc. However, this research studied only classroom climate enhancement because it is a significant factor in enhancing students’ learning engagement (Buyse, Verschueren, Doumen, Damme, & Maes, 2008). Since previous research found that the contents of different subjects create a different classroom climate (Ambrose et al., 2010, cited in Cornell University, 2012; Brophy-Herb, Lee, Nievar, & Stollak, 2007; Zahn, Kagen, & Widaman, 1986), this research, therefore, focused on the classroom climate in science lessons only, due to the difficulty of the content that the students encountered.

5. Research methods

The sample of this study were 355 Grade Eight students (men = 192 and women = 163), who were acquired by simple random sampling. Their favorite subjects in descending order were: Mathematics (26.00%); Sciences (24.20%); Physical Sciences (15.40%), and; English (14.10%), respectively.

The instrument used to measure classroom climate was a questionnaire with a scale from 1-5 including 17 items. The three components of classroom climate were: 1) Managing learning activity by teachers to respond to individual learning needs, 2) encouraging students to participate in learning activities, and 3) supporting students to achieve their learning. Sample of items measuring classroom climate are as follows:

Managing learning activity by teachers to respond to individual learning needs
- The teacher prepared appropriate materials for me. (For example, the materials are not too difficult and not too easy; they responded to my needs; the teacher showed confidence that I could learn from them).
- The teacher used appropriate learning materials. (For example, the technological media that the teacher used are up to date, not boring, exciting and different from textbooks; teachers’ teaching materials made me understand complicated lessons better).

Encouraging students to participate in learning activities
- I felt a friendly relationship between teachers and students in the classroom. (For example, feel comfortable, familiar, unafraid to ask questions and can seek assistance or express opinions that are different from those of teachers or friends).
- I liked the way the teacher paid attention to me, realised when I didn’t understand lessons or noticed my problem and helped me before I asked questions.

Supporting students to achieve their learning
- The teacher helped solve problems that occurred whilst I was doing activities. (For example, the teacher gave me recommendations when I was faced with problems; when I could not finish activities in time, the teacher extended the time for me).
- The teacher gave useful information to develop my learning ability. (For example, the teacher gave me suggestions or added knowledge to where my weaknesses were; the teacher let me do additional activities so I had a better understanding).

The measurement model of the classroom climate was validated to show the quality of the instrument. The validity of the content was reviewed by seven experts based on indices of item objective congruence (IOC), discrimination indices as examined by analysis of item-total correlations, internal consistency reliability by analysis of Cronbach’s $\alpha$ coefficient and construct validity by confirmatory factor analysis.
6. Research results

The classroom climate instrument consists of three components. Each component was designed to have 5, 7, and 5 items, respectively.

Managing learning activity by teachers to respond to individual learning needs. Indices of item objective congruence (IOC) ranged from 0.714 to 1.000. Each question had an item-total correlations range from 0.449 to 0.701. Internal consistency reliability of this component was 0.818.

Encouraging students to participate in learning activities. Indices of item objective congruence (IOC) ranged from 0.856 to 1.000. Each question had an item-total correlations range from 0.682 to 0.745. Internal consistency reliability of this component was 0.904.

Supporting students to achieve their learning. Indices of item objective congruence (IOC) ranged from 0.714 to 1.000. Each question had an item-total correlations range from 0.602 to 0.782. Internal consistency reliability of this component was 0.818.

Construct Validity

Every component positively related with statistical significance. The correlation was at medium level (0.702-0.777). The pair with the highest correlation was “encouraging students to participate in learning activities” and “supporting students to achieve their learning”. Variance accounted for 60.373% and the pair with the least correlations was “managing learning activity by teachers to respond to individual learning needs” and “encouraging students to participate in learning activities”. Variance accounted for 49.421%.

Table 1 Descriptive statistics and correlations of components

<table>
<thead>
<tr>
<th>Classroom climate components</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Managing learning activity by teachers to respond to individual learning needs</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Encouraging students to participate in learning activities</td>
<td>.712*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>3. Supporting students to achieve their learning</td>
<td>.703*</td>
<td>.777*</td>
<td>1.000</td>
</tr>
<tr>
<td>M</td>
<td>3.328</td>
<td>3.413</td>
<td>3.424</td>
</tr>
<tr>
<td>SD</td>
<td>0.719</td>
<td>0.681</td>
<td>0.745</td>
</tr>
</tbody>
</table>

*p < .05

Results of construct validity using confirmatory factor analysis showed that the measurement model of the classroom climate fitted with empirical data ($\chi^2 = 0.001, df = 1, p = 0.985$). The component “encouraging students to participate in learning activities” had the highest level of factor loading ($\beta = 0.887$), followed by “supporting students to achieve their learning” ($\beta = 0.876$), and “managing learning activity by teachers to respond to individual learning needs” ($\beta = 0.830$), respectively. The details are presented in Fig. 3.

![Fig. 3. Linear structural analysis of the classroom climate model](image-url)
7. Discussion and recommendations

The constructed 17 items of the classroom climate instrument were appropriate in terms of content validity, examined by experts who have experience in learning management. Discrimination indices were suitable. Each component had high internal consistency reliabilities. This means that items of each component measure the same objective.

It was also found that the measurement model of the classroom climate had construct validity (Wiratchai, 1998 cited in Kaemkate & Boonsorn, 2012). The component with the highest factor loading was “encouraging students to participate in learning activities”. The items under this component were constructed in a different way when compared to the other two components. The second component, “encouraging students to participate in learning activities”, emphasized that students’ feelings were more affected by teachers’ behavior than the other two components, which emphasized the perceptions of students towards learning activities and teachers’ behavior (Djigic & Stojiljkovic, 2011; Fraser, Aldridge, & Adolphe, 2010, cited in Patrick, Kaplane, & Ryan, 2011; Reyes, Brackett, Rivers, White, & Salovey, 2012).

The research showed that the measurement model of the classroom climate could be used to study the classroom climate, as well as the causes and consequences of the classroom climate. It could also suggest a guideline for developing the learning process of students. The classroom climate should be improved to motivate and support students’ learning. Research results indicate that teachers should organize learning activities that respond to individual needs and the differences of students. Students should be continuously encouraged to participate in learning activities in order to enhance the classroom climate and to encourage them to continue learning.

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References


