Construction and Validation of the Classroom Learning Behavior Self-assessment Inventory

Rajendra Kunwar1,*, Lekhnath Sharma2, Bed Raj Acharya3

1 Mahendra Ratna Multiple Campus, Tribhuvan University, Ilam, Nepal
2 Nepal Open University (NOU), Lalitpur, Nepal
3 Department of Mathematics Education, Tribhuvan University, Kirtipur, Nepal

Received January 17, 2021; Revised March 31, 2021; Accepted May 11, 2021

Cite This Paper in the following Citation Styles

Copyright©2021 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Abstract Classroom learning behavior self-assessment tool can be supportive to the teachers to understand students' learning readiness and learner type to design each lesson for everyday instruction and guide students for their learning promotion. The purpose of this study was to construct and validate the classroom learning behavior assessment inventory for the secondary level students to measure their classroom learning behaviors. To construct the inventory, students' learning activities and their traits that they demonstrate were selected from the three learning thoughts such as behaviorism, cognitivism, and constructivism and were listed categorically into six thematic areas. These three thematic areas were also divided into five subcategories and formulated 30 behavioral statements from each sub-category in the form of 5 points Likert scale. A sample of 600 high school students studying in grade X from Province No 1, Nepal has been drawn to verify and validate the students' classroom learning behavior instrument. In this research, each of the items was validated by using confirmatory factor analysis and their internal consistency of the instrument as a whole was assessed using Cronbach's coefficient alpha and found to be 0.86. Likewise, to ensure the validity, the internal structure, and the important features of the test like experts' judgment and verifications were employed. In this process, some statements and the terms were also revised. Thus, the result of the factor analysis and the value of internal consistency of the items were verified as the efficient inventory to measure the students' classroom learning behavior.

Keywords Classroom Learning Behavior, Behavioral Statement, Self-assessment, Secondary Level

1. Introduction

The student Classroom Learning Behavior Self-assessment Inventory (CLBSI) is a tool that a student uses himself/herself to measure the students' classroom learning behaviors. It is a self-assessment tool that can be used for research purposes by a researcher too. The tool can be helpful to the student to assess their own learning behaviors in the classroom learning that appear unknowingly. Through this assessment of learning behavior, students can make self-correction or adjustment in their learning behavior to promote their learning. This self-rating scale measures the dimensions of the social and emotional behaviors of the learner. This inventory was mainly designed to access the students' classroom learning behavior for academic research. Mathematics at Secondary School is considered a difficult subject to teachers and students. The main implication of this inventory, therefore, is to assess the students' learning behavior that can be used in planning lessons and developmental learning following the learning behavior attributes derived from theories of learning. The inventory was designed as multidimensional measures of learning behaviors as positive, negative and neutral. The CLBSI consisted of 30 learning behavior items that were constructed in the form of first-person statements. Each item was to be rated with a 5-point
Likert-style scale (from consistently to never) that is each five items are categorized into six thematic areas as Engagement, Motivation, Independence, Responsiveness, Collaboration, and Participation. These learning behaviors under the thematic areas comprise the expected learning behaviors from the learning thoughts from the three theories such as behaviorism, cognitivism and constructivism. Mostly, the instructional design and even the personal learning management are guided by these theories in the Nepalese context.

Most of the behavior inventories comprise the rating scale to observe the behavior of the organism. In such inventory, the observer should be more experienced and have more knowledge about the organism or should observe for a long time which in some sense may not be appropriate and the results may be misleading. So, considering these limitations, this inventory is designed as a self-assessment inventory in which, the organisms (learners) use their self-decision to record the social and emotional behavior from the given rating scales without giving their identification.

Self-assessment is a process of assessing the own activity and behavior own self in the learning process [1]. This process of assessment helps the student to evaluate the quality of their thinking and behavior in learning. Moreover, self-assessment is conceptualized as the combination of three components: self-monitoring, self-evaluation, and identification and implementation of instructional correctives [2]. This helps to enhance the student's knowledge, skill, and attitude for the expected performance. Self-monitoring is a skill necessary for effective self-assessment which involves focused attention to some aspects of behavior or thinking [3]. In self-monitoring, students pay deliberate attention to what they are doing, often concerning external standards. Thus, self-monitoring concerns awareness of thinking and progress as it occurs, and as such, it identifies part of what students do when they self-assess [2]. The second component of self-assessment/self-evaluation involves identifying progress toward the targeted performance. Finally, the identified decision will be implemented in the instructional process.

The main objective of constructing the CLBSI scale is to measure the classroom behaviors exhibited by the student in the mathematics classroom. Classroom behaviors determine the entire learning environment of the class. Students' positive and negative behaviors create a positive and negative learning environment in the class. Better classroom management largely depends on how students' behaviors are directed towards learning. This self-rating scale uses to examine students' classroom behaviors in the classroom which directly affect the management of the classroom learning environment. As the assessment show positive behaviors like compliance with classroom rules and expectations, interest and engagement in class activities, and mastery of subject matter, have been associated with positive academic outcomes [4, 5], while negative behaviors such as inattention, distractibility, and withdrawal behaviors have been associated with negative academic outcomes [6, 7]. Student's positive behaviors contribute to positive academic outcomes because they promote academically-oriented behavior, such as intellectual curiosity, active listening and an interest in school work [8]. As teachers see student's negative behavior but students are unaware, they are exhibiting such behavior. As teachers warn the students about negative behaviors, students may take it as teachers' biasness. In such conditions, teachers can develop negative perceptions about such students who are constantly disruptive, cannot put high expectations on such students and the care to the students' learning implicitly decreases. As teachers keep low expectations from the students, the learning opportunity provided to the students is affected. Student self-assessment can correct their undesirable learning behaviors.

It is essential that the teacher should treat the students according to their learning behavior to get the expected outcome of the curriculum. In this regard, it is necessary for every teacher to know the way of learning mathematics about their children and the learner's expectations as well as social and emotional conditions of learning mathematics. Similarly, it is equally necessary to be familiar with the perceptions of the learner towards learning mathematics. On the other hand, the test instrument or tool that can be used to measure the learners' behaviors are closely linked with its ability to provide the kind of information needed regarding students’ learning behavior [9]. Therefore, this inventory may help to find out the existing students' mathematics learning conditions and assist to decrease the students' negative behaviors and subsequently increase positive behaviors for better academic achievement. So, this study focuses to develop and validate an inventory for assessing the school level students' classroom learning behaviors in Nepal.

2. Methodology

Design and Development of the Instrument

In the process of design and development of the instrument, the purposes of the test and the test specifications are the fundamental aspects [10]. The inventory has been constructed and validated under the guidelines followed by the researcher [11, 12]. Students learning behavior is the multi-dimensional construct in which different learning perspectives may jointly embed. So, to fully appraise such construct, it is necessary to incorporate the different dimensions of such construct and should assign the items according to the weight of the construct [13]. Thus, in the process of constructing this instrument, the CLBSI inventory was designed considering the developmental characteristics of the children or their
activities as suggested by the three learning thoughts such as behaviorism, cognitivism, and constructivism. The items concerning the three learning thoughts were included in an equal ratio in the inventory because the weightage of such learning thoughts depends on the learners' perception. In this way, the three different viewpoints and their practical applications in the instructional practices, the inventory was designed. In this course, the learning attributes were divided into six thematic areas or factors, two each from the three learning camps. All the factors were also categorized into five subcategories. So, 30 learning behavior items or statements were constructed containing equally from each factor. The items or the behavioral statements were constructed so as to contain positive, negative and neutral statements based on learning attributes in the form of 5 points Likert-type scale.

**Defining the Thematic Areas and Constructing the Behavioral Statements**

**Engagement**

Generally, the degree of attention, curiosity, interest, optimism and passion of students as shown when they are learning or at the time of being taught refer to students' engaged behaviors. Such behaviors extend to the level of motivation they have to learn and progress in their study. It is challenging tasks to assess students' engagement because of its complex construct influenced by multiple factors. Fredericks, Blumenfeld & Paris [13] identify three dimensions of engagement:

i) Cognitive engagement: students' investment in their learning (motivation and self-regulation).

ii) Behavioral engagement: students' participation in education, including the academic, social, and extracurricular activities of the school.

iii) Emotional engagement: students' emotional reactions in the classroom and the school (a sense of belonging or connectedness to the school).

According to McDonald [14], students' engagement focuses on the students' cognitive interaction with the content. “Learning occurs through the cognitive engagement of the learner with the appropriate subject matter knowledge. Engagement can take place when students listen to the teacher, conduct lab experiments or solve a mathematics problem. A well-managed classroom and a supportive classroom environment can facilitate this engagement process [15].

The subcategory of the thematic area, engagements are:

i) Imitation: the act of copying somebody or something by the students or when someone or something imitates another people or things.

ii) Doing classroom activity: doing classroom activity related to the mathematics class.

iii) Enjoying in mathematics class: to get pleasure or enjoy in the mathematics class activities.

iv) Drill and practice: repeated activity especially related to the mathematical skill by the students.

v) Engagement in unsocial behavior: to engage or busy in an uncivil or unwanted behavior in the classroom.

**Motivation**

In classroom teaching and learning, motivation refers to students’ readiness to learn or desire to do some learning activities in the classroom. The source of academic motivation and how it can be facilitated within the school, classroom and home, have been a recurrent area of research [16]. Students have different levels of motivation for each distinct task and subject area. Most of the literature separates motivation into two distinct constructs: intrinsic motivation and extrinsic motivation. Intrinsic motivation is an “energizer of behavior” [17]. Students who are intrinsically motivated to learn mathematics or science find the subject to be interesting and enjoyable [17]. Although it is theorized that all human beings are born with intrinsic motivation to learn, the home and school can either facilitate or suppress this inner motivation.

Extrinsic motivation refers to the drive that comes from external rewards like praise, career success, money, and other incentives. Research consistently shows that intrinsic motivation is more closely related to achievement than extrinsic motivation [18]. Indeed, some research points to external rewards dampening a student’s intrinsic motivation [19]. Nevertheless, most students do not have an intrinsic motivation to learn all subjects, and therefore fostering motivation through extrinsic rewards may be a necessary course of action for a teacher or a parent. In these cases, research has found that successful students internalize their extrinsic motivation to increase performance, in an environment that cultivates feelings of relatedness, competence, and autonomy [20]. The subcategories of the thematic area, motivation include:

i) Activity concentration: look intense about the classroom activity or think carefully about the activity.

ii) Like to do something: intend to do any mathematical task

iii) Attention: to watch, listen or think about mathematics carefully or with interest

iv) Curiosity: an eager or excite wish to know or learn about something

v) Enthusiasm: a feeling of energetic interest in a particular subject or activity and an eagerness to be involved in it.

**Independence**

Students' independence in the classroom means to follow the student-centered learning approaches that personalize learning and enable the learner to take ownership of the learning process and students take control of their learning [21]. This can be challenging for both students and teachers. One of the prerequisites of independent learning is the ability to work on their own,
with minimal direction and with confidence. This includes a sense of how to manage one's learning as well as how to respond to difficulties or challenges. In such a situation, it is necessary that the teacher takes a back seat.

The key role of teachers in independent learning is assisting students to become independent learners by ensuring that students were actively involved in learning. The teacher should provide scaffolding, opportunities to self-monitor, offering models of behavior, developing communication and providing feedback to the students when necessary, and support the students for independent learning [21]. These ways of assisting students include improving their confidence in working independently and helping them develop the reflective aspect of independent learning. Self-monitoring helps the students in the processes of establishing goals and receiving feedback from others and themselves. Developing communication helps the students to become more aware of the steps involved in learning, understands their learning styles and helps students and teachers share their thinking. The subcategories of the thematic area of independence are:

i) Individual work: the involvement of a single person or a particular person in learning.

ii) Self-direction: doing something by self-decision or without being influence by others

iii) Exploration: searching to find out something or to discover

iv) Self-practice: an action that is usually or regularly done by own self.

v) Autonomous learning: any learning which is self-guided and independent or depends on his/her interest.

Responsiveness

The term 'responsiveness' is defined as making a positive and quick reaction to something or someone in the existing situation. It is the immediate act or response of the students in a particular situation in the classroom. Responsiveness consists of the set of social, cultural, emotional and academic competencies of the students [22]. Such competencies help the students to establish new relationships, maintain positive relationships and friendships, avoid social isolation and resolve conflicts. It helps to recognize and regulate their thoughts, emotions, and behaviors to be successful at the moment and remain successful.

The academic aspects help the students conduct themselves to support their success in school, including such things as regular attendance, arriving ready to work, paying attention, participating in instructional activities and class discussions, and devoting out-of-school time to studying and completing assignments and projects. The subcategories of the thematic area, responsiveness include:

i) Competitiveness: competing to others or to compete against each other

ii) Keeping silence: a state of not speaking or making noise or being complete quiet

iii) Support to peers: to give encouragement to someone or to help someone emotionally or physically.

iv) Reaction to the teachers and peers: a type of behavior, opinion, a feeling, or an action that is a direct result of something else, which will happen by the learner immediately when something happens.

v) Accountable: Completely responsible for what they do and must be able to give a satisfactory reason for it.

Participation

Participation is often equated with the term discussion, which typically involves a lengthy conversation with the whole class. However, participation can also include short exchanges between instructors and students or within a small group of students [23]. Class participation is an important aspect of student learning. When students speak up in class, they learn to express their ideas in a way that others can understand. When they ask questions, they learn how to obtain information to enhance their understanding of a topic.

Classroom participation can result in insightful comments and interesting connections being made by students and can foster a high level of energy and enthusiasm in the classroom learning environment. However, poorly managed participation can also lead to instructor frustration and student confusion. Participation in the classroom helps the students to articulate their ideas, build shared understandings, engage with contents and contribute to a dynamic learning environment. It provides tutors with a means of acknowledging students' contributions and also provides the incentive for students to actively participate in class discussions and by doing so, improves their oral communication skills [24]. It encourages students to prepare for classes and engage with course readings, preparing materials and project work.

Overall Student Participation is meant to create a learning environment where student contributions, peer interactions and a healthy engagement with the course are acknowledged and rewarded by the teacher. The subcategories of the thematic area participation are:

i) Participation: the extent to which students participate or involve themselves in a classroom activity or to take part or become involved in the learning activity.

ii) Involvement: the act of taking part in the learning process.

iii) Non-instructional talking: the act of formal non-teaching learning activities inside the classroom.

iv) Concentration: the total effort and attention on one thing without thinking of other things of complete attention on a particular thing.

v) Talks, whispers with friends: to speak or talk very quietly with the friends so that others can't understand what they are saying.
Collaboration

Collaborative learning is an emerging specialized classroom design or style of learning. The term ‘collaboration’ is defined as the situation in which two or more people work together to create or achieve the same thing. According to Johnson & Johnson [25], collaboration is group work working together to accomplish shared goals. Collaboration happens in both small and large groups, cooperation refers primarily to small groups of students working together. Collaborative learning emphasizes group learning. Implementing an effective collaborative classroom also requires a well-managed classroom. Heterogeneous groups of students are essential characteristics of collaborative classrooms.

The role of the teacher in collaborative classroom teaching is facilitating, modeling, and coaching the students. Teachers facilitate collaborative learning by creating learning tasks that encourage diversity but aim at high standards of performance for all students. These tasks involve students in high-level thought processes such as decision making and problem-solving which are best accomplished in collaboration. These tasks enable students to make connections to real-world objects, events and situations in their own and an expanded world and tap their diverse perspectives and experiences.

Facilitating involves creating a rich environment and activities for linking new information to prior knowledge, providing opportunities for collaborative work and problem solving and offering students a multiplicity of authentic learning tasks [26]. Modeling serves to share with students about the content to be learned and the process of communication and demonstration. Coaching involves giving hints or cues, providing feedback, redirecting students' efforts and helping them use a strategy. A major principle of coaching is to provide the right amount of help when students need it neither too much nor too little.

Indeed, collaboration occurs through dialogue and interaction that curriculum objectives come alive. Collaborative learning affords students enormous advantages not available from more traditional instruction because a group, whether it is, the whole class or a learning group within the class can accomplish meaningful learning and solve problems better than any individual can alone. The subcategories of the thematic area, collaboration are:

i) Group work: several people working together in the same place that is similar in some way.

ii) Group discussion: talk about something and tell each other their ideas or opinions in the group.

iii) Interaction: two or more people communicate with or react to each other in any object, issue, or matter.

iv) Cooperativeness: the act of unconditional acceptance of others, empathy with others' feelings, and willingness to help without a desire for selfish domination.

v) Teamwork: the activity of working well together in a team or work together by a group of people.

Sample Selection and Administering the Instrument

In this study, secondary level grade X students from Province No. 1 of Nepal were selected as the participants. A sample of 600 students was selected from 12 different public schools. Fifty students were selected from each school covering a wide range of geographical regions with different demographic backgrounds. Each two schools from every geographical region Mountain, Hill and Terai were selected so as to represent one school from the municipal and other schools from the rural municipal area based on the stratified random sampling. Among 600 students, 391 were female students and the remaining 209 were male students. The age of the participants was in the range of 15 to 19 years.

The instrument was translated into Nepali by the Nepali translator. The translation was reviewed by two English and Nepali subject experts to ensure the intended meaning of the items maintained in the translation. Then, the instrument was administered to the students of class X during their mathematics class. The instructions given in the instrument were read out and explained by the researcher in different 12 schools. Before the distribution of the instrument to the participant, it was assured that the data are only for academic purposes. They were given 30 minutes to complete the questionnaire after which it was collected from them.

Establishing Validity and Reliability

Validity

The validity of a test is the extent to which a test measures what it is supposed to measure; therefore, a test is considered valid when its results are congruent with the objectives pursued by its use [27]. According to the standards for educational and psychological testing [28], the content of the test, its internal structure, and the important features of the test should be measured. So, to maintain the content validity and construct validity, the specification of thematic areas and the learning attributes on behaviorist, cognitivist and constructivist learning theory was prepared and the expert's judgment was employed.

Descriptive reviewer feedback was also obtained and based on the experts' feedback, some of the repetitive items were removed and some were reworded to make simple and non-ambiguous. Finally, the questionnaire consisting of 30 items was prepared to be pilot tested before being administered to the research sample.

Reliability

Reliability is a measure that produces similar results under similar conditions. More specifically, the degree of reliability of a test depends on (1) the extent to which
differences in observed test scores can be attributed to real differences and (2) the extent to which such differences depend on measurement errors [29]. In this instrument, the internal consistency reliability method (Cronbach’s α) was used. Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. In other words, the reliability of any given measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach’s alpha is one way of measuring the strength of that consistency. This method is conventionally defined as an item-level approach because it considers each item of a test as a separate test. The internal consistency reliability of the instrument was assessed using Cronbach’s coefficient alpha and found to be 0.86. The reliability of the instrument was judged sufficient because the alpha value was well above 0.60 [30] which is the minimum requirement.

### 3. Results and Discussion

The inventory was developed from the review of the literature and different survey instruments. In the beginning, the factors for the instrument were determined through the thematic analysis of the different learning theories however, the items of the inventory were validated using confirmatory factor analysis and calculating their internal consistency, later, by using SPSS software version 22. The principal component analysis method was applied using a fixed number of factor extractions to examine the factor loading and the factor structure. The results in Table 1 revealed that the six factors extracted during the analysis, all the factors were found sufficiently loaded. The factor loading or the correlation coefficient between the variables and the factors [31] was calculated and it was found to be correlated. The internal consistency (Cronbach's Alpha) for the six subscales was also calculated and found in the range between 0.68 and 0.79 as shown in Table 1.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Items</th>
<th>Factor loadings</th>
<th>α- value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>1. I learn mathematical concepts and items by imitating them as given by the teacher.</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. I like to practice the problem related to the exercise with the help of teachers’ hints in the math class.</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I enjoy practising and doing exercises in math class.</td>
<td>0.64</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>4. I learn mathematical concepts, structures and formulae through constant repetitions.</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. It is my experience that we can learn math even without keeping quiet (e.g. playing with objects, sticking a 'tail' to friends' back, throwing objects, destroying objects, instrument, books, etc.).</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. I feel comfortable and have fun while learning new things in the math class.</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. I like to go to the front of the class to share my ideas with peers to solve the problem in the math class.</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td>8. I listen and follow the teachers’ instructions and suggestions very attentively while practising mathematical problems.</td>
<td>0.76</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>9. New and challenging mathematical problems make me engaged for a long.</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. I feel excited when I can solve new mathematical problems.</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>Independence</td>
<td>11. I like to practice math alone with my own effort.</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12. I make several attempts to solve mathematical problems regularly in the classroom without any instruction from other(s).</td>
<td>0.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13. In doing math, I usually try to find out ideas for solving problems through personal initiatives.</td>
<td>0.66</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>14. I am used to solving mathematical problems at home and at school.</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15. I do mathematical activities best when I am independent.</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>Responsiveness</td>
<td>16. I like practicing and learning math by competing with my peers.</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17. I remain silent in the math class rather than asking questions.</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18. I help my friends and also take help them when necessary in the math class.</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19. I react immediately against the teacher or friends if they ignore my issue(s).</td>
<td>0.72</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>20. I think I like to do mathematical activities in the class with full responsibilities.</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td>21. I can do mathematical activities best as group work.</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. I feel joyful to take part in classroom discussions in the math class.</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23. I feel easy to learn some math problems through interaction rather than another method (s).</td>
<td>0.63</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>24. I like working in cooperation with my peers in the classroom.</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25. I hesitate to work in a team while learning mathematical problems.</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td>26. It is interesting to sit at the back of the classroom and stare out of the window.</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>27. I learn math with active involvement mainly by doing tasks in the classroom.</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>28. I talk about non-instructional/private topics in math classes.</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29. In the math class, I immediately ask the teacher for clarification when I am confused.</td>
<td>0.54</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>30. I also participate with neighboring friends talking and whispering in the class.</td>
<td>0.61</td>
<td></td>
</tr>
</tbody>
</table>
In Table 1, the values of factor loading or the correlation coefficient between the variable and factor were in the range between 0.51 and 0.72 for their corresponding factors then it is considered that the inventory signifies convergent validity. Then this is considered as the strong correlation between the items and the corresponding factors. Thus, this inventory can be considered as an efficient tool to measure the students' mathematics classroom learning behaviors by the results of factor analysis and their internal consistency of the items.

4. Conclusions

The study was conducted to construct the students' classroom learning behavior inventory for the school level education, particularly aimed at mathematics. This students' self-assessment inventory was constructed to seek information about students' classroom learning behaviors concerning the teacher, subjects, teaching strategy, materials and the overall classroom environment. The result of the confirmatory factor analysis and the internal consistency of the items confirmed that this inventory could yield information regarding the students' responses to questions about the classroom learning activities, learning process, their attitude, feeling and expectations about the overall classroom situation. Thus, such self-assessment inventory can be necessarily useful for the researcher, mathematics teachers and also the teachers of other subjects who can use as a reference to address the classroom learning problem. This can also be helpful for the students to know more about their classroom learning problems and maintain a good student-teacher relationship. It can also help to determine the students' responses regarding their learning activity, feeling and behavior in the classroom learning situation. So, this instrument can be utilized as one of the useful tools for the betterment of the mathematics classroom teaching-learning process.

REFERENCES


