Extended Summary

It is known that what students think about mathematics course significantly influence their academic success in mathematics (Dogan, 2012; Hembree, 1990). In this context, it is thought that what students think about mathematical applications course can influence their academic success in mathematics. The objectives of this course should be reviewed in line with student expectations, and corrections in the curriculum will contribute the cognitive and affective abilities of students in mathematics course. Moreover, teachers should be made aware of student expectations for the course, thus contributing to improvement of students. Keeping these expectations in view, this study aims to develop a data collection tool with high validity and reliability in order to reveal what secondary school fifth- and sixth-grade students expect of mathematics course.

Methodology

The study employs survey model. Because, survey model is a research model used in identifying types of information such as attitudes, beliefs, values, habits, and thoughts of people. The research group is comprised of fifth- and sixth-grade students taking mathematical applications course in a medium sized city of north east of Turkey. The research was carried out on the third week of the first semester of 2013-2014 school year. The research group was selected based on students who took on the elective mathematical applications course. In this regard, criterion sampling method, a purposeful sampling method, is taken as basis in research group selection. Generally, three sources were used in creating scale items to reveal what students expects of mathematical applications course. First is the students themselves. A preliminary study was carried out in class environment on 60 secondary school fifth- and sixth-grade students to reveal what students expect of this course. Students were asked about their expectations of mathematical applications course and they provided written answers. Then, answers were reviewed and used to form scale items. The second source for scale items are materials provided by the Ministry of National Education for the mathematical applications course. Teaching method, scope and attainments recommended for the course were reviewed by using the materials. Points and attainments projected for this course by the Ministry of National Education were included in the draft scale. The third source used in forming a pool of
items are similar studies in the literature. These three sources were used to create a draft scale of 66 items. In terms of language and scope validity, the 66-item draft scale was submitted to six academicians, expert on primary mathematics education. In line with the view of academicians, six items were concluded to be higher than the knowledge level of students and not clear enough, so those six items were omitted. 60-item draft scale created in line with views from the specialists was submitted to two Turkish education specialist academicians for language validity. Required arrangements were done according to feedback from language specialists, and the draft scale was finalized for pilot application.

Results and Conclusions

Kaiser-Mayer-Olkin (KMO) and Barlett’s Test of Sphericity tests were applied to measure the adequacy of the sampling. BTS test used for data obtained from the scale are statistically significant ($\chi^2(946) = 12641.184, p < .05$). Accordingly, obtained data correspond to the factor analysis. KMO test is used to identify whether the scale sampling is suitable for factor analysis or not. The KMO value of the developed scale is .97. This corresponds to “excellent” classification”. MSA value separately evaluates each item’s suitability to factory analysis. All items in the scale have MSA values over .50. Accordingly, each item in the scale is suitable for factor analysis. Upon reviews to reveal the factor structure of the scale, it was deemed suitable to collect the scale under three factors. For factor selection, Varimax orthogonal rotation method was used to perform rotated principal components analysis. .40 value is taken as lower breakpoint of factor loads in Varimax rotation. Items with a factor load value lower than .40 were omitted from the analysis, then factor analysis was repeated. .10 was taken as basis for cyclical limit value. Items having lower than .10 difference between different factor load values were omitted. Exploratory factor analysis resulted in 15 items with a factor load value under .40, odd or even under a single factor and having a cyclical load value. These items were omitted and factor analysis was repeated. At the end of the repeated factor analysis, the scale got its stable structure with 29 items and three factors. Factor load values of items vary between .67 and .77 for the first factor, .59 and .75 for the second factory, and .76 and .82 for the third factor. In terms of size, factor load values can be classified from “good” to “excellent”. In terms of contribution of factors to total variance, first factor contributes 27.29%, second factor 24.23%, and third factor 9.17%. Total contribution of three factors to the variance is 60.69%. Accordingly, three factors of the Expectation Scale for Mathematical Applications Course explain 60.69% of the variance in all scale scores. Initial number of factors of 2/3 of total variance about variables included in the analysis are regarded as significant number of factors. It is hard to reach the said amount in scale development particularly in social sciences. 40 to 60% declared variance is considered sufficient in multi-factor designs (Büyüköztürk, 2011; Tavşancıl, 2010).
As a scale reliability approach, Cronbach’s Alpha internal consistency coefficient was taken as the reference in the study. Reliability analyses showed the internal consistency coefficient of the scale as .93, and internal consistency coefficients of three factors in the scale as .94, .93, and .81 respectively. These values mean that the 29-item and 3-factor Expectation Scale for Mathematical Applications Course is a highly reliable measurement tool.

Following the validity and reliability analyses, scale factors were named. Items in the first factor are about cognitive behaviors the Ministry of National Education expects students to acquire, items in the second factor are about the education of this course to students, and items in the third factor are about the affective acquisitions of students. Hence, first factor of the scale is named “cognitive expectations”, second factor “educational expectations”, and third “affective expectations”.