

## Effects of Formative Assessment on Prospective Teachers' Achievement, Attitudes and Self-Regulation Skills\*

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### Abstract

The aim of the study is to investigate the effects of formative assessment on prospective teachers' academic achievement, attitudes towards educational measurement and self-regulation skills. In the study, quasi-experimental design including non-equivalent pre-test and post-test control group. There are 40 prospective teachers in each one of the experimental and control group which implemented in the scope of measurement and evaluation course in education faculty. Formative assessment was implemented within the 14-weeks in the experimental group, and summative assessment practices were done in the control group. According to the research results, it is determined that academic achievements of prospective teachers in the experimental group have differentiated significantly to academic achievements of prospective achievement in the control group. There is no statistically significant difference between prospective students' attitudes towards measurement and self-regulation in the experimental and control group. However, it has been made out those prospective teachers' attitudes towards measurement and self-regulation skills in the experimental group have been higher than the others' in the control group.

**Keywords:** formative assessment, academic achievement, attitudes towards measurement, self-regulation skills, prospective teachers

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## Introduction

Assessment has an important role in the education. Generally, it is determined the difference between summative and formative assessment aims. While summative assessment focuses firstly on learning outputs, formative assessment aims to constitute an approach in the learning process with supporting learning by feedback (Dixson & Worrell, 2016; Stobart, 2008). The most common assessment types used in the schools is summative assessment. In addition, the assessment has a role as a formative skill. Formative assessment has been often used in the classroom, which enables to identify learners' learning needs, and to assess their learnings and developments interactively for organizing according to their learning needs (Centre for Educational Research and Innovation [CERI], 2008). Formative assessment is a process, which is to give feedback to the students and teachers for filling the gap between the current learning situation and intended aims; and it appears into the learning and teaching process (Heritage, 2008). O'Connor (2002) defines formative assessment as "Assessment designed to provide direction for improvement and/or adjustment to a program for individual students or for a whole class, that is, quizzes, initial drafts/attempts, homework, and questions during instruction" (p. 109).

Black, Harrison, Lee, Marshall, and Wiliam (2003) stated four main approaches as questioning, feedback through marking, peer- and self-assessments and formative use of summative tests. In Florez and Sammons' (2013) study, in which they investigated 33 essays, they found out that at least one of these four elements, which are accepted as formative assessment features, was analysed in the studies. Hodgson and Pyle's (2010) study that investigated formative assessment in science teaching have been stressed that talking, questioning, peer and self-assessment are important and main elements in the process of formative assessment, and formative usage of summative tests is used to support the learning and teaching.

According to McMillan (2014) the goal of the formative assessment is students' motivation and development of students' learning. To achieve this goal, teachers must adopt a cyclical and continuous process, which includes the assessment about students' behaviours and papers, the feedback given to them and their instructional adaptations, or organizations, which are called as 'recoverable'. When formative assessments are used, students are encouraged to be more active in their learning, and teachers have the opportunity to provide a more supportive yet challenging learning environment (Wood, 2010). More specifically, formative assessment allows instructors to check for understanding and help students achieve mastery and course success (Dirksen, 2011). According to Maier, Wolf, and Randler (2016) formative assessment is one of the main parts of effective learning and teaching processes, and also it is crucial to increase students' achievements in all the levels (Clark, 2013; Eshun, Bordoh, Bassaw, & Mensah 2014; Hannah, James, & Williams, 2014; Kline, 2013; Lee & Coniam, 2013; Moeed, 2015; Organisation for Economic Co-operation and Development [OECD], 2005). Black and Wiliam (1998a) conducted a literature review of over 250 articles related to studies on formative assessments. Their review found that students had higher gains in academic achievement when they engaged in self-assessment, were tested more frequently, were given corrective feedback, and were focused on learning goals rather than performance goals. This led Black and Wiliam (1998a) to conclude that "attention to formative assessment can lead to significant learning gains" (p. 17). Different meta-analysis studies show that formative assessment have increased both the students' achievements and its standards (Fuchs & Fuchs, 1986; Kingston & Nash, 2011).

It has been seen that there is a growing interest into the formative perspective of the assessment. One of few formative assessment or its practices have been supported or practiced in many countries like United States of America (USA), Austria, New Zealand, United Kingdom (UK), Barbados, Canada, Israel, Portugal, Belgium, Hong Kong, Chile, Iran, Netherlands and some African countries speaking French (Azúa & Bick 2009; Black et al., 2003; Hodgson & Pyle, 2010; Kellaghan, 2004; Tan, 2011; Tierney & Charland, 2007). Formative assessment is a popular practice in primary and secondary education. It has come a shared theme in scientific organizations such as symposium or congress about education; a suggested practice by publishers; an important element of government

education policy and a focus for teachers' in-service education (Bennett, 2011). Formative assessment is used as formal policy in the schools in twenty-five states in USA (Altman et al., 2010). The governments in UK and other countries have struggled to increase for students' diversity with the help of his policy, which enables students, who are from different social environment or have different background, to participate into higher education (Asghar, 2012). Brown (2007) also stated that feedback was crucial for everybody, but it was more important for these students to enter the university. Yorke (2001) have expressed that formative assessment has a role for supporting the students by helping retention. Globalisation and employment problems make students have their own self-efficacy about decision making of their own and others performances (Boud & Fallchikov, 2007). Formative assessment could be a way for gaining these proficiencies (Asghar, 2012).

Students might think the higher education as a preparation for their career rather than a learning experience. Therefore, this might make them have interest into the grades rather than learning mentally (Taras, 2002). Moreover, this factor makes the formative assessment to be more difficult for practicing in higher education. Because formative assessment is not required to give a mark. Using formative assessment in higher education is not only real but also a must. However, both formative and summative assessment are used together in higher education (Andrews, 2011). There have been significant developments for understanding both research and practice of formative assessment (Bloxham & Carver, 2014). Higher education perspective has changed recently from teacher-centred training to student-centred training with the help of authentic learning and lifelong learning. Formative assessment, which helps the teachers improve in terms of instruction, helps to make student-centred atmosphere in higher education (Rushton, 2005).

When analysing different practices in all over the world, formative assessment is the most important factor for assessing the students and learning and teaching process in all education levels. The curriculum, which is developed on constructive approach and has been implemented in the schools since 2005, has made some changes about the approach in Turkey. So, teachers are expected to have student-centred learning rather teacher-centred learning. However, it can be said that there are many significant problems because the student-centred learning approach has not been practiced in real although it has been as a theory. Constructivist approach, which is based on students' active participation into the learning- teaching process taken into consideration students' individual differences, focuses on process assessment rather than outcome assessment. Formative assessment is expected to use more often according to summative assessment because of that, summative assessment focuses on grading in learning and teaching process while formative assessment aims to define learning deficiencies and direct to continuous process. In this respect, it might contribute to make research about formative assessment about which there is many research in the world in Turkey to develop learning-teaching process and its quality.

Although there have been some studies about formative assessment's effect upon students' academic achievement, it has been stated that it must be researched about formative assessment's effect upon academic achievement because of that there has been some problems about method (Bennett, 2011; Kingston & Nash, 2011). Therefore, it can be said that this experimental research, which is about formative assessment effect upon students' academic achievement, attitudes towards educational measurement and self-regulation skills, may contribute to related literature.

This study aims to investigate the effect of formative assessment upon prospective teachers' academic achievement, attitudes towards educational measurement and self-regulation skills. These sub-problems are below according to this aim:

Is there any significant difference among the students' in control and experimental group after the experimentation,

1. Academic achievement,
2. Attitudes towards educational measurement,

### 3. Self-regulation skills?

## Methodology

### Research design

Non-equivalent pre-test post-test quasi-experimental design with control group was used in the study. The participants were not sampled to the groups randomly in quasi-experimental design. The groups were not formed for the experimentation, and they were not controlled completely. The researchers use the existing groups (Ary, Jacobs, Sorensen, & Razavieh 2010; Teddlie & Tashakkori, 2009). If individual were not separated into the groups randomly, the best option is quasi-experimental design (Robson 2011).

### Research group

The study group consisted of prospective teachers who studied at Turkish language teaching department in junior year, spring term, 2013-2014 education year at a public university. The study was implemented by the researcher in measurement and evaluation course, which the researchers instructed, and while identifying the groups, the researchers selected Turkish language teaching department's students because it had two branches. In the research, attitudes towards measurement and evaluation variable were also examined. Therefore, the age group taking the measurement and assessment course is preferred. A branch was selected randomly as an experimental group, and B branch was selected as control group. Each of the groups consisted of 40 prospective teachers. There were no any prospective teachers to repeat the course. Besides, one of prospective students in each group was foreign national. Prospective students in experimental group were 23 females and 14 males; and the students in control group were 25 females and 15 males. Average ages of experimental group were 20,7 (SD=3,2); control group were 20,9 (SD=3,4). All of the students volunteered to participate in the research. The exercises about formative assessment were involved in the experimental group.

### Procedure

Summative assessment based on visa and final exams was done in the control group while formative assessment approach was done in the experimental group in the study. The study was implemented for 3 hours (one course hour equals to 50 minutes) during 52 course hour in 14 weeks. The same researchers in both control group and experimental group did the experiments. In the experimental group, the instruction was done according to the stages within the scope of formative assessment. In the control group, the course was instructed according to summative assessment approach with visa and final exams rather than formative assessment exercises in the control group.

Pre-test was employed to define students' academic achievement, their attitudes towards measurement and self-regulation skills in the first week of the course. The syllabus in which goals and sub-goals were explained in a detailed way was distributed to the students and students were informed about the goals and were explained the expectations. The collaborative learning groups including 4 or 6 people were created. A social networking site was used for the course and the documents and exercises about the course were published on this site. Each group published its own exercise's sheets in the sub-groups belonging to their own groups. The groups created their own digital portfolio in their publication. The students and researcher gave feedback about the publication in this site weekly. Each group met with a teacher to do the exam they prepared in secondary school. The teacher was asked for director information to prepare for the context of the exam, type of it and the number of question. The questions prepared as a group were presented to the class to discuss and given verbal feedbacks. Prepared exams were published during all of the week in the site and the group preparing the exam made self-assessment and other groups made peer-assessment for them. Prepared exams were done in

a class at school after they were reorganized according to the feedbacks. The students marked exams, and so students made content analysis and gave to the teacher feedback. Marked exams' statistical analysis was done in the classroom. Students were given feedback immediately during this analysis. The researcher marked visa exam, which is a type of summative assessment, and then the exams were distributed to the students and questions were discussed in the class and they were used as formative. Both the researcher and the students were given feedback via the quiz at the end of each unit. In this manner, 5 quizzes were done. The scores of the quizzes did not influence average point of the course. The researcher in an online environment called as Socrative via students' mobile phones did the quizzes. The feedbacks were given immediately to both the researcher and the students and these feedbacks were taken into consideration during the instruction. Repetition was done according to identified learning deficiencies and different exercises about concepts were exemplified. Digital portfolio also consisted of alternative assessment instruments such as concept and knowledge map, structured grid, diagnostic branched tree and word association. Both the researcher and the students gave the written feedback about all the works in students' digital portfolio. After the experimentation, post-test was employed to determine students' academic achievement, their attitudes towards measurement and self-regulation skills at the last week.

Pre-test was employed to the students in the control group to determine their academic achievement, attitudes towards measurement and self-regulation skills in the first week. Summative assessment approach was used during the instruction. In this manner, 5 quizzes were done and these scores of the quizzes were added to half of the visa exam score. Moreover, visa and final exams were done. After the experimentation, post-test was employed to determine students' academic achievement, their attitudes towards measurement and self-regulation skills at the last week.

### **Data Collection Tools**

“Measurement and Evaluation Achievement Test (MEAT)”, “Attitude Toward Educational Measurement Inventory (ATEMI)” and the dimensions about the self-regulation of “Motivated Strategies for Learning Questionnaire (MSLQ)” were used as a data collection tools in the study. The researchers created MEAT after expert views and analysis of the items in the multiple choice test prepared in measurement and evaluation course in 2013-2014 fall term. The item discrimination indices range from .35 to .90. Multiple choice questions 40 in the achievement test. Bryant and Barnes (1997) developed ATEMI while Ozan and Köse (2013) adapted it into Turkish language. Results of exploratory factor analysis showed that the 31 items with 5 likert-type loaded on three factors. The total variance explained was 47.4% and factor loadings ranged between .31 to .83. Confirmatory factor analyses indicated that a three factors structure of the ATEMI provided a good fit to the observed data. The internal consistency reliability coefficient of the ATEMI was .92 and the test-retest reliability coefficient was .78. ATEMI's lowest score was 0 and highest score was 5. The increase in scores on the ATEMI indicates that attitudes towards educational measurement increase. MSLQ was developed by Pintrich, Smith, Garcia, and McKeachie (1991) and was adapted into Turkish by Altun and Erden (2006). The questionnaire consists of 15 dimensions and 81 items with 7 likert-type. Because the whole of the questionnaire has a modular structure, each one of the dimensions is used separately or together (Pintrich et al., 1991). Some dimensions of the questionnaire, which are “metacognitive self-regulation”, “time and work environment”, “effort regulation and help seeking”, were used in this study and there are 35 items in the related dimensions. The Cronbach alpha reliability coefficient range of MSLQ was from .76 to .93. MSLQ's lowest score was 0 and highest score was 7. The increase in scores on the MSLQ indicates that self-regulation skills increase.

In this research, MEAT KR-20 reliability coefficient .84 and .86 respectively for pre-test and post-test. ATEMI Cronbach alpha reliability coefficient for pre-test and post-test changed between .70 and .92 according to the general and sub-dimensions. MSLQ Cronbach alpha reliability coefficient for pre-test and post-test changed between .73 and .91 according to its general and sub-dimensions. According to these results, the data obtained from these data collection tools have been determined to be reliable.

## Data Analysis

Independent samples t-test were done to determine whether there has been a significant difference between control and experimental group's pre-test; paired samples t-test were done to determine whether there has been a significant difference between control and experimental group's pre-test and post-test. Analysis of covariance (ANCOVA) for post-test were used to determine if there has been a significant difference between control and experimental group. The analysis has been tested at .05 significant level. Before the analysis, the needed assumptions were investigated for testing. In this manner, univariate and multivariate normality, homogeneity of regression slopes, homogeneity of variances, and variance-covariance homogeneity assumptions were analysed (Field, 2013; Pallant, 2013; Tabachnick & Fidell, 2014). Skewness - kurtosis coefficient was calculated for each group and variables in terms of normality for univariate. Accordingly, skewness and kurtosis coefficients of results of pre-test post-test of the dependent variables e.g. achievement, attitude and self-regulation was between -1 and +1 in both control group and experimental group. The criteria that skewness and kurtosis coefficients are between -1 and +1 is accepted as normal distribution (Field, 2013; Morgan, Leech, Gloeckner, & Barrett, 2013). Mahalanobis distance values of dependent variables were calculated to determine extreme values in terms of multivariate normality. Accordingly, it has been determined that there is no any extreme values in the distribution. Regression slopes, homogeneity of variances and matrix of variance-covariance have been defined as homogenous for extreme dependent variable ( $p > .05$ ).

## Results

Independent samples t-test was done to determine whether there have been a significant difference between pre-test scores of academic achievement, attitudes towards educational measurement and self-regulation skills of students in both control group and experimental group. It is shown in Table 1.

**Table 1.** Pre-test results for dependent variables

Dependent variable	Group	Mean	Std. deviation	Df	t	p
Academic achievement	Control	31.85	5.37	78	.99	.33
	Experimental	30.50	6.77			
Attitudes towards educational measurement	Control	3.68	.37	78	.77	.44
	Experimental	3.62	.28			
Self-regulation skills	Control	4.71	.97	78	.05	.96
	Experimental	4.70	.85			

According to Table 1, it has not found out any significant difference between pre-test scores for academic achievement, attitudes towards educational measurement and self-regulation skills ( $t = .99, p > .05$ ;  $t = .77, p > .05$ ;  $t = .05, p > .05$ ).

Table 2 shows descriptive statistics for post-test of academic achievement, attitudes towards educational measurement and self-regulation skills.

**Table 2.** Descriptive statistics for the post-test of dependent variables

Dependent variable	Group	Mean	Adjusted Mean
Academic achievement	Control	46.40	46.40
	Experimental	54.18	54.17
Attitude toward educational measurement	Control	3.74	3.75
	Experimental	3.95	3.95
Self-regulation skills	Control	5.04	5.02
	Experimental	5.26	5.29

According to table 2, while the adjusted mean of control group has not changed, the adjusted mean of the experimental group has dropped slightly. ANCOVA was employed to compare the groups' academic achievement post-test scores. The results are shown at Table 3.

**Table 3.** ANCOVA results for the post-test of academic achievement

Source of Variance	Type III Sum of Squares	Df	Mean Square	F	p	Partial $\eta^2$
Pre-test scores	.02	1	.02	.00	.99	.00
Group	1193.06	1	1193.06	8.47	.01	.01
Error	10837.36	77	140.75			
Total	214353.00	80				

According to table 3, it has been found out that there is significant difference between post-test scores of the groups' academic achievement ( $F_{(1, 77)}=8.47$ ;  $p<.05$ ). Therefore, it could be said that thanks to experimental process, academic achievement of students in the experimental group has increased statistically significant in comparison with academic achievement of students in the control group.

ANCOVA was employed to compare the groups' attitudes towards educational measurement post-test scores. The results are shown at table 4.

**Table 4.** ANCOVA results for the post-test of attitudes towards educational measurement

Source of Variance	Type III Sum of Squares	Df	Mean Square	F	p	Partial $\eta^2$
Pre-test scores	.41	1	.41	1.18	.28	.02
Group	.93	1	.93	2.68	.11	.03
Error	26.70	77	.35			
Total	1211.01	80				

According to table 4, it is found out that there is no significant difference between post-test scores of the groups' attitudes towards educational measurement ( $F_{(1, 77)}=2.68$ ;  $p>.05$ ). This result shows that after the experimental process, attitudes towards measurement of students in the experimental group, which have been trained according to the formative assessment, have not differentiated statistically significant in comparison with the attitudes of students in the control group.

ANCOVA was employed to compare the groups' self-regulation skills post-test scores. The results are shown at table 5.

**Table 5.** ANCOVA results for the post-test of self-regulation skills

Source of Variance	Type III Sum of Squares	Df	Mean Square	F	p	Partial $\eta^2$
Pre-test scores	4.91	1	4.91	9.54	.00	.11
Group	.94	1	.94	1.83	.18	.02
Error	36.67	77	.52			
Total	2169.26	80				

According to table 5, it is found out that there is no significant difference between post-test scores of the groups' self-regulation skills ( $F_{(4, 71)}=1.83$ ;  $p>.05$ ).

### Discussion, Conclusion and Suggestion

It is found out that formative assessment practices done in the scope of measurement and evaluation course have increased statistically significant prospective teachers' academic achievement but attitudes towards educational measurement and self-regulation skills of prospective teachers has not differentiated significantly. Prospective teachers' academic achievement have increased statistically significant. This result is parallel with the other studies about formative assessment effects upon academic achievement in literature. Fuchs and Fuchs (1986) investigated 21 experimental studies about formative assessment effects upon academic achievement in their meta-analysis and concluded that formative assessment increased considerably academic achievement. Black and William (1998a) investigated formative assessment's effect on learning from a wide perspective. They stated in their study in which they analysed 250 studies about formative assessment effect upon students' learning that formative assessment would develop students' learning and raise standards. In another meta-analysis study by Kingston and Nash (2011), selected 13 studies from 300 studies about formative assessment have been found out that formative assessment has enhanced students' academic achievement to .20 impact factor. Moreover, impact factor computer supported formative assessment practices have been calculated .28.

Similar results have been made out in the other studies about formative assessment effect upon academic achievement at higher education level. Ökten (2009) investigated the effects of formative assessment upon students in technical education faculty and stated that students' academic achievement would raise at % 50 more via formative assessment. Yalaki's study (2010) investigating formative assessment effect upon university students' academic achievement of science course has stated that formative assessment has affected positively students' academic achievement of science course. Similarly, Aydeniz and Pabuccu (2011) have also found out that formative assessment could increase considerably students' learning in their study investigating its effect on students' conceptual learning in chemistry course. Andrews (2011) has determined that goal setting and monitoring himself/herself supported formative assessment practices has increased students' academic achievement significantly in developmental psychology. There has been so many studies about that formative assessment has increased students' academic achievement significantly at all education levels except for the studies at higher education level (Chauncey, 2009; Clark, 2013; Kline, 2013; Ruiz-Primo & Furtak, 2007; Tekin, 2010; Van Evera, 2003; Yin, 2005). Although Collins (2012) and King (2003) have found out in their studies that formative assessment has affected positively students' academic achievement, it is not significant statistically. Yin et al. (2008) has stated that formative assessment has not affect significantly students' achievement, motivation and conceptual changes but it could be derived from the difficulties of practicing it effectively rather than effectiveness of formative assessment. According to the studies in last 10 years, it is found out that there has been a positive correlation between students' learning and formative assessment. Practising formative assessment effectively has increased students' learning levels (Black & McCormick, 2010; Black & Wiliam, 2009; Chappuis, Stiggins, Chappuis, & Arter, 2011; Clark, 2012; Gardner, 2012; Heitink,

Van der Kleij, Veldkamp, Schildkamp, & Kippers, 2016; McMillan, 2014; Popham, 2013). According to results of the studies, it could be said that formative assessment practiced effectively has affected considerably students' academic achievement at all level of the education.

Black and William (1998a) and Harlen (2003) have stated that formative assessment could enable equal learning opportunities to the students and therefore, it has enabled more achievement in the learning of the students especially who have low achievement. Formative assessment could help to head especially for the problems of students who have low achievement while enabling them to understand clearly what they do wrong or what they must do (Black & William, 1998b). Burns, Klingbeil, and Ysseldyke (2010) and Miesels et al. (2003) have stated that formative assessment have been more useful for the students who have low achievement. In parallel with this result, Solgun-Günel (2014) has stated in their study, which implemented in English language course at higher education level, that formative assessment practices have increased considerably students' participation into the course. In his experimental study which was carried out in science course at secondary school, Van Evera's (2003) has made out that feedback used in the scope of formative assessment has increased students' academic achievement especially who have low and secondary achievement levels but it would drop the students' academic achievement who have high achievement levels. According to analyses of Herman, Osmundson, and Silver (2010), James et al. (2007) and Shepard (2005), they have supported the result of the fact that formative assessment has more affected on students especially who have low academic achievement.

According to the study results, it has been made out that formative assessment has affected positively prospective teachers' attitudes towards educational measurement although it doesn't differentiate statistically significant. Chauncey (2009) has stated in his experimental study that formative assessment has not increase significantly students' attitudes towards the course. Ökten (2009) has found out in his study, which was implemented at higher education that the attitudes of university students have changed positively after the practices of formative assessment. Solgun-Günel (2014) has also stated to have the similar result in their study, which was carried out in English language course at higher education. They have stated that it has affected their attitudes towards the course positively because students have begun to take responsibility of their own learning, to have more interest into the course and to take the opportunity for their self-expression without any fear of grading. In another study implemented at higher education level, Yalaki (2010) has determined that formative assessment has affected positively the attitudes of prospective teachers towards the course. Johnson (2016) has found out that formative feedback could affect positively attitudes and perceptions of students studying in secondary education. In Hwang and Chang (2011), Tekin (2010) and King (2003) studies carried out in secondary school level, they have found out that formative assessment would increase significantly students' attitudes. Tekin (2010) points out that the practices of formative assessment at math course in 8<sup>th</sup> grade have increased significantly students' attitudes towards maths. It has determined that the students in the experimental group have developed positive attitudes towards maths. King (2003) has stated that formative assessment has increased students' attitudes towards science at 5<sup>th</sup> grade according to his experimental study. Another similar experimental study by Hwang and Chang (2011) points out mobile learning supported formative assessment has increased significantly the attitudes and perceptions of students' learning at 5<sup>th</sup> grade.

McKenna (2011) investigated the attitudes of the students towards science course in the half of the study's experimental process (11<sup>th</sup> week) in the study which he implemented in the science course at 7<sup>th</sup> grade, and also he points out %96 of the students' attitudes have been affected positively by the formative assessment. In her qualitative study, which was carried out with the prospective teachers, studying at physical education teaching, Lorente-Catalan (2016) determines that the students intend to use formative assessment in their future professional practices, but they think to have some struggles while using it because alternative assessment practices has not been used widely.

According to the study results, it is found out that formative assessment has affected positively self-regulation skills of prospective teachers although it has not differentiated significantly. In parallel

with this result, King (2003) investigated the formative assessment's effect upon self-regulation skills of students at 5<sup>th</sup> grade, and he points out that there is no any significant difference between self-regulation skills of students in control group and experimental group. According to the findings obtained from qualitative data of the study, it is made out that students have benefited from cognitive strategies and self-regulated learning behaviour during the learning process. Students have stated that they take responsibility of their own learning via formative assessment practices and participate directly into the learning. Teachers also express that formative assessment has increased students' self-regulation skills so that it has a continuous and purposeful interaction with learning effort and performance between teacher and students. DeLuca, Klinger, Pyper, and Woods (2015) state that formative assessment supports students' self-regulation and meta-cognitive skills development and increases their academic achievements in summative tests and supports their developments about educational standards.

Self-regulated learning, which is an important element to focus students in learning-teaching environment for raising students' achievements, is about thinking, motivation and organizing behaviours of students' own learning processes (Pintrich & Zusho, 2002). According to Zimmerman (2000), self-regulation has been at different levels and has different qualities in people's life; and it is defined as that which is to be exhibited for reaching the defined aims and controlled feelings, opinions and behaviours of people. Pintrich (2000) also defines self-regulated learning is as a learning issued into the class or school organized by learners. Self-regulated learners generally give internal feedback for reacting external feedback and use the resources to reach the learning aims; make their own learning aims by their struggles and develop their strategies (Nicol & Macfarlane-Dick, 2006). There are many studies about the direct relationship between formative assessment and self-regulation (Black & Wiliam, 2009; Bose & Rengel, 2009; Nicol & Macfarlane-Dick, 2006). Formative assessment is designed according to metacognitive skills required for self-regulation, and support in process of learning and teaching by focusing on learning contexts (Heritage, 2007). Formative assessments aim to give both internal and external specified feedback about students' performances to develop and reinforce self-regulated learning (Sadler, 1998).

Consequently, formative assessment is determined as an approach, which increases crucially prospective teachers' academic achievement, and affects the attitudes towards educational measurement and self-regulation skills in a positive way. Although formative assessment has affected positively the attitudes towards educational measurement and self-regulation skills, it does not make any significant difference according to the control group. Moreover, it is derived from the fact that prospective teachers' attitudes and self-regulation skills have been at high level before the experimental process and these features have not changed in a long period. According to the study results, it is suggested to use formative assessment practices more in teacher education. Furthermore, it is thought that different experimental studies, which investigate the effects of formative assessment upon different variables, and qualitative or mixed researches, which is to investigate, deeply may contribute to the literature. The use of quasi-experimental design in the study was a methodological limitation.

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