

The Effect of the EBA (Educational Informatics Network) Coding Module's Use on Secondary School Students' Self-efficacy Beliefs on Programming and Student Opinions on the Moduleⁱ

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Abstract The purpose of this study is to investigate the effects of the EBA Coding module - created in Turkey to be used in coding education - on the self-efficacy of secondary school students in the 5th grade in relation to programming, and the students' opinions about the platform and platform usability. The study was carried out via the mixed method with a total of 30 students in the 5th grade studying at the Hatay Anayazi Secondary School in the 2nd semester of the 2017-2018 academic year, who participated in the Support and Training Program for the Information Technologies and Software Course. 15 of these students were in the experimental group, while the remaining 15 students were in the control group. During the study, the experimental group was trained by the EBA Coding module, while the control group was trained by the demonstration and practice method. At the end of the study, it was found that the EBA Coding module was more effective in improving the self-efficacy of students in programming compared to the demonstration and practice method. In addition, the study concludes with the students considering the EBA Coding module to be useful and informative, and described it as a usable platform for programming education.

Keywords Coding, EBA, Fatih Project, Usability, Self-efficacy

1. Introduction

The 21st century is a period referred to as the Information Age and in which technology is being used intensively. The skills that students need to have in relation

to the competencies of the 21st century include: problem solving skills, innovative skills, the ability to work in a collaborative environment, critical thinking, access to information and adaptability to new situations (Önder and Kuzu, 2017, p.402-403). Students of the new generation are able to send messages quite easily and play online games. The number of students who can produce their own original games or software is still insufficient. However, individuals, who grow up in this age must inevitably be both consumers and producers of technology. Therefore, providing training for programming at an early age is on the educational agenda of many countries. In addition, programming skills are important in terms of gaining 21st Century qualifications. In education, the efforts for students to gain the qualifications of the 21st century have become important for all levels of education (Durak, Karaoğlan Yılmaz, Yılmaz & Seferoğlu, 2017, p.207-211).

Coding or programming, is defined as the process of bringing commands together in order to guide a computer (Turan, Akça and Küçük Kurt, 2016, p.1-10). Şahin and Namlı (2017) defined programming as writing code to use a programming language to solve an existing or potential problem. Programming develops the high-level problem-solving skills of students (Yağcı, 2016, p.1419). While programming, children learn to look at problems from a different point of view and produce solutions by logical reasoning; to think productively and creatively, and to offer the best solution (Durak et al., 2017, p.207-211).

Great importance is attached to coding education around the world and it has also attracted attention in Turkey. The FATİH Project is an ongoing technology integration project which started in 2011. The goal of the project is to create equal opportunities for each student. The project intends to provide each student with the same technological

means, and to allow each student to receive an education with good and high-quality educational content (MoNE, Ministry of National Education) Fatih Project, 2018). A module on coding education was created in the e-content component of the project, the EBA, in 2017 and the program was updated in 2017 with additional coding skills for the secondary school course of Information Technology and Software (ITS). Accordingly, students begin to receive coding education as of the 5th grade. The renewed program and the EBA Coding module were launched at the beginning of the 2017-2018 academic year. Assessing the usability of this platform, which will be used for the first time, based on student opinions and examining whether the coding education provided by using this module will have an effect on the students' self-efficacy in programming constitutes the problem state of this study.

A literature review of the research on computer, internet and programming self-efficacy (De la Cruz and Palaoag, 2015; Jerede, 2009; Kasalak, 2017; Kukul, Gökçearsan and Günbatar, 2017; Mazman and Altun, 2013; Öncü, Şengel and Baltacı Göktaay, 2012; Özyurt and Özyurt, 2015; Ramalingam, LaBelle and Wiedenbeck, 2004; Yağcı, 2016) and research on the availability of educational web platforms (Alqudsi and Alkhaledi, 2015; Brady, 2004; Gülbahar, Kalelioğlu and Madran, 2008; İşbulan, 2008; Naidu, 2005; Parlak, 2016; Varol and Kubanç, 2012; Yılmaz and Tüfekçi, 2013) reveals the importance of examining the usability of the newly introduced EBA Coding Module, and its effect on the self-efficacy of students.

The main purpose of this study, performed in this context, is to investigate the effects of the EBA Coding module - created in Turkey to be used in coding education - on the self-efficacy of the secondary school students in the 5th grade, in relation to programming and to gather opinions from the students about the platform. The study will assess whether the module is a usable platform for programming education through student opinions. Receiving the student opinions on the developed module planned to be used for coding education is intended to prevent errors in the platform and to reveal the required revisions. To meet this purpose, the research questions for which answers are searched for are as follows:

1. Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the experimental group students who were provided with a coding training by using the EBA Coding module and the control group students who were provided with a coding training by using demonstration and practice method?
2. Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the experimental group students who were provided with a coding training by using the EBA Coding module?
3. Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the control group students who were provided with a coding training by demonstration and practice method?
4. Is the EBA Coding module a usable platform for coding training?
5. What are the opinions of 5th grade students on the EBA Coding module?

2. Materials and Methods

2.1. Study Design

In this study the mixed method, including both quantitative and qualitative methods, was used. In mixed methods, quantitative and qualitative methods are used together to take advantage of the properties of both methods and strengthen the researcher's work (Baki and Gökçek, 2012). In this study, explanatory sequential mixed methods design is used (Creswell, 2014). Firstly, experimental study in quantitative research was completed and data were analyzed. Then, the usability of EBA coding module has been tried to be explained by case study from qualitative research methods.

The weak experimental design, with a control group of the preliminary test and final test, was used in the quantitative aspect of the study to investigate the effect of using the EBA Coding module on the students' self-efficacy in programming. The reason for using the weak experimental design is due to the lack of randomness in student selection for the study group. Therefore, the study was carried out in the two branches available at the school. A case study was conducted in the qualitative aspect of the study, through which the usability of the EBA Coding module was assessed and the students' opinions about the platform were received. The reason why the case study method is used is because not all schools have the same capabilities. The assessment will be made in accordance with the capabilities of the school, where the study is conducted. The holistic single case design, which is one of the types of case study, was used for the research.

The task analysis technique was used to test the usability of the EBA Coding module. Interviews were conducted with students to obtain their opinions on the module. In the task analysis technique;

1. The participant is given tasks that they need to complete by using the application.
2. The participant's performance of the task is silently observed.
3. Participants are interviewed about their activities.

2.2. Study Group

The study group consists of 30 students from 2 branches in the 5th grade, who were studying at the Anayazi Secondary School in the Antakya district of Hatay in the 2017-2018 Academic Year. This study group was preferred by the researcher due to the availability of a computer class in the school where the study was conducted, the easy access to the school by the researcher, and the willingness of the students to participate in the study. The study was carried out with students who participated in the training program for the support and training of the Information Technologies and Software course. In the study group, a branch consisting of 15 students was designated as the experimental group, while another branch consisting of 15 students was designated as the control group.

2.3. Data Collection Tools

2.3.1. The Scale of Self-efficacy of Secondary School Students in Programming

In this study, "Self-efficacy Scale for Programming" developed by Kukul, Gökçearslan and Günbatır (2017) for secondary school students was used. The scale consists of 31 items and has a single factor. The item loadings of the items in the measuring instrument range from 0.47 to 0.71 and the total variance indicated by the scale is 41.15%. The analyses that are performed to determine the internal consistency of the scale resulted in a Cronbach's alpha coefficient of 0.95 and a two semi-method of 0.96. According to the results of the analysis, the scale was valid and reliable. The 5-point Likert-type scale consisting of 31 items was used to collect quantitative data on the self-efficacy beliefs of students in relation to programming, before and after the implementation. The reliability coefficient of the scale that was applied on the study group for this research was 0.88.

2.3.2. Task List and the Observation Form for Tasks

A task list including 30 tasks in total for each menu in the module, which are completed in 4 weeks, was created by the researcher for the stage where the students would use the EBA coding module, which is an educational web platform. Tasks include simple actions such as downloading and clicking through the website. The completion statuses and durations of the tasks were recorded in the observation form developed by the researcher, while the students performed the tasks. An observation form is a form which includes the assigned tasks and the completion status of these tasks.

2.3.3. Interview Form

At the end of the implementation period, semi-structured interviews were held with 15 students who participated in the research and were willing to be

interviewed. The interview questions were adapted from the study conducted by Parlak (2016) for the assessment of the usability of the Khan Academy platform to assess the usability of the EBA Coding module.

As a result of the screening of the related literature for the preparation of the interview questions created by the researcher, 14 questions were initially prepared for the EBA coding module's use. Sample questions were sent to 3 academicians to peer review and ensure the scope validity of the questions. The interview questions were revised as a result of the peer review and recommendations; 1 question was removed on the grounds that it wasn't appropriate for the purpose, 2 questions were updated, and the interview form consisting of 11 questions was finalized. The interview form was subjected to peer review to determine whether it was appropriate for the level of students in terms of spelling, grammar and comprehension. After it was determined that there was no need for any further changes at this stage, the interview form was applied to 2 (two) 5th grade students who were not in the experimental group, the feedback of the students on the interview questions were taken and the interview form was finalized.

2.4. Data Collection Process

2.4.1. Activities Conducted with the Experimental Group

The experimental group consisted of a total of 15 students with ages ranging from 11 to 12 years, 8 of whom were girls and 7 of whom were boys. The study was conducted for 6 weeks. In the first week, the EBA coding module was introduced to the students by the researcher, and the students were informed about the study. The task analyses to be performed were discussed, and it was discovered that all students in the branches were willing to participate in the study. After the introduction of the platform, the self-efficacy scale related to programming was applied to the students as a preliminary test. During the following 4 weeks, task lists including tasks from each section of the platform were created for students. The tasks to be implemented every week were written on the cards. Students were individually called by the researcher; the task cards were handed to them one by one; and the durations for the completion of the tasks were timed and recorded in the observation form. In the last week (the 6th week), the students were interviewed and the final test for the Scale of Self-Efficacy in Programming was conducted.

Throughout the study, the ITS course was taught to the experimental group students with the support of the EBA Coding module. The teaching process was maintained at 2 hours per week. At the end of the study, the Scale of Self-Efficacy in Programming was applied to the experimental group as a final test. At the end of the study, all 15 students in the experimental group were interviewed and their opinions on the usability of the module, and of

the module itself were received. The interviews were audio recorded and then transferred to a word processing program on a computer.

2.4.2. Activities Conducted with the Control Group

The control group consisted of a total of 15 students with ages ranging from 10 to 12 years, 9 of whom were girls and 6 of whom were boys. During the study, the ITS course was taught to the control group students through the demonstration and practice and teaching methods, without using the EBA Coding module. The teaching process for the control group was conducted in the IT class environment for 2 hours per week for a total of 6 weeks, just without the use of the EBA Coding module, unlike the teaching process for the experimental group students. The levels of the students in relation to this dependent variable were identified by applying the Scale of Self-Efficacy in Programming to the control group students, before and after the study.

2.5. Analysis of the Data

Non-parametric tests were preferred to compare the quantitatively obtained test scores for comparing the self-efficacy levels of groups in relation to programming, due to the low number of individuals in the sample. In this study, the experimental and control groups consist of 15 people in each. A statistical program was used for the analysis of quantitative data. Accordingly, the following tests were conducted;

The Mann – Whitney U Test between the preliminary test scores of the experimental group and the control group, to compare the groups in terms of their self-efficacy levels in relation to programming before the study,

The Mann – Whitney U Test between the final test scores of the experimental group and the control group, to compare the groups in terms of their self-efficacy levels in relation to programming at the end of the study,

The Wilcoxon Signed Rank Test between the preliminary and final test scores of the control group in relation to self-efficacy in programming to identify the effect of the demonstration and practice and training method, on the self-efficacy of the control group in programming,

The Wilcoxon Signed Rank Test between the preliminary and final test scores of the experimental group in relation to self-efficacy in programming to identify the effectiveness of training via the EBA Coding module on the experimental group's self-efficacy in programming.

For the analysis of qualitative data;

The data obtained by the observation forms, applied in relation to the task cards given to students so that they could use the platform for 4 weeks, were descriptively analyzed. In the observation forms, the status of students in relation to fulfilling the duties on the given task cards and the completion times of the tasks were taken into

consideration. The usability of the platform was interpreted based on the number of students who completed the tasks and the average completion times.

Content analysis was used for the analysis of the qualitative data obtained as a result of the interviews held with the students in the experimental group. Content analysis involves bringing similar data together around specific concepts and themes, and organizing them in a clear manner, and is often employed when there are no predetermined categories or dimensions to explain the available data (Şimşek, 2012). Accordingly, the interviews were transferred from the audio files to a computer in a written form. Responses to each interview question were converted into themes and codes, and similar responses were expressed via frequency values

3. Findings

In this section, the data obtained during the research are presented based on the research questions.

3.1. Findings Related to the First Research Question

Initially, the preliminary test scores of the groups were compared, to identify whether the groups were homogenous in terms of the levels of self-efficacy in programming before the study to analyze the following research question: “Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the experimental group who were provided with a coding training by using the EBA Coding module and the control group students who were provided with a coding training by the demonstration and practice method?” The Mann - Whitney U Test was conducted to compare the preliminary tests of the groups; the findings are presented in Table 1.

Table 1. The Mann - Whitney U Test results conducted between the preliminary test scores of the experimental group and the preliminary test scores of the control group

Group	N	\bar{X}	sd	dof	R.A.	U	p
Experimental Group	15	110.93	17.77	274	18.27	71	0.08
Control Group	15	104.73	11.70	191	12.73		

$p > 0.05$

According to Table 1, there was no significant difference between the groups in relation to levels of self-efficacy in programming before the study ($p = 0.08 > 0.05$). Therefore, the self-efficacy levels of the groups in relation to programming can be suggested to be homogeneous before the study.

The Mann - Whitney U Test was conducted between the groups after the study, to compare the self-efficacy levels of the experimental and control group in relation to programming, and the findings are provided in table 2.

Table 2. Results of the Mann - Whitney U Test conducted between the final test scores of the experimental group and the final test scores of the control group

Group	N	\bar{X}	sd	dof	R.A.	U	p
Experimental Group	15	124.40	12.17	314	20.93	31	0.00*
Control Group	15	100.40	18.66	151	10.07		

*p < 0.05

According to Table 2, there is a significant difference between the groups in relation to self-efficacy levels in programming, in favor of the experimental group ($p = 0.00 < 0.05$). Accordingly, the use of EBA Coding module was effective in raising the self-efficacy levels of students in relation to programming. The size of this effect was calculated as 0.61 based on the formula where the Z score is divided by the square root of the number of people, and the effect size was found to be at a medium level. This result shows that the use of the EBA Coding module in raising the self-efficacy levels of the students in relation to programming is moderately effective.

3.2. Findings Related to the Second and Third Research Question

In relation to the following research questions, the groups were considered as separate, individual groups, taking into account the changes in them during the process and results were obtained by making analyses without comparing the groups: “Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the experimental group students who were provided with a coding training by using the EBA Coding module?” and “Is there a significant difference between the preliminary test scores and the final test scores - in relation to self-efficacy in programming - of the control group students who were provided with a coding training by demonstration and practice method?”

The Wilcoxon Signed Ranks Test was performed between the preliminary test scores and the final test scores of the experimental group students to identify the effects of the training performed throughout the study by using the EBA Coding module for the experimental group on the self-efficacy of students in programming.

Table 3. Descriptive statistics results of the preliminary and final test scores of the experimental group

Group	N	\bar{X}	sd
Preliminary Test Results of the Experimental Group	15	110.93	17.77
Final Test Results of the Experimental Group	15	124.40	12.17

Table 3 shows that the mean scores of the final test were higher than the mean scores of the preliminary test for the experimental group.

According to Table 4, there were 4 students from the

experimental group whose final test score ranks were lower than their preliminary test score ranks, 10 students whose final test score ranks were higher than their preliminary test score ranks, and 1 student whose final test score rank was equal to his/her preliminary test score rank. There was a significant difference between the preliminary and final test score rank averages of the experimental group students in favor of the mean scores of the final test ($p = 0.02 < 0.05$). The size of the effect of the use of the EBA Coding module was calculated to be 0.57 in relation to raising the self-efficacy levels of students in relation to programming. This result shows that the use of the EBA Coding module in raising the self-efficacy levels of the students in relation to programming is moderately effective.

Table 4. Results of Wilcoxon Signed Rank Test conducted between the preliminary and final test scores of the experimental group

Final test - Preliminary test	N	F.T.	R.A.	Z	p
Negative Rank	4	17	4.25	-2.23	0.02*
Positive Rank	10	88	8.80		
Equal Rank	1				

*p < 0.05

The Wilcoxon Signed Rank Test was conducted between the preliminary and final test scores of the control group students to identify the effect of the training performed throughout the study for the control group students by the demonstration and practice method, on the self-efficacy of students in programming, and the findings are presented in Table 6.

Table 5. Descriptive statistics results of the preliminary and final test scores of the control group

Group	N	\bar{X}	S.D.
Preliminary Test of the Control Group	15	104.73	11.70
Final Test of the Control Group	15	100.40	18.66

Table 5 shows that the preliminary test scores of the control group were higher than their final test scores. The decline in the final test scores of the control group can be interpreted as the negative effect of the demonstration and practice method used by the teacher on the self-efficacy beliefs of the students.

Table 6. Results of Wilcoxon Signed Rank Test conducted between the preliminary and final test scores of the control group

Final test - Preliminary test	N	F.T.	R.A.	Z	p
Negative Rank	8	72.50	9.06	-0.71	0.47
Positive Rank	7	42.50	6.79		
Equal Rank	0				

p > 0.05

According to Table 6, there were 8 students from the control group whose final test score ranks were lower than their preliminary test score ranks, and 7 students whose final test score ranks were higher than their preliminary test score ranks. There were no students whose final test score ranks were equal to their preliminary test score ranks. There was no significant difference between the preliminary and final test score rank averages of the control group students ($p = 0.47 > 0.05$).

3.3. Findings Related to the Fourth and Fifth Research Question

Assessments that relate to the usability of an educational web platform are based on effectiveness, efficiency and satisfaction. The task analysis technique was used to determine the effectiveness and efficiency of the platform. The success rates of the students for completing the tasks that they were assigned in the platform was used to determine the effectiveness of the platform, while the average time spent to complete the tasks was used to determine the efficiency. A total of 30 task cards were created each week for students, which included tasks related to the menus or the features of the platform, to allow the students to use the module and assess the usability of the platform at the same time. The tasks assigned in the platform were simple enough to be completed in a short while and included tasks such as "Download", "Click" or "Review". Each of the 15 students in the experimental group performed the tasks in a specific order over 4 weeks. The students tried to perform the tasks and the completion times of the tasks were recorded in the observation form. The findings of the task analysis indicated the completion status and the completion time of each task.

Tasks assigned on week 1 include logging into the EBA Coding module, reviewing the descriptions on the main page, and other tasks related to the menus in the module. The completion rates and completion times of the assigned tasks are provided in Table 7.

Table 7. 1st Week Results of the Task Analysis

	N (successful)	% (successful)	Average success time
Task 1	15	100%	00:56
Task 2	14	93%	00:34
Task 3	14	93%	00:15
1st Week Task 4	13	86%	00:46
Task 5	15	100%	00:38
Task 6	15	100%	00:17
Task 7	2	13%	02:21
Average		83%	00:61

A review of Table 7 reveals that all students successfully completed task 1, task 5 and task 6. Completion of the 1st task which is "Login to the EBA platform and click on the 'coding' module on the main page" by all students suggested that they had no trouble in accessing the module. Task 5 and task 6 involve clicking on the "İllerimizin Çalışmaları" (Activities of Our Provinces) and "Sizden Gelenler" (Your Comments) menus on the main page and displaying their contents and all students completed these tasks successfully. Task 2 and task 3 were successfully completed by 14 students, while task 4 was successfully completed by 13 students. Task 7 which is "Answer the question of the week in the Portal menu of the EBA Coding module" was successfully completed by only 2 students. The reason for this was analyzed and it was found out that the section in the Portal menu of the module, where the answer should be written was not explicitly stated. Although the students could see the question, they could not write their answers. In addition, while the students can use the EBA platform without logging in with their user information under normal circumstances, they must log in with their user information to be able to answer the question in the Portal menu. The average success rate of the students in the 1st week is 83% and the average time they spent on tasks is 61 seconds.

There are 6 tasks for the 2nd week, which generally involve the Scratch program interface. The success rates and durations related to the tasks in the 2nd week are provided in table 8.

Table 8. 2nd Week Results of the Task Analysis

	N (successful)	% (successful)	Average success time
Task8	15	100%	00:37
Task9	15	100%	00:05
2 nd week Task10	15	100%	00:14
Task11	8	53%	00:29
Task12	13	86%	00:41
Average		87%	00:25

According to Table 8, all students successfully completed task 8, task 9 and task 10. This suggests that the students are able to access the section of the module where the Scratch program is located, successfully download the program onto their computers and review the overall appearance of the program. Only 8 students were able to complete Task 11 which was "State the descriptions of the file contents and view menu in the interface section". This is because the description of the menus was provided at the bottom of the page. Students couldn't see the description section as they didn't scroll down the page. The success rate for the tasks of the 2nd week was 87% and the average completion time of the tasks was 25 seconds.

In the 3rd week, there were 8 tasks related to the code blocks menus used in the Scratch program. The completion rates and completion times of the assigned tasks are

provided in Table 9.

Table 9. 3rd Week Results of the Task Analysis

	N (successful)	% (successful)	Average success time
Task14	15	100%	00:24
Task15	13	86%	00:56
Task16	15	100%	00:28
Task17	13	86%	00:28
Task18	15	100%	00:20
Task19	14	93%	00:18
Task20	14	93%	00:20
Task21	14	93%	00:20
Average		93%	00:26

According to Table 9 task 14, task 16 and task 18 were successfully completed by all students. The reason why students had a difficult time in other tasks was because they had to click on the relevant code block in the module to see its description. In the Scratch program, it is possible to see how it works by dragging and dropping a block. The vast majority of the students practiced dragging and dropping as they did in the Scratch program to review the code blocks. The success rate for the 3rd week tasks was 93% and the average completion time for the tasks was 26 seconds.

Tasks of the 4th week consisted of 9 tasks in relation to the Blockly Games and Alice programs. The completion rates and completion times of the assigned tasks are provided in Table 10.

Table 10. 4th Week Results of the Task Analysis

	N (successful)	% (successful)	Average success time
Task22	15	100%	00:21
Task23	15	100%	01:04
Task24	15	100%	00:49
Task25	15	100%	00:54
Task26	15	100%	00:37
Task27	15	100%	01:24
Task28	15	100%	00:16
Task29	14	93%	00:09
Task30	15	100%	00:09
Average		99%	00:47

A review of Table 10 reveals that 14 students completed all of the tasks successfully. Blockly Games is a platform that aims to provide coding training through games. The students stated that they had a lot of fun while performing the tasks. The success rate for the 4th week tasks was 99% and the average completion time for the tasks was 47 seconds.

Looking at the overall efficiency of the platform, students were observed to have difficulty with 2 of the 30

tasks, however, the longest time spent for completing a task in the platform was 2 minutes and 24 seconds. This was for the time spent during Task 7 which was only completed by 2 people. Students completed the remaining tasks in a short time. The success rates for the completion of the tasks assigned each week for the 4 weeks during the application in relation to the usability of the EBA coding module were calculated as 92% on average. The average time spent by the study group in the platform to successfully complete the tasks assigned for 4 weeks was found to be 35 seconds considering the average completion times of the tasks. Accordingly, the EBA Coding module can be suggested to generally provide positive results in terms of effectiveness and efficiency, considering the study group and the study platform.

15 students who participated in the application, in other words the entire experimental group, were interviewed to discover their level of satisfaction with the Coding module and to obtain their opinions on the usability study.

As a result of the review of the opinions of the 5th grade students in relation to the Coding module, categories were created based on the responses provided to the interview questions, and the provided responses were expressed based on their frequency values, as presented in table 11.

Table 11. Results of the interview analysis - Opinions on the EBA Coding module

	f Yes	f No	f A little
Fun	15	0	0
Beneficial	15	0	0
I'm satisfied to use it.	15	0	0
Using it is necessary.	14	0	1
There are difficult sections.	14	0	1
It raised my learning efficiency.	14	0	0
It raised my learning performance.	13	0	2
It's easy to navigate the pages.	9	4	2
I was able to easily pinpoint which section of the page I was in.	9	2	4
I had a hard time when using it for the first time.	6	3	6

Table 11 shows that all the interviewed students mentioned that using the module was fun and beneficial, and that they were satisfied to use it. 6 of the students stated that they had a hard time using the module for the first time, 6 stated that they experienced some difficulty and 3 stated that they didn't have a hard time. When the students who had difficulty using the module were asked why they had such difficulty, one of the students, S15 stated the reason for that as follows: "Yes. I didn't know anything. I didn't know what was where."

In the EBA Coding module, 9 people stated that it was easy to navigate the pages, 2 people stated that it was a little easy, and 4 people stated that it was not easy. S9 who thought that it was easy to navigate the pages said: "It's

obviously easy when you learn how to do it". 9 people stated that they were easily able to pinpoint which section of the page they are on in the module, 4 people stated that they had a bit of a difficult time doing it, and 2 people stated that they weren't able to do it.

14 of the students stated that it was necessary to use the EBA Coding module, while 1 student stated that using it from time to time would be enough. S3 who thought that it was necessary to use the module stated their opinions as follows: "I think it's necessary. Let me tell you why. Because when we grow up, we may be dealing with this kind of thing. And we can do things that are related to them, such as games." Similarly, S15 stated that it was necessary to use the platform by saying: "I think it is necessary, because it would be useful for us in the future."

When asked about the effect of the EBA Coding module on learning performance, 13 students said that the module raised their performance, while 2 said that it had a moderate effect. S3 stated that their learning performance increased slightly by saying: "It may have increased slightly." When asked about the effect of the module on learning efficiency, 14 students stated that their learning efficiencies increased, while 1 student stated that they had no idea about it. Learning performance and learning efficiency result from the effects of the usability of an educational platform. As an individual successfully completes tasks on a platform which they believe to be useful for themselves and they have a good time in, this would affect the learning performance and efficiency.

The table including the opinions of the 5th grade students on the EBA Coding module shows that the 15 interviewed students all stated that the platform was entertaining. Information regarding the sections that the students find entertaining is provided in table 12.

Table 12. Results of the interview analysis - Sections in the EBA Coding module that students find entertaining

Opinions	f
Blockly Games	7
Scratch	5
Block-based Coding Tools	3
Coding Section	2
All Sections	1
Alice	1

According to Table 12, it can be concluded that the majority of students have more fun while learning with games. 7 of the students stated that the Blockly Games section was entertaining. S10 stated their opinions on this as follows: "We were entering these games under the Block-based Coding tools; the tasks you assigned in that section were fun." In relation to the responses of the students regarding the sections they found entertaining, S9 mentioned the entertaining sections as follows: "The Scratch section is fun, the Alice section is fun." S11 indicated the entertaining sections as follows: "The Games

section. Well, I like games. Games are fun." S12 indicated the entertaining sections as follows: "Block-based coding tools and the Blockly games." S1 indicated the entertaining sections as follows: "All sections."

6 students said that they had a difficult time when they first used the EBA Coding module, 6 said that they had a little difficulty, and 3 said that they had no difficulty. The data on the reasons why students have a difficult time are provided in table 13.

Table 13. Results of the interview analysis - Reasons for having a difficult time in the EBA Coding module

Opinions	f
I didn't know anything	3
I didn't know some things.	2
It seemed too complicated.	2
I couldn't find the menus.	1
I got excited.	1
I had a difficult time with the Block-based Coding Tools	1
I had a difficult time when I first used it, then it gradually got easier.	1

A review of Table 13 indicates that most of the reasons for students having a difficult time are caused by the use of the platform for the first time. When asked whether they had a difficult time using the EBA Coding module and if so, why they had a difficult time, S1 said: "A little. Some of its sections were difficult and some were easy. For example, there was one section where when I did something it didn't work out, but something else happened." S9 who was asked the same question said: "Yes. Because I didn't know anything back then." S5 provided the following response to this question: "Yes. In the initial tasks, I couldn't find the text located in the bottom." S3 stated their opinions on the difficult sections of the module as follows: "A little. I didn't know anything, I had no information. That's why I had a hard time. I also had a hard time in the Scratch section." Likewise, S4 stated their reason for having a hard time as follows: "A little. Because I found it very confusing."

When 3 students who indicated that there were difficult sections in the coding module were asked which sections they were, 1 student stated that they had difficulty in Scratch, 1 stated that they had difficulty in the Blockly Games, and the other 1 stated that they had difficulty in Alice. 11 of the remaining students stated that there were no difficult sections and 1 student stated that there were sections which were a little difficult. S10 indicated that some sections were a little difficult as follows: "A little. Some were easy. There were ones that I didn't understand, such as finding the block by clicking on it." S14 said: "Yes. The red sections in Alice. I couldn't do that part."

The responses provided by the students when asked whether the EBA coding module is a platform that could be used in programming education are presented in Table 14 along with their frequency values.

Table 14. Results of the interview analysis - Opinions on the usability of the EBA Coding module

	f	f	f	f
	Yes	No	A little	I don't know
The Eba Coding Module is a usable platform in programming education.	14	0	0	1

The 14 students who think that the EBA Coding module is usable as presented in Table 14, were asked why they think so and the answers provided are presented in Table 15 below.

Table 15. Results of the interview analysis - Reasons for the usability of the coding module

Opinions	f
It's a site that includes necessary information	5
We can learn and practice easier	2
New things can be learned.	2
There is entertaining stuff on the site, which has a positive impact on learning.	2
It develops intelligence.	1
It's a reliable site.	1

According to Table 15, 2 students indicated that they can learn and practice more easily via the module, 5 students thought that the module is a site that includes necessary information, 2 students indicated that it was a platform where they could learn new things, 2 students indicated that it was entertaining, which had a positive impact on their learning, 1 student indicated that the website was reliable and 1 student indicated that using the module improved their intelligence. These were the reasons that the students provided for the EBA Coding module to be a platform that can be used in programming education. S2 who thought that the module was usable explained their reason for this as follows: *“Yes. Because it improves intelligence.”* Likewise, S13 said: *“Yes. Well, it includes fun stuff. This affects learning”*. S10 said: *“Yes. Sometimes it may be necessary for some people to get information.”* S9 said: *“Yes. Because there are block-based programs. Through those programs, you enter the games and learn how to develop games.”* S5 said: *“Yes. Because it's an informative site”* S7 said: *“Yes. Because we are able to learn new things.”*

4. Discussion

According to the findings of this study, the EBA Coding module has a positive impact on the self-efficacy of 5th grade secondary school students, in relation to programming. Similarly, Mazman and Altun (2013) conducted a study examining the effect of the EBA Coding module on the students' self-efficacy perceptions who were studying at the department of Computer Education and Instructional Technology (CEIT) who had never taken

any programming course before. The study group of the research consisted of 64 sophomore students from the CEIT department of the Hacettepe University. According to the findings of the study, the level of self-efficacy increased in students with prior experience in programming as well as students with no prior experience in programming. The self-efficacy score of the group who had no prior experience in programming was found to be higher. Moreover, the difference between the self-efficacies of the students who had prior experience in programming and those who had no prior experience decreased by the end of the study. As their master's thesis, Kasalak (2017) conducted a study with the objective of identifying whether there was a significant relationship between the robotic coding activities at the secondary education level and the self-efficacy perceptions of students in relation to block-based programming. As a result of the study, the self-efficacy perception in relation to block-based programming increased positively for the study group. The study also examined student experiences in relation to robotic coding activities. It was found that students thought that the activities were fun and interesting, they were willing to participate in the activities and they thought that the activities positively contributed to their personal development. Unlike Kasalak (2017), Bayırtepe and Tüzün (2007) conducted a study where they investigated the effect of educational computer games on the success of elementary school students in computer courses and their self-efficacy in relation to computers. A success test was applied to the students before the application. Another success test was carried out at the end of the application, and a significant difference was found between the results of the initial test and the final test. However, there was no difference in the self-efficacy of students. The students expressed their satisfaction by saying that they liked the game-based learning platform. It reduced their anxiety, and helped them to learn individually.

Whether the media used in the study was interesting or entertaining or not, affected the self-efficacies of the students. The EBA Coding module was characterized as entertaining by students. The fact that the module included activities on block-based coding tools in particular provided related information to students and guided them to the activities created a positive impact on the self-efficacies of students.

The tests conducted in relation to the usability of the module revealed that the platform created positive outcomes in terms of effectiveness and efficiency. Furthermore, the students expressed that they were satisfied with their use of the module. In addition, it was concluded that the EBA Coding module was a usable platform for programming education. Similarly, in their study, Yılmaz and Tüfekçi (2013) investigated the usability of the TNet Vitamin Mathematics education software for 6th grade Primary Education, which is a web-based

educational platform. A task list, including 11 questions in relation to the TTnet Vitamin program, was created and applied to 12 students. Data from the tasks was recorded in the observation form. The task completion statuses of the 12 students who were part of the study on an individual basis, the behaviors displayed while performing the tasks and their opinions were taken into consideration. At the end of the study it was concluded that the users found the program to be generally usable.

In their research where they examined the usability of the web-based Khan Academy Turkish, Parlak (2016) worked with a study group consisting of 8 randomly selected fifth grade students who had never used Khan Academy Turkish before. According to the results of the study, the task completion rate of the participants was 97.8%. It was concluded that the platform was effective, and the students were satisfied with the platform use. Naidu (2005) conducted a study where they examined the usability of the educational websites for children. For that research, seven search tasks in three websites were assigned to children aged 7-11. The findings of the study revealed that especially children under 10 years of age were not very successful in tasks. It was concluded that the language used in the sites, the number and organization of the links, the stacking of information on top of one another and the length of the individual pages affected the performance of the tasks.

The assessments made in the usability studies are generally based on task analysis, questionnaires and interviews. Previous usability studies are similar to this one. For the usability tests for educational platforms, the students were provided with tasks and were asked to use the platform to complete those tasks, then, the students were interviewed about the platform and their opinions and suggestions were collected. As a result of the task analysis, the success rate for the completion of the tasks in the EBA Coding module was found to be 92%. In the interviews, the students stated that they were satisfied with their use of the platform.

5. Conclusions and Suggestions

While the groups were homogeneous before the study in terms of the preliminary test scores for the scale of self-efficacy in programming, a significant difference was found at the end of the study in favor of the experimental group in terms of the self-efficacy levels. According to the findings of the study, the use of the EBA Coding module has a positive and moderate impact on the self-efficacy of the 5th grade students, in relation to programming.

When looking at the effect of the EBA Coding module, it was found that there was no significant difference between the preliminary and final test scores of the control group, who were provided with a programming training by the demonstration and practice method, while there was a significant difference between the preliminary and final

test scores of the experimental group who were provided with a programming training using the module.

A task analysis was performed to test the effectiveness and efficiency of the module. A total of 30 tasks were applied to the students, one by one for 4 weeks, and the completion times were recorded in an observation form. According to this analysis, the success rate of the students for the completion of the tasks is 92%. The successful completion of tasks is an indicator of the effectiveness of the platform. In the satisfaction category of the usability test for the EBA Coding module, the students' opinions on the platform were received. All students were satisfied with the module.

A review of the opinions on the EBA Coding module reveals that some of the students had a difficult time when they first used the module. The reason for this was due to using the module as a training platform for the first time. As the students completed the assigned tasks and used the platform, using it became easier. According to the opinions of the students, the module is necessary and useful for providing information. Using the environment is enjoyable. Based on the opinions of the students who describe the EBA Coding module as an informative, secure site, the module was observed to be as a usable platform for programming education.

6. Suggestions

Suggestions for policy makers: Programming education started to become popular in Turkey since the 2017 academic year and all schools started to work on it, in line with their capabilities. EBA is the official e-content platform of Turkey and it is free. Every student and teacher can use the resources available in the platform or they can enrich the platform by adding resources. Teachers who want to ensure equal opportunities for students can use the EBA Coding module in programming education. The purpose of this study was to draw attention to any deficiencies of the module and to offer suggestions. The portal section of the module in particular, should be revised considering the age of the younger students. Application platforms for block-based coding tools should be developed further, and more emphasis should be placed in the introduction and use of the coding module. The module should be constantly updated with content that appeals to all age groups.

Suggestions for researchers: It can be suggested that the module has a positive effect on the self-efficacy of students in programming. The students described the module as an informative and reliable site. In this study, the 5th grade students who have just started their programming education were analyzed. Similarly, the same study can be done for 6th grade or high school students. In addition, teachers' views on the coding module can be the subject of another study.

This study was conducted as a case study in a state

school that has an IT class with a 1 Mb ADSL internet connection and 15 computers that don't have a very high capacity. The situation may vary in schools with smart boards and fiber internet connections. Considering the facilities and the capabilities, the same study can be carried out in schools with better or worse conditions, and the differences can be examined.

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