Perceptions of students and teachers about the use of a kid’s programming language in computer courses

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Introduction

Computer technology is playing an important role in the lives of children since computers have become increasingly available at almost all schools. According to statistics of the Ministry of National Education (MONE) in 2008, there are more than 550,000 computers in elementary and secondary schools in Turkey. Computers are used in several ways in classrooms. However, today, in many schools, “computer aided instruction means making the computer teach the child” (Papert, 1993, p.5). Also, it is claimed that although children meet computers and technology in early ages, still, the child computer interaction has not been optimal (Druin, 1999). The successful learning model is that the way children actively construct knowledge by combining new information with existing one. Children learn to talk and a process without covering the organized curriculum. By this model, learning process is supported by experiences and social interactions rather than by memorization, drill and practice. Also, curriculum and teaching becomes more student centered to connect the school to real life situations and support students to become better thinkers and problem solvers (Falk, 2009; Papert, 1993; Piaget, 1973; Vosniadou, 2001; Vygotsky, 1978).

Although many different approaches have been suggested for developing students’ computer skills by the usage of programming languages, computer programming has not been popular and mostly ignored in computer classrooms in Turkey. The reason for this situation is based on some thoughts: programming is difficult for most children. That is, although new generation programming languages are mathematically very elegant, they are still difficult to learn and master (Siegle, 2009; Kahn, 1995). It does not promote any students’ skills; there is no persuasive evidence “that writing programs will automatically improve the students’ creativity or general reasoning ability or higher order cognitive skills” (Shafto, 1986, p. 297), and it is not directly related with education curriculum.

When considering the list of many programming languages, software development tools, techniques and supporting technologies which have developed in the last decade, it is accepted that computer science is technological profession and a field of study which needs to be promoted not only in higher education but also in secondary, elementary education. The current crisis in computer science enrollment is bringing new attentions to programming languages and for beginner programmers, it is needed and important to provide programming languages and environments which are usable and interesting (Siegle, 2009; Schwartz et. al., 2006). The problem which we are now faced with is that while we have distributed computing technologies everywhere so rapidly, we have spent very little time for beginner programmers in this process (Schwartz et. al., 2006). Therefore, for a beginner programmer, the learning of how to code a program has become difficult, discouraging and painful resulting in decreasing the number of programmers while increasing the computers we have.

To make beginner learners of programming languages more adaptive the advance computing technologies and to reduce the technical difficulties that beginner programmers are faced with educational and kid’s programming languages have been developed (Siegle, 2009; Schwartz et. al., 2006). Kid’s programming languages are designed primarily as a learning instrument and they are low level programming languages used for just educational purposes. They offer entertaining environments to beginner learners and help them to learn more professional ones easily. This is also important to encourage and prepare them in order to use more powerful and mainstream programming languages and technologies in the future (Papert, 1993).

Although such kinds of technologies are created to be used and they provide a lot of advantages for their users, this does not mean computer systems make the child teach and improve their skills if they are not used (Papert, 1993). According to Technology Acceptance Model (TAM), the usefulness of these types of technologies can be investigated by the indicator factors reported in perceived usefulness and perceived ease of use constructs of TAM (Davis, 1989). Therefore, it is also needed to investigate the usefulness and ease of use of these new technologies. Also, their effects on users’ motivation should be also investigated carefully before integrating them into learning processes.
The purpose of this study is to analyze the integration of Small Basic as a new technology into computer courses of elementary schools in Turkey. In this study, it is aimed to investigate the perceptions of students and teachers of Plevne Elementary School located at Ankara, Turkey about the use of Small Basic in their computer courses in terms of its effects on their perceived motivation, perceived usefulness and perceived ease of use. Also, it is aimed to gather information from teachers about advantages and disadvantages of this technology. Moreover, it is aimed to get the suggestions of teachers about the use of this technology and the content. Research indicates that when the content of the course is more involved, it is important that the teacher have a good content knowledge base to be effective in teaching the subject (Westerman, 1989) and in active learning process, learning is not a standard process, anymore; actually, it transforms into a personalized process (Aknöglu & Tandoğan, 2007). This study tries to answer the following research questions:

1. How do students perceive the use of Small Basic in their computer courses in terms of its effects on their perceived motivation towards the computer courses, its usefulness and its ease of use?
2. How do teachers of Plevne Elementary School perceive the use of the Small Basic in their computer courses in terms of its effects on students’ perceived motivation towards the computer courses, its usefulness and its ease of use?
3. What are the advantages and disadvantages of the use of Small Basic in their computer courses from the teachers’ point of view and what are the suggestions of the teachers about the use of this technology?

Method

The purpose of this study is to investigate the perceptions of students and teachers from Plevne Elementary School about the use of Small Basic in computer courses. With this purpose in mind, a case study was conducted in the form of an action research. That is, this study uses components of case study by action research (Şanal-Erginel, 2006). Therefore, this research focuses on a single case - Small Basic application in computer courses that was experienced by students and teachers from Plevne Elementary School.

Case studies work with a single or a unique instance in a real situation (Cohen, Manion & Morrison, 2000). A case is a specific, unique, and integrated system which is bounded to contextual factors. A case study is defined as “a research strategy which focuses on understanding the dynamics present within single settings” (Eisenhardt, 1989, p. 534). It is also the learning process about the case and the output of our learning (Stake, 1994, p. 237). Patton is also stated that the rich and detailed data that is obtained in case studies enable the researcher to understand the phenomenon in question in great depth (as cited in Şanal-Erginel, 2006). It is regarded as a complex design strategy, and it investigates the phenomenon in its real life context (Robson, 2002).

Action research is a practical approach to professional examination in any social condition (Waters-Adams, 2006). The term “action research” was first employed by Lewin (1948) referring to it “as a way of learning about organizations through trying to change them” (as cited in Şanal-Erginel, 2006) and indeed, action research did not emerge in education. However, later, it was applied to education to be used in the development of teaching and learning; and the examples in this component related to education are so particular relevance to teachers or lecturers engaged in their daily contact with children or students (Waters-Adams, 2006). The context for professional examination may change; however, the principles and processes in action research remain same with respect to the nature of the practice (Waters-Adams, 2006). Within this context, Bogdan and Biklen state that the researcher utilizes qualitative methods and processes in order to reflect on his/her experiences in the research process (as cited in Şanal-Erginel, 2006). The work of Lawrence Stenhouse (1975) was the particular usage of action research in education. In that study, it was supported that curriculum development and research should belong to the teacher (Stenhouse, 1975). He also stated that teachers need to study curriculum and their works by themselves by the lights of action research (Stenhouse, 1975). Action research in education is based on the works of teachers which they experience (Waters-Adams, 2006).

Carr and Kemmis (1986) described action research as it is about the development of practice, the understanding of practice, the situation in which the practice takes in place.

Kemmis and McTaggart (1988) also defined action research as a cycle of research and action involved in four phases: planning phase, acting phase, observing phase and reflecting phase.

These four particular points become a part of a cycle and the processes of each phase may be revised. Therefore, in this ongoing process of action research, changes may occur. In this study, analysis part was also added to this cycle of processes of action research to define research questions, to examine context, to research sample projects to be used as a guide and help the processes occurred in planning stage. By this new form, it may be the sample cycle for all other researchers who use action research in their works.

Stages of Action Research in the Study

With the purpose in mind, research design was completed with respect to following stages.

First, in analysis part, context, teaching and learning practice were examined at the beginning of the fall semester of school. As a participant of the study and as a participatory researcher, analysis related to problem situation was
conducted in this stage. As a researcher, observations were made and contributions to the examinations of teaching and learning practice were made. Context and curriculum about computer courses were also reviewed. After defining problems in learning programming languages, researcher focused on one specific area of interest to define the research questions. After the definition of research questions, researcher started to analyze sample projects in literature to be used as a guide to this study.

Second, in planning stage, researcher formed a detailed plan of action and decided on the time frame. Then, the resources to be used in the study were selected with respect to problems identifies and based on the needs for learning programming languages. Since the computer literacy level of both students and teachers were very low, this planning stage helped great to overcome this issue. In this stage, as a researcher, it was helped to prepare a detailed plan of action and also, while deciding on the time frame used in the study. In resource selection process, the researcher offered many resources to other participants and these resources were selected with respect to needs of participants. Since the computer literacy levels of teachers were very low, the contents about basic computer topics were prepared by the researcher. This was the first revision conducted by the researcher on the plan. After first implementation, it was seen that computer literacy levels of participants were not enough to conduct this study. Therefore, trainings about the learning environment and basic computer topics were prepared and conducted. Moreover, the other contents related to research problem were prepared and given to participants of the study. Phrogram™ was selected as a kid’s programming language in this stage and contents about Phrogram™ were prepared. Also, the learning environment was provided in this stage to conduct these programming courses. As a researcher, by the suggestions of teachers, all hardware and software needs were met such as laptops, projection devices, servers, content development tools and e-learning environments. In the application of this part of stage, it was seen that Phrogram™ was the complex programming language for the study by the suggestions of participants. It was difficult to learn and teach. Since the researcher first taught the topics to teachers before students, it was figured out before conducting these lessons to students. Researcher immediately revised the plan and started to research the other resources such as Visual Basic, Logo and Small Basic to be used as kid’s programming language. Later, Small Basic was defined as new kid’s programming language and course materials were immediately prepared again.

After planning stage, action plan was implemented. In this section, researcher revised planning stage two times as mentioned in planning stage and then implemented the final plan. The one of the reasons of this is the low computer literacy level of participants and the other reason is the more complex kid’s programming language (Phrogram™) which was selected for this study before. In implementation, the researcher first taught the topics related to kid’s programming language and then, teachers conducted their lessons with students. It was also taught how to use learning content development software and e-learning portal. While teaching these tools, the researcher had also helps from his colleagues. In implementation of the computer courses, the first and last computer courses were given by the researcher. Also, in the remaining lessons, the researcher helped to teachers while teaching their topics as an assistant teacher. Also, in the first parts of lab sessions, the researcher helped the teachers.

Then, in observing stage, two data collection techniques were used: Questionnaire with students and interview with teachers. Although the researcher acted in these stages as a participatory researcher and attended the classes as an assistant role, he did not involve in data collection parts of the study since he did not directly take in place in teaching activities and did not spend much time all the lessons participants attended. To avoid threats against trustworthiness of the study and not to provide incorrect information about educational activities conducted both in class and out class, researcher was not engaged in data collection part of the study as a participant. And finally, the perceptions of the students and the teachers about the use of Small Basic were declared in Reflecting Stage. All stages of this action research are listed in Figure 1.
Participants of the Study

To meet the purpose of this study, participants were selected from public school of Ministry of National Education (MONE) and took this research in during 2008-2009 semesters. Seventy six students and two elementary school teachers involved in the research for six weeks to meet the purpose of this study. The students were 4th and 5th grade Plevne Elementary School students. There were two classrooms and seventy six students involved in the activities. However, just sixty eight of them responded to Students’ Perceptions about Kid’s Programming Language Questionnaire (SPKPL-Q). This is because four of them does not read and write well and the other four of them were absent at evaluation lesson. As it is showed in Table 1, twenty eight (41.2%) of them were male and forty (58.8%) of them were female.

<table>
<thead>
<tr>
<th>GENDER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>28</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Interviews were conducted with the teachers of these classrooms in order get their perceptions about the tool. As it is seen in table 2, the teachers are working in Plevne Elementary School at least four years. Also, they have been giving
computer courses approximately for one year. However, they have not used any e-learning portal and programming language in their computer courses before this study. One of them is male and the other teacher is female.

Table 2. Characteristics of Teachers of Plevne Elementary School

<table>
<thead>
<tr>
<th>Questions</th>
<th>Teacher 1</th>
<th>Teacher 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long have you been working as a teacher in Plevne Elementary School?</td>
<td>for 4 years</td>
<td>for 5 years</td>
</tr>
<tr>
<td>How long have you been giving computer course?</td>
<td>for 1 year</td>
<td>for 0.5 years</td>
</tr>
<tr>
<td>Have you ever used any e-learning portal before?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Have you ever used any programming language in your courses before?</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

The Study

In order to investigate the perceptions of students and teachers, a computer course was redesigned with respect to curriculum provided by MONE (2006). The content and the structure of this course was revised and redeveloped considering the basic principles of a kid’s programming language education, and new components were integrated into it. Blended; both face to face and online learning environment were used to provide better education about Small Basic. The following section provides detailed information on how the course was developed and implemented.

Small Basic Sessions for Students

The programming sessions took place in the classrooms of school and lasted approximately two hour including one break time. The study lasted 6 weeks. Sessions were conducted once a week and students in their leisure times were free to use computers in their classrooms. Small Basic, e-learning environment, notebooks, netbooks, pencils, worksheets and presentation files were provided by the researcher and the sponsor of the study. Moreover, web site in e-learning portal was designed for students to provide better learning environments. In order to develop students’ programming skills, sessions were divided into three phases. In the first instruction phase, teachers gave the basic concepts of Small Basic on that day’s topics and introduced sections of programming tools. In this phase, students were also free to ask questions. In the second practices phase, students made some exercises on learning topic using programming language and worked on practices provided by their teachers. Students were also able to ask questions about topic and tool. In last sharing experiences and practicing on problematic issue phase, students engaged in some problematic issues provided by their teachers by using kid’s programming languages. These issues were taken from real time conditions. Students shared their ideas with pupils and tried to find better solutions to the problem case. In this phase, teachers did not provide any solution to the students and they were out in learning process. Students developed their own ways to solve the problems. After sessions, students were able to reach lesson documents and sent their assignments via their web site in e-learning portal. They were also able to discuss course topics on this site with their friends and teachers.

Small Basic Sessions for Teachers

The programming sessions for teachers took place in the school and lasted approximately one hour, and conducted once a week. Also, teaching materials were provided via e-learning portal. Teachers were free to ask questions whenever they wanted to the researcher about kid’s programming language. By this reason, there were no exact times for learning sessions except scheduled ones. Small Basic, educational materials and presentation files were provided. Teachers used web site in portal environment designed for children. In this web site, they found sections which were special to them and restricted for just their usage. In order to provide better learning materials to the students including teachers’ perceptions, teachers were taught in detail on Small Basic. They were instructed on both programming languages and tool. Problematic cases were also provided such as English vocabulary. After course sessions, teachers gave their assignments and discuss with their students about course topics via e-learning portal.

Learning Environment

Addition to Face-to-Face Lectures, participants used e-learning environment as another tool. SharePoint® Portal Server and Learning Gateway contains all known modules used in online learning and sharing environments such as discussion boards, announcements, surveys calendars etc. (Özden, 2007). At Plevne Elementary School, by using SharePoint® Portal Server and Learning Gateway capabilities, teachers were able to manage their course documents, store students’ works, reports, lesson plans, and course materials in an electronic filing cabinet, manage user account information, use tasks and calendar web parts, open discussion boards, collaborate with students by using discussion boards, handle
announcements, manage course syllabus, deal with assignments, collect and grade assignments, and give feedbacks to students. Students were also able to view course documents, their tasks, course calendars, announcements and course syllabus. They were also able to discuss on open topics, view, complete and submit their assignments online, and see their feedbacks provided by their teachers. They also collaborate with others by sharing photographs, videos, and project work. Moreover, each student’s files, assessments, and homework were stored in their own workspace and e-portfolio.

Microsoft® Learning Content Development System (LCDS) was used to provide learning contents. LCDS is a free tool that provides communities with content development environment to create high-quality and interactive online courses (Microsoft, 2009). By this tool, people can generate and publish SCORM compatible interactive activities, highly customized content, quizzes, assessments, animations, games, demos, and other multimedia (Microsoft, 2009). SCORM is a series of standards and specifications for e-learning systems and it provides communications between client side content and a server system by providing set of definitions. Teachers prepared SCORM compatible learning objects and learning materials by this tool.

Small Basic

Microsoft® Small Basic is programming language for children. It is designed to create easy, approachable and entertaining programming environment for beginners (MSDN, 2009). By including minimum amount of programming concepts, Microsoft® provides an easy and user friendly programming language for beginners to learn (MSDN, 2009). Small Basic users can be anyone who wants to learn programming concepts. They may be children, beginner adults or even parents who want to educate their children in programming.

Small Basic was the main tool to teach programming concepts to students. In just one day, students had the ability to manage all sections of the software. Students wrote codes by using this tool. While writing their codes, they used all features of this tool such as intellisense and quick tips. By using this tool, students also wrote codes in their free study times as playing a game. By the help of this study, tool was also localized into Turkish. As it is seen in figure 2, all help files and user interface are now in Turkish.

Data Collection Instruments and Analysis

Two instruments were used to gather data from participants in this study. In order to obtain students’ perceptions about the Small Basic, “Students’ Perceptions about Kid’s Programming Language Questionnaire (SPKPL-Q)” was used. Another instrument used in the study, to obtain teachers’ perceptions about the Small Basic is that “Teachers’ Perception about Kid’s Programming Language Interview Guide (TPKPL-IG)”. Also, in order to obtain information about advantages and disadvantage of Small Basic and suggestions of teachers about this technology, TPKPL-IG was used.
Students’ Perceptions about Kid’s Programming Language Questionnaire (SPKPL-Q)

This questionnaire was adapted from the study of Tursak (2007). The questionnaire consists of 6 sections. These sections are: self-reported computer competency level, self-reported e-learning background, self-reported usage, perceived effects on students’ perceived motivation towards computer courses, perceived usefulness and perceived ease of use. First 3 sub scales contain questions about participants’ background information which are self-reported computer competency level, self-reported e-learning background and self-reported usage. Other 3 sub scales are aimed to get students’ perceptions about Small Basic.

This questionnaire was used to obtain the students’ perceptions about Small Basic. It was adapted and developed in English; however, Turkish version of the questionnaire was used to make them understand the all questions clearly. After adaption, the questionnaire was examined by several test and subject area experts to assure the questionnaire’s accuracy, clarity and validity. One test and 7 subject area experts examined the questionnaire. Some English technical words were replaced with appropriate ones by the help of experts and technical dictionaries. Also, some questions containing two directions were divided into two parts. Also, some irrelevant questions were removed or revised. After all feedbacks, some questions were revised and changed. After all revisions, English to Turkish translation was checked and the questionnaire was finalized.

After adaption and revise of questionnaire by the help of expert feedbacks to increase the reliability of the study, the questionnaire was conducted paper-based. After data collection and analysis, the reliability coefficient alpha value was calculated as 0.927. As Hatcher (1994) stated that the recommended “minimum” level of .70 and the accepted “desirable” level of .80 for social science research. This value is high enough for reliability and widely accepted in social sciences. Number of questions and Cronbach's Alpha values for perception constructs are listed in the Table 3.

<table>
<thead>
<tr>
<th>Table 3. SPKPL-Q Reliability Statistics for Perception Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of</strong></td>
</tr>
<tr>
<td><strong>Items</strong></td>
</tr>
<tr>
<td>Perceived Effects on Students’ Perceived Motivation Towards the Computer Courses</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
</tr>
<tr>
<td>Overall for Perception Constructs</td>
</tr>
</tbody>
</table>

In data collection and analysis phase, SPKPL-Q was delivered to students at the end of the action stage period and conducted paper-based. The response data were recorded into Excel file by using data coding procedures of questionnaire. Then, data was imported into SPSS sheets from Excel to measure statistical values and to analyze. Questions were analyzed by using quantitative data analysis and descriptive statistics were used as data analysis techniques. Frequencies, percentages, means and standard deviations were calculated. Different graphical charts such as histograms, bar charts and pie charts were prepared to visualize the data. As it is mentioned in reliability section, the reliability of all measurement sub scales was clearly above the recommended “minimum” level of .70 and the accepted “desirable” level of .80 for social science research (Hatcher, 1994). Also, while delivering the questionnaires, it was said to the students that the data was important and this data would contribute to the future of computer courses. Out of seventy six students, sixty eight of them responded to the questions.

Teachers’ Perceptions about Kid’s Programming Language Interview Guide (TPKPL-IG)

This interview guide, its subscales and questions was revised and adapted from the study of Tursak (2007). During the adaption and development of the instrument, expert feedbacks were gathered and interview guide was revised by those feedbacks. It was used to obtain the teachers’ perceptions about Small Basic. It was adapted and developed in English; however, Turkish version of the interview guide was used to make teachers understand the all questions clearly.

After development of interview guide, conceptual framework for interview data analysis was created (Yıldırım & Şimşek, 2006). The conceptual framework used in this study for descriptive analysis of interview data can be seen in following table.
Table 4. Conceptual Framework for Interview Data Analysis

1. Effects of the use of Small Basic on Students’ Perceived Motivation towards Computer Courses
   a. Interest / Enjoyment
   b. Perceived Competence
   c. Willingness
   d. Participation

2. Perceived Usefulness
   a. Work More Quickly
   b. Job Performance
   c. Increase Productivity
   d. Make Job Easier
   e. Useful

3. Perceived Ease of Use
   a. Easy to Learn
   b. Easy to Use
   c. Easy to Become Skillful
   d. Clear and Understandable

4. Advantages and Disadvantages

5. Suggestions

In data collection and analysis phase, TPKPL-IG was delivered and conducted to teachers at the end of the action stage period. All interview sessions were recorded by using two sound recorders with the permission of teachers. Also, some important points were recorded into notebooks by the researcher. Finally, to analyze the qualitative data, all notes translated into English since all teachers used Turkish in interviews. Descriptive analysis method was used to analyze the interview data and this interview data were analyzed by using descriptive analysis approach described by Yıldırım and Şimşek (2006). The data obtained was summarized and interpreted by using this predefined framework.

Results

Students’ Computer Competency Levels

According to students’ self-reported data about their computer competencies as shown in Table 5, approximately 80% of students stated themselves as expert or intermediate in several software included in the questionnaire such as web browsers, e-mails, search engines etc... For the competency on programming language software, 41.2% of the students reported their competencies as intermediate. According to participants’ answers, the number of intermediate students was 28; the number of expert students was 20 (29.4%). These numbers show that participants are mostly familiar with the programming language software.

Table 5. Statistics of the Students’ Self-Reported Computer Competencies

<table>
<thead>
<tr>
<th></th>
<th>Not Used</th>
<th></th>
<th>Beginner</th>
<th></th>
<th>Intermediate</th>
<th></th>
<th>Expert</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Web browsers</td>
<td>8</td>
<td>11.8</td>
<td>4</td>
<td>5.9</td>
<td>34</td>
<td>50.0</td>
<td>22</td>
<td>32.4</td>
</tr>
<tr>
<td>Search Engines</td>
<td>2</td>
<td>2.9</td>
<td>4</td>
<td>5.9</td>
<td>20</td>
<td>29.4</td>
<td>42</td>
<td>61.8</td>
</tr>
<tr>
<td>E-Mail</td>
<td>18</td>
<td>26.5</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>17.6</td>
<td>38</td>
<td>55.9</td>
</tr>
<tr>
<td>Online Forums &amp; Blogs</td>
<td>8</td>
<td>11.8</td>
<td>10</td>
<td>14.7</td>
<td>38</td>
<td>55.9</td>
<td>12</td>
<td>17.6</td>
</tr>
<tr>
<td>Online Chat Applications</td>
<td>18</td>
<td>26.5</td>
<td>2</td>
<td>2.9</td>
<td>20</td>
<td>29.4</td>
<td>28</td>
<td>41.2</td>
</tr>
<tr>
<td>Microsoft® Word Applications</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2.9</td>
<td>30</td>
<td>44.1</td>
<td>36</td>
<td>52.9</td>
</tr>
<tr>
<td>Microsoft® Excel Applications</td>
<td>14</td>
<td>20.6</td>
<td>10</td>
<td>14.7</td>
<td>14</td>
<td>20.6</td>
<td>30</td>
<td>44.1</td>
</tr>
<tr>
<td>Microsoft® PowerPoint Applications</td>
<td>20</td>
<td>29.4</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>32.4</td>
<td>26</td>
<td>38.2</td>
</tr>
<tr>
<td>Programming Language Software</td>
<td>8</td>
<td>11.8</td>
<td>12</td>
<td>17.6</td>
<td>28</td>
<td>41.2</td>
<td>20</td>
<td>29.4</td>
</tr>
</tbody>
</table>
Self-Reported E-Learning Background

According to the results of SPKPL-Q which are shown in Table 6, 97.1% of the participants used Internet in their courses and many of them did not take any online or web-supported course before this study.

Table 6. Statistics of the Students’ Self-Reported Experiences

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Have you ever taken any web-supported or online course until now?</td>
<td>12</td>
</tr>
<tr>
<td>Have you ever taken any web-supported programming language courses before this semester?</td>
<td>12</td>
</tr>
<tr>
<td>Have you ever used the internet for your course studies until now?</td>
<td>66</td>
</tr>
<tr>
<td>Have you have ever used any programming language software in your computer courses until now?</td>
<td>40</td>
</tr>
</tbody>
</table>

Students’ Self-Reported Usage

As it is seen in Table 7, 44.1% of the students reported their usage as 1-3 times in a week. The percentages of participants reporting their usage as 3-5 times in a week was 23.5%. Also, 29.4% of students used the system every day or more than one in a in a day.

Table 7. “How frequently did you use “Small Basic” in your computer courses?”

<table>
<thead>
<tr>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>2</td>
</tr>
<tr>
<td>1-3 times in a week</td>
<td>30</td>
</tr>
<tr>
<td>3-5 times in a week</td>
<td>16</td>
</tr>
<tr>
<td>Everyday</td>
<td>12</td>
</tr>
<tr>
<td>More than one in a day</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
</tr>
</tbody>
</table>

Students’ Perceptions about Small Basic (SPKPL-Q)

SPKPL-Q was conducted to obtain students’ perceptions about using “Small Basic”. Their perceptions were investigated in terms of three aspects: Effects of the use of this technology in students’ perceived motivation towards their computer courses, perceived usefulness and perceived ease of use.

Perceived Motivation towards the Computer Courses

Students’ perceptions about the effects of the use of “Small Basic” on their motivation towards the computer courses were investigated by the use of 9 questions grouped in 4 indicator factors.

Table 8. Descriptive Statistics for Sub-Factors of Perceived Motivation

<table>
<thead>
<tr>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest / Enjoyment</td>
<td>6.8</td>
<td>2.9</td>
<td>11.7</td>
<td>12.8</td>
<td>65.7</td>
<td>4.27</td>
</tr>
<tr>
<td>Perceived Competence</td>
<td>0</td>
<td>5.9</td>
<td>14.7</td>
<td>23.5</td>
<td>55.9</td>
<td>4.29</td>
</tr>
<tr>
<td>Willingness</td>
<td>1.9</td>
<td>2.9</td>
<td>15.7</td>
<td>20.6</td>
<td>58.8</td>
<td>4.31</td>
</tr>
<tr>
<td>Participation</td>
<td>5.9</td>
<td>1.5</td>
<td>11.8</td>
<td>20.6</td>
<td>60.3</td>
<td>4.28</td>
</tr>
<tr>
<td>Overall</td>
<td>3.7</td>
<td>3.3</td>
<td>13.5</td>
<td>19.4</td>
<td>60.2</td>
<td>4.29</td>
</tr>
</tbody>
</table>
As it is presented in the Table 8, it is seen that approximately 80% of students that is much more than a half of all students stated positive perceptions for all sub-factors of perceived motivation while just 7.0% of them reporting negative perceptions.

Students’ Perceptions about Usefulness
Students’ perceptions about the usefulness of “Small Basic” were investigated by the use of 9 questions grouped in 6 indicator factors reported in Perceived Usefulness construct of Technology Acceptance Model (Davis, 1989). Descriptive statistics for those factors obtained from the results of SPKPL-Q reported in the table 9.

Table 9. Descriptive Statistics for Sub-Factors of Perceived Usefulness

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work More Quickly</td>
<td>8.9</td>
<td>4.4</td>
<td>5.9</td>
<td>20.6</td>
<td>60.3</td>
<td>4.19</td>
<td>1.022</td>
</tr>
<tr>
<td>Job Performance</td>
<td>5.9</td>
<td>8.8</td>
<td>10.3</td>
<td>23.6</td>
<td>51.5</td>
<td>4.06</td>
<td>0.998</td>
</tr>
<tr>
<td>Increase Productivity</td>
<td>5.9</td>
<td>0</td>
<td>8.8</td>
<td>35.3</td>
<td>50</td>
<td>4.24</td>
<td>1.038</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>2.9</td>
<td>5.9</td>
<td>2.9</td>
<td>23.5</td>
<td>64.7</td>
<td>4.41</td>
<td>1.011</td>
</tr>
<tr>
<td>Makes Job Easier</td>
<td>5.9</td>
<td>2.9</td>
<td>8.8</td>
<td>26.5</td>
<td>55.9</td>
<td>4.24</td>
<td>1.121</td>
</tr>
<tr>
<td>Useful</td>
<td>0</td>
<td>5.9</td>
<td>2.9</td>
<td>23.6</td>
<td>67.7</td>
<td>4.53</td>
<td>0.753</td>
</tr>
<tr>
<td>Overall</td>
<td>4.9</td>
<td>4.7</td>
<td>6.6</td>
<td>25.5</td>
<td>58.4</td>
<td>4.28</td>
<td>0.779</td>
</tr>
</tbody>
</table>

As it is shown in the Table 9, for “Useful” variables of perceived usefulness factor of Small Basic, students reported most positive responses with the percentage of 91.3%. For other sub-factors students’ responses were also highly positive. As a result, 83.9% of students; that is much more than a half of all students reported positive perception while just 9.6% of them reporting negative perception about “Perceived Usefulness” of Small Basic.

Students’ Perceptions about Ease of Use
Students’ perceptions about the ease of use of “Small Basic” were investigated by the use of 9 questions grouped in 4 indicator factors reported in Perceived Usefulness construct of Technology Acceptance Model (Davis, 1989).

Table 10. Descriptive Statistics for Sub-Factors of Perceived Ease of Use

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy to Learn</td>
<td>5.9</td>
<td>8.9</td>
<td>7.4</td>
<td>20.6</td>
<td>57.4</td>
<td>4.15</td>
<td>0.958</td>
</tr>
<tr>
<td>Easy to Use</td>
<td>2.9</td>
<td>8.8</td>
<td>2.9</td>
<td>20.6</td>
<td>64.7</td>
<td>4.35</td>
<td>1.089</td>
</tr>
<tr>
<td>Easy to Become Skillful</td>
<td>0</td>
<td>8.8</td>
<td>11.8</td>
<td>20.6</td>
<td>58.8</td>
<td>4.29</td>
<td>0.993</td>
</tr>
<tr>
<td>Clear and Understandable</td>
<td>0.9</td>
<td>10</td>
<td>14.7</td>
<td>28.8</td>
<td>45.6</td>
<td>4.08</td>
<td>0.671</td>
</tr>
<tr>
<td>Overall</td>
<td>2.4</td>
<td>9.1</td>
<td>9.2</td>
<td>22.7</td>
<td>56.6</td>
<td>4.22</td>
<td>0.781</td>
</tr>
</tbody>
</table>

As it is presented in the Table 10, most of the students reported positive perceptions about the ease of use of Small Basic. It is clearly seen that all indicator factors had positive answers which were greater than the percentage of 75%. This is again much more than a half of all students.

Characteristics of the Teachers
As it is seen in Table 11, the teachers are working in Plevne Elementary School at least 4 years. Also, they have been giving computer courses approximately for one year. However, they have not used any e-learning portal and programming language in their computer courses before.
### Table 11. Characteristics of Teachers of Plevne Elementary School

<table>
<thead>
<tr>
<th>Questions</th>
<th>Teacher 1</th>
<th>Teacher 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>How long have you been working as a teacher in Plevne Elementary School?</td>
<td>for 4 years</td>
<td>for 5 years</td>
</tr>
<tr>
<td>How long have you been giving computer course?</td>
<td>for 1 year</td>
<td>for 0.5 years</td>
</tr>
<tr>
<td>Have you ever used any e-learning portal before?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Have you ever used any programming language in your courses before?</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### The Teachers’ Perceptions

The teachers’ perceptions about the use of Small Basic in computer courses were investigated by the use of interviews.

**Teachers’ Perceptions about the Effects of the Use of Small Basic on Students’ Perceived Motivation towards the Computer Courses**

First of all, in order to investigate the effects of the use of Small Basic on students’ perceived motivation towards the computer courses, teachers were asked that “How did the use of this technology effect the motivation of the students towards their concentrating on computer courses? Positively, negatively or not effected?” Answers of both teachers were positive. To get detailed indicators of their observations, they were asked to explain the indicators which they observed to support their positive opinions:

> “First of all, I want to state that by the use of this technology, attendance of students to computer courses has increased. Since they were able to reach their notebooks whenever they want, they used Small Basic almost all their break times. Before that, they did not want to go computer labs because with respect to their ideas, computer lessons were boring; however, now they love it. They loved computer lessons and also programming!”

The first indicator for perceived motivation with respect to conceptual framework was “Interest / Enjoyment”. In order to investigate the teachers’ perceptions about this variable, they were asked two questions: one of them is about students’ interests and the other one about their enjoyment in computer. First, it was asked that “Have you observed that the use of this technology has increased students’ interest to the computer courses?” Both teachers stated that by the use of Small Basic, students’ interest to computer courses has dramatically increased:

> “The use of this technology has increased the students’ interest and students have used it till the end of semester. Although almost no lessons at the end of the semester and many students from other classes were absent, they have come and attend lessons and used Small Basic.”

Second, it was asked that “Have you observed that the use of this technology has increased students’ enjoyment in the computer courses?” Both teachers stated positive observations and reported that by the use of Small Basic, students’ enjoyment in the courses has dramatically increased:

> “Since Small Basic showed the results of their works immediately; I mean they write codes and show the outputs just hitting F5, they enjoyed from this situation very much. Actually, they enjoyed the feeling of success and felt themselves as a creator of something. They all created virtual objects as they saw in their computer games. They loved this feeling.”

The second indicator for perceived motivation was “Perceived Competence”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has increased students’ satisfaction about the computer courses?” The teachers stated positive opinions and the following observations:

> “Their satisfaction has sharply increased. First, they did not know anything about this technology; however, they bravely wanted to try it and saw that they were able to write codes; and the result, highly motivated little programmers who enjoys writing codes.”

The third indicator for perceived motivation was “Willingness”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has increased students’ willingness to work on the computer courses?” The teachers stated positive opinions and the following observations:

> “Even some students who were uninterested to computer lessons before this technology wanted more work, more request and more problem situation to be solved. Their willingness to work has increased with the percentage of a hundred.”

The last indicator for perceived motivation was “Participation”. In order to investigate the teachers’ perceptions about this variable, they were asked two questions. One was about students’ participation and the other was about their study time in the computer courses. First, it was asked that “Have you observed that the use of this technology has
increased students’ study time in the computer courses?” The teachers stated positive opinions and the following observations:

“First, I want to state that by the use of this technology, the participation of students to computer courses has increased. They were able to reach their notebooks whenever they want in computer courses. Also, they use Small Basic almost all their break times.”

Second, it was asked that “Have you observed that the use of this technology has increased students’ participation to the computer courses?” Both teachers stated positive observations and reported that by the use of Small Basic, students’ study times in the courses have dramatically increased. They stated the following observations:

“I observed that every student has used this technology with a great interest and this made students’ study time in computer courses increased. Also, productivity in that time has dramatically increased.”

The Teachers’ Perceptions about Usefulness of this Technology

First of all, in order to investigate the perceptions of the teachers about the usefulness of the use of Small Basic, teachers were asked that “What do you think about the usefulness of this technology in student’s computer courses? Was it useful or not?” Answers of both teachers were positive. To get detailed indicators of their observations, they were asked to explain the indicators which they observed to support their positive opinions. They stated following observations as indicators:

“I think the practical usage of Small Basic was the main factor of the success of this project. Students found it very practical to create programs. Also, while writing codes, they developed their other skills such as mathematical thinking and problem solving. They learnt a lot while playing something and this process was not boring. They think that they were using it just for fun; however, they have been learning many things while writing codes. Now, many of them think that they may be software developer or programmer in the future. I think it was very useful and made the computers the part of real learning materials like pencils, books and notebooks.”

The first indicator for perceived usefulness was “Work More Quickly”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has increased students’ work speed in the computer courses?” The teachers stated positive opinions:

“The feeling of being a part of the solution made them they were the member of the situation. They felt themselves as an architect of buildings which they created while coding. They built every part of the buildings and saw the results of their wonders. This feeling has increased dramatically the work speed of students since they wanted to see immediately the results of their works.”

The second indicator for perceived usefulness was “Job Performance”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has increased students’ performance in the computer courses?” The teachers reported positive opinions:

“Uninterested students’ performances have also increased and this is the evidence of the success of this study.”

The third indicator for perceived usefulness was “Increase Productivity”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has increased students’ productivity in the computer courses?” The teachers stated positive opinions and the following observations:

“They have used the time in computer courses very efficient. While using technology, by the solutions they developed, they made lessons very productive for themselves. They were the creators of their works and this made them more productive and contributed their creativity skills they already have.”

The fourth indicator for perceived usefulness was “Make Job Easier”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Have you observed that the use of this technology has made the development of projects on the computer courses easy?” The teachers stated positive opinions:

“Students integrated other disciplines with computer courses such as physics, mathematics, geometry etc. They used knowledge they have already had with computer courses and expanded the computer projects which were assigned. Also, by using Small Basic, they all completed their projects and added more from themselves to their projects. This made them more enthusiastic.”

The last indicator for perceived usefulness was “Overall Usefulness”. In order to investigate the teachers’ perceptions about this variable, they were asked three questions. First, it was asked that “Have you observed that the use of this technology has increased students’ contribution to the computer courses?” Both teachers stated that by the use of Small Basic, students’ contribution to computer courses has dramatically increased:

“I clearly stated that by the solutions which students developed while using this technology, Small Basic made students think out of the box. Therefore, this has increased the students’ contribution to computer courses.”

Second, it was asked that “Have you observed that the use of this technology has improved students’ opportunity to work on projects on the computer courses?” Both teachers stated positive observations and reported that by the use of Small Basic, students’ opportunity to work on projects on the computer courses has improved:

“I think this technology made students look more positive and decisive to other educational activities. Also, it increased the working opportunities. They really used computers in their educational activities and enjoyed while using it. They also found the ways to share their solutions with their friends.”
Finally, it was asked that “Overall, was the use of this technology useful?” Both teachers stated positive observations and reported that the use of Small Basic was useful:

“I clearly stated that it was very useful for students. Not only volunteer students but also uninterested students wanted to be successful in their projects. Also, they wanted to develop more solutions for their projects which were not assigned. They voluntarily added more solutions to their projects and enjoyed very much while doing it. In order to make students more interested to computer courses, Small Basic has to be used. It will also help their other skills such as problem solving and critical thinking.”

The Teachers’ Perceptions about Ease of Use of this Technology

In order to investigate the perceptions of the teachers about the ease of the use of Small Basic, teachers were asked four groups of questions. Answers of both teachers were quite positive. To get detailed indicators of their observations, they were asked to explain the indicators which they observed to support their positive opinions. The first indicator for perceived ease of use was “Easy to Learn”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Was learning to use Small Basic easy for your students?” The teachers stated positive opinions and the following observations:

“Sure. They learnt the using of this application easily since they enjoyed it very much. Also, the ease usage of helped a lot to be learnt easily. Although some students who did not know anything about the usage of computers, I observed that they were compiling their codes in just one hour.”

The second indicator for perceived ease of use was “Easy to Become Skillful”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Was becoming skillful at using Small Basic easy for your students?” The teachers stated positive opinions:

“Many students become master at using Small Basic. I had some students and I think that they did not complete their assigned works; however, surprisingly, they did not resist to this new system and they also became skillful easily while using it. Almost 80 percent of students created their own solutions in their free times and showed me their works. They were amazing works compared to examples which I showed to them.”

The third indicator for perceived ease of use was “Clear and Understandable”. In order to investigate the teachers’ perceptions about this variable, they were asked four questions. First, it was asked that “Were user interfaces and messages of Small Basic clear and understandable for your students?” Both teachers stated that they found it clear and understandable for students:

“I found it very clear and understandable. My students easily analyzed and learnt how to use the interfaces of it. At the beginning, they just learnt the meanings of the messages while asking to me.”

Second, it was asked that “Were user interfaces and messages of Small Basic user friendly for your students?” Both teachers stated that they found it user friendly for students:

“Yes. In general, students were not faced with any problem. However, I think that they may prefer the program localized into Turkish.”

Third, it was asked that “Does user interfaces and messages of Small Basic use terms familiar for your students?” Both teachers stated positive perceptions about it:

“Yes. They particularly knew direction terms. I clearly state that they were not faced with any difficulties except a few questions about terms which they did not knew the meanings.”

Finally, it was asked that “Was it hard to understand the user interfaces of Small Basic for your students?” Both teachers stated that they found it very easy to understand for students:

“No. They were very interested about using it and this made them discover it in a very short time. Also, this made them use it easily. I think that the user interfaces of Small Basic were very easy to understand.”

The last indicator for perceived ease of use was “Overall Easy to Use”. In order to investigate the teachers’ perceptions about this variable, they were asked that “Overall, was the use of Small Basic easy for your students?” The teachers stated positive opinions:

“Yes, overall, the usage of it was very easy and the students used it efficiently.”

Advantages and Disadvantages of Small Basic

Finally, the teachers were also asked the advantages and disadvantages of this technology. They stated the following advantages and disadvantages:

Advantages of Small Basic from the Teachers’ Point of View

- Small Basic changes students’ view to computer courses positively.
- It helps to develop thinking and analyzing skills of students who have learning disabilities.
- It contributes to be understood other courses’ topics such as mathematics, geometry, physics and English.
- It contributes positively to students by providing the feeling of success.


- It contributes students’ problem solving and critical thinking skills. For example, students when they are faced with some problematic situations, they start to find and solve this problem and define what to cause it and how to solve it. Finally, they define the problem and create solutions to resolve them.
- By using Small Basic, they learn how to behave in problematic situation. They are patient while they are faced with problems and they create steps to solve it. They know how to think to overcome the problematic situations.
- By the help of Small Basic, they create predictions and are not afraid of trying. They try and try to find the solutions.
- It helps to students’ creativity. Since they write the codes step by step and think that these programs are their own products, they always try to create new different works and products.
- It absolutely contributes to students’ logical mathematical intelligence and helps to developments of characteristics of students.
- It is suitable and beneficial for all grade students and it should be used all computer courses.

Disadvantages of Small Basic from the Teachers’ Point of View

- User interface of Small Basic is in English.
  - Solution: User interface of Small Basic has been translated into Turkish.
- Help files and intellisense feature of Small Basic is in English.
  - Solution: Help files and intellisense feature of Small Basic has been translated into Turkish.

Suggestions for Teachers about Small Basic

Finally, the teachers were asked to share their suggestions about the further use of this technology. These suggestions were listed below:

- By using Small Basic, topics about algorithm and flowcharts can be supported for 4 and 5 grade students.
- Since its usage is easy and it promotes students’ interest very much, students’ motivation to computer lessons can be increased.
- Before programming courses of upper level classroom students, this software can be used and by this way, their learning process can be supported about programming before learning higher level programming languages.
- University students can easily learn programming concepts easily by using Small Basic.
- This software can be used immediately as supportive tool after teaching basic concepts of programming such as algorithm and flowcharts topic about the addition or multiplication of two numbers.
- Small Basic can be used as starting software about programming languages.
- This software can be used easily in computer and internet students clubs to develop programs.
- This software can be used easily in secondary schools and universities.

Discussion

Interest in programming languages is still a major problem in the recruitment of new students to computer science departments and related works. The general programming concept still creates misunderstandings in the minds of children. They think that programming is boring, difficult and inaccessible. Since computing science continues to advance rapidly and these rapid developments do not seem to decelerate, it is obviously seen that programming needs to be promoted not only in higher education but also in secondary and elementary education (Schwartz et. al., 2006).

In order to make beginner learners of programming languages more adaptive the advance computing technologies, to decrease that learning curve as much as is possible, and to remove the technical difficulties that beginner programmers are face with, educational and kid’s programming languages have been developed (Schwartz et. al., 2006). According to Papert (1993), by the experiences gained by programming languages, children will extend their skills beyond the programming environment to other problem solving areas.

The solution used in this study as kid’s programming language in order to teach basic concepts of programming languages was Small Basic. Small Basic is an effective in stimulating interest in programming concepts. It is successful in making computer science extremely easy, fun, approachable and interesting. It’s known that computers contribute children’s learning process. Also, computer programming languages creates transferable problem solving and thinking skills (Goldenson, 1996). By the use of Small Basic, while helping students’ learning process, it is also provided a base for almost all modern programming languages and by this way, beginner learners of programming languages more adaptive the advance computing technologies.
The purpose of the study is to investigate the perceptions of students and teachers of about the use of Small Basic in their computer courses in terms of its effects on students’ perceived motivation, perceived usefulness and perceived ease of use. Also, it is aimed to gather information from teachers about advantages and disadvantages of this technology. Moreover, it is aimed to get the suggestions of teachers about the use of this technology and the content.

When the results of the Small Basic’s effects on students’ perceived motivation are examined, it is clearly seen that according to the results of this study, many of the students stated positive perceptions about the effects of the use of Small Basic on their perceived motivation towards the computer course. On the teacher side, results are also positive. According to teachers, students have positive perception about the effect of the use of this technology. For example, teachers stated that by the use of this technology, attendance of students to computer courses has increased. Teachers also reported that they were highly motivated and students who did not love computer courses; now, love it and participated with high numbers to these classes.

When the results of the perceived usefulness and perceived ease of use of Small Basic are examined, it is also seen that according to the results of this study, Small Basic was useful and easy for them. On the teacher side, results are also positive. According to teachers, Small Basic is a very useful tool. For example, they state that Small Basic helps to develop thinking and analyzing skills of students who have learning disabilities. Also, it contributes to be understood other courses’ topics such as mathematics, geometry, physics and English. They stated that they will use this tool in their computer courses because of all the advantages it provides.

According to the results of this study and previous studies reported in literature, it can be said that Small Basic is accepted by high number of students and all teachers.

Suggestions for Practice

Following suggestions may help teachers or researchers in the design and implementation of such a Small Basic sessions in computer courses.

- In this study, learning sessions were divided into three sessions. First, in the instruction phase, teachers gave the basic concepts of Small Basic on that day’s topics and introduced sections of programming tools. However, I think it was very short session. Allocation of at least 20 minutes lecture would be better.
- Second, in practices phase, students made some exercises on learning topic using programming language and worked on practices provided by their teachers. In this phase, teachers need to actively participate in the learning process to help the students who needs assistance; especially technical assistance.
- Third, in sharing experiences and practicing on problematic issue phase, students engaged in some problematic issues provided by their teachers. In this phase, teachers should not provide any solution to the students and they need to be out in learning process. Students need to develop their own ways to solve the problems.
- Teachers or system administrators need to install required software to students’ computers. If just Small Basic is used in learning environment, latest Small Basic application needs to be downloaded and installed to computers.
- If any e-learning environment needs to be used, Microsoft® Learning Gateway or any other e-learning setup needs to be built.
- While preparing learning materials, be careful. Materials need to fit the grade levels of students to motivate them better to learning environment and increase their performances.
- Learning Content Development System is an easy way to develop contents for students. This tool would be used while creating learning materials for students.

Recommendations for Future Researches

The present study answered many questions about the perception of students and teachers about the use of Small Basic in computer courses. However, more detailed analyses of the usage of Small Basic in computer courses are needed. This study is considered as one step for the learning of Small Basic. Additional researches on the effects of Small Basic would help to:

- verify the claims of this review that Small Basic has a positive effect on the perceptions of students and teachers,
- understand the learning process and relevant differences in students’ abilities,
- understand its effects on mathematical knowledge, and
- understand its effects on problem solving and critical thinking skills of students.

Also, this study can be replicated in different grade levels with many more subjects to investigate the similar variables and investigate them with more general subjects since this study was conducted just with 4 and 5 grade elementary school students.
If the results of this study are validated by future researches, then the case for Small Basic’s effectiveness becomes more solidly built. I believe this study suggests the need for additional Small Basic research.

References


