

DEVELOPMENT OF A NEW CURRICULUM FOR COMPUTER EDUCATION AND COMPARISON WITH THE CURRENT CURRICULUM OF THE TURKISH MINISTRY OF NATIONAL EDUCATION

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ABSTRACT

The aim of this study is to develop a new curriculum, which meets the standards of today's computer literacy and enables the students to apply the MS Excel program in their daily lives as a tool, for the spreadsheet courses in computer lessons in the 6th, 7th, 8th grades of the current curriculum of the Turkish Ministry of National Education, which is considered requiring improvements. During the study, the new curriculum developed for use in computer lessons was compared with the curriculum, which is currently applied by the Turkish Ministry of National Education, in accordance with the EU standards. Total of 80 students participated in the study. The students were divided into two groups. The spreadsheet curriculum was applied to the first group during the computer lessons. On the other hand, the curriculum for the elective computer course 4 of the Ministry of National Education was applied to the second group. The results of the Spreadsheet Application Tests developed by the researchers were utilized in collection of the necessary data. The t-test and single-factor analysis of variance methods were used in the analysis of the data obtained. The results of the study indicate that the newly developed spreadsheet curriculum is more effective compared to the curriculum of the Ministry of National Education for the computer courses in the primary education. This study will serve as a guide for reviewing and revising the Turkish Ministry of National Education's primary education curriculum for the elective computer courses in line with the EU standards and in the light of the new curriculum developed.

Keywords: Spreadsheet Curriculum, Curriculum Development, MS Excel

Bilgisayar Eğitiminde Yeni Öğretim Programının Geliştirilmesi Ve M.E.B Öğretim Programı İle Karşılaştırılması

ÖZET

Bu çalışmanın amacı; geliştirilmeye ihtiyacı olduğu düşünülen M.E.B'nin İlköğretim II. Kademe bilgisayar öğretim programında yer alan hesap çizelgeleri (MS Excel) konusunda, günümüz bilgisayar okur-yazarlığı standartlarını sağlayan ve öğrencinin günlük yaşamında MS Excel programını bir araç olarak kullanabilmesine imkan tanıyan yeni bir öğretim programı geliştirmektir. Çalışmada, bilgisayar dersinde kullanılmak üzere geliştirilen yeni öğretim programı ile M.E.B'nin uygulamakta olduğu öğretim programı, AB standartları doğrultusunda karşılaştırılmıştır. Araştırmaya toplam 80 öğrenci katılmıştır. Öğrenciler iki gruba bölünmüş, birinci gruba araştırmacılar tarafından geliştirilen hesap çizelgeleri öğretim programı, ikinci gruba ise M.E.B'nin ilköğretim seçmeli bilgisayar 4 öğretim programı uygulanarak ders işlenmiştir. Verilerin toplanmasında araştırmacılar tarafından geliştirilen Hesap Çizelgeleri Uygulama Sınav sonuçlarından yararlanılmış, elde edilen verilerin analizinde t-testi ve tek faktörlü varyans analizi kullanılmıştır. Araştırmada elde edilen sonuçlar, geliştirilen hesap çizelgeleri öğretim programının öğrencilerin bilgisayar ders başarıları açısından, M.E.B'nin ilköğretim bilgisayar öğretim programına kıyasla daha etkili olduğunu göstermiştir. Bu çalışma, M.E.B'nin ilköğretim seçmeli bilgisayar dersi öğretim programının, AB standartları doğrultusunda ve geliştirilen yeni öğretim programı ışığında gözden geçirilerek yeniden düzenlenmesi konusunda rehber olacaktır.

Anahtar Kelimeler: Hesap Çizelgeleri, Öğretim Programı, MS Excel

Today, in the information age, also the education and training are required to change. This necessity of change specifically increases the importance of computers used as a tool in teaching technology. Feeling the necessity for the knowledge to be learned is an important factor for the permanence of knowledge and for the motivation of students. Also the computer lesson curriculum prepared by the Turkish Ministry of National Education in 1998 should be improved in this direction. In European Union countries, computer lessons are provided under the title ICT "Information and Communication Technology" or IT "Information Technology". Examining the curricula of these internationally equivalent lessons indicates that enabling the students to use information and communication technologies for acquiring access to ideas and experiences of people from different societies and cultures is one of the targets of these programs. Furthermore, abilities of making individual decisions and

thinking independently, and to distinguish where and when to use the information and communication technologies at home, office, at this moment and in future activities, either in other lessons or in daily life, are also among the skills aimed by these programs.

Considering the computer education programs, contents of lessons and computer literacy standards acknowledged in the European Union member countries and throughout the world, it can be observed that the curriculum applied in Turkey is inadequate in this perspective (Özdener and Öztok, 2005; Özdener and Cüre, 2006; Baki and Tatlı 2006). In this context, it can be concluded that the program of the Turkish Ministry of National Education will not sufficiently enable the students to use the developing computer and communication technologies in their daily lives, and in parallel, also in other education subjects as a tool. Regarding these points, it will be suitable to reorganize the curriculum of computer lessons based on the requirements of the society and the world standards.

PURPOSE OF THE STUDY

The purpose of this study is to develop a new curriculum for the subject of “spreadsheets” in elective computer lessons for the second grade primary education of the Ministry of National Education, which will fulfill the standards of computer literacy of our age and enable the students to use computers as a tool in their daily lives. Determination of the required characteristics of the new curriculum to be developed taking into consideration the other curricula (e.g. science), and of the activities to be used during the course of the lessons in accordance with the program are among the basic objectives of this study. In this context, current computer 4 lesson curriculum of the Ministry of National Education and the new curriculum developed by the researchers have been compared in terms of the success of the students.

Hypothesis 1: When comparing the success of students in “spreadsheet creation” in two different research populations (Ministry of National Education Curriculum, New Curriculum), a relevant difference in favor of the new curriculum shall become apparent.

Hypothesis 2: When comparing the success of students in “the ability to organize information” in two different research populations (Ministry of National Education Curriculum, New Curriculum), a relevant difference in favor of the new curriculum shall become apparent.

Hypothesis 3: When comparing the success of students in “the ability to conduct mathematical operations” in two different research populations (Ministry of National Education Curriculum, New Curriculum), a relevant difference in favor of the new curriculum shall become apparent.

Hypothesis 4: When comparing the success of students in “the ability to interpret the relationship between two variables” in two different research populations (Ministry of National Education Curriculum, New Curriculum), a relevant difference in favor of the new curriculum shall become apparent.

RELATED LITERATURE

Since education is a process of producing desired changes in the behavior of students through their own experiences, the program must be able to realize desired behaviors required by this process. Büyükkaragöz (1997, p.6) emphasizes that the curriculum must be both operational (functional) and flexible. The individual learns through mutual action of elements in his education condition when a change in behaviors occurs. Whether the change is in the desired direction or not depends on the carefully chosen education condition which includes subtly organized and arranged elements. This planning and organization works can shortly be called program preparation (Bilen, 1996, p.15).

Indicating that program preparation is a process of planning with the final purpose of creating a draft program, Fidan says that “developing a program includes all activities to make the program more realistic and more effective. A program must be developed subject to continuous evaluation and research activities” (Fidan, 1996, pp.23-24).

Different definitions regarding a curriculum in the education literature naturally result in different approaches, opinions and definitions in program development. In this context, it is quite difficult to make one single definition for program development. Erden (1995, p.3) defines program development in a general sense as “the process of drafting, applying, evaluating curricula and reorganizing them in parallel with the data obtained as a result of the evaluation”. According to Feyereisen, Fiorino and Nowak, program development is “in its essence an environmental organization plan made to coordinate the elements of time, place, material, equipment and personnel properly” (Wiles and Bondi, 1979, p.9).

Program development has been falsely perceived in Turkey in the past years in general as the addition or omission of lessons or subjects in the program, and as the increase or decrease of time reserved for these. (Varış,

1986, p.46). As Doll also indicates, “program development is not only developing the program documents and structure, but also encouraging the change of understanding and values in all individuals related with the program” (Doll, 1970, p.232).

McNeil (1996, p.112) classifies the participants of the program development process in social, institutional, educational and individual levels. And Ertürk (1975, p.12) identifies that the program development process includes the program preparation, application and evaluation stages.

Three basic approaches are adopted when developing curricula. These are; subject-centered program design, student-centered program design and problem-centered program design (Demirel, 1997, p.61).

Program Development Models in Education

Purpose of establishment of a model is to make a complex process comprehensible and applicable. Important characteristics of models are that they are personal, aesthetic, transitive and subjective. Needs and interests of students are important. They are student-centered and activity-centered. Students determine their interests themselves. They make personal preferences apparent, they are functional. Most important of these are:

Taba Model: The Taba Model assumes the induction approach and suggests performance of the program development in eight stages.

Rogers Model: Rogers Model is also called the interpersonal model. This model is based on human experiences and is open to innovations and changes.

Miller and Seller Model: Miller and Seller showed how to direct the program in the direction of its purpose in their models. (Büyükkaragöz, 1997, p.218).

Tyler Model: Tyler Model consists of targets obtained from students, society and subject field resources, and includes their filtering through philosophy and psychology to reach the education purposes, in addition to choosing, organizing, managing and evaluating the learning experiences (Demir, 1998, p.67).

Saylor, Alexander and Lewis Model: Program design (Saylor, Alexander and Lewis, 1981) consists of a plurality of smaller plans related to individual parts of the program rather than a single document.

Program Models in Turkey

Results of a research conducted to seek an answer to the question as to how a program development model for the Turkish education system should look like suggested a model similar to that of Taba-Tyler approach (Demirel, 1997, p.72). In order to unify program development efforts in several units of the Ministry of National Education, current program development models applied in developed countries have been examined by domestic and foreign experts and also by experts from the Education Research and Development Directorate (EARGED), and a modern “program development model” has been developed in our country for the first time. This model has been recommended to various units to be used in program development efforts of the field of education for general training.

The Program Development Model developed by EARGED defines program development as a multi-aspect process, in which decisions on the targets that may be achieved by students in a certain field of education and grade are made (<http://www.earged.gov.tr/prg.htm>).

Program Development Model of the Educational Board of Turkey

Observing that the Turkish education system is becoming insufficient in recent years, the Ministry of National Education initiated studies in this framework by the Educational Board of Turkey (TTKB). The difference of the developed program from previous and current programs is the progression from a rigid behaviorist program approach towards a cognitive and structuring approach. Furthermore, pre-school education, primary education and general intermediary education and vocational intermediary education are redesigned with a unified purpose. Instead of the partitioned program concept organized according to the primary and secondary school approach, it is intended to make the programs suitable for the eight-year uninterrupted education. When attaining these purposes, the program is reportedly considering integration with the world and EU standards.

The Turkish Ministry of National Education adopted the concept of gradual transition to the system starting from the first grade of primary education in the 2005-2006 School Year in order to start execution of the newly developed curricula. The program developed by the TTKB includes a total of 12 stages indicated in Figure 1. (http://ttkb.meb.gov.tr/programlar/program_giris/prog_gelis_3.htm).

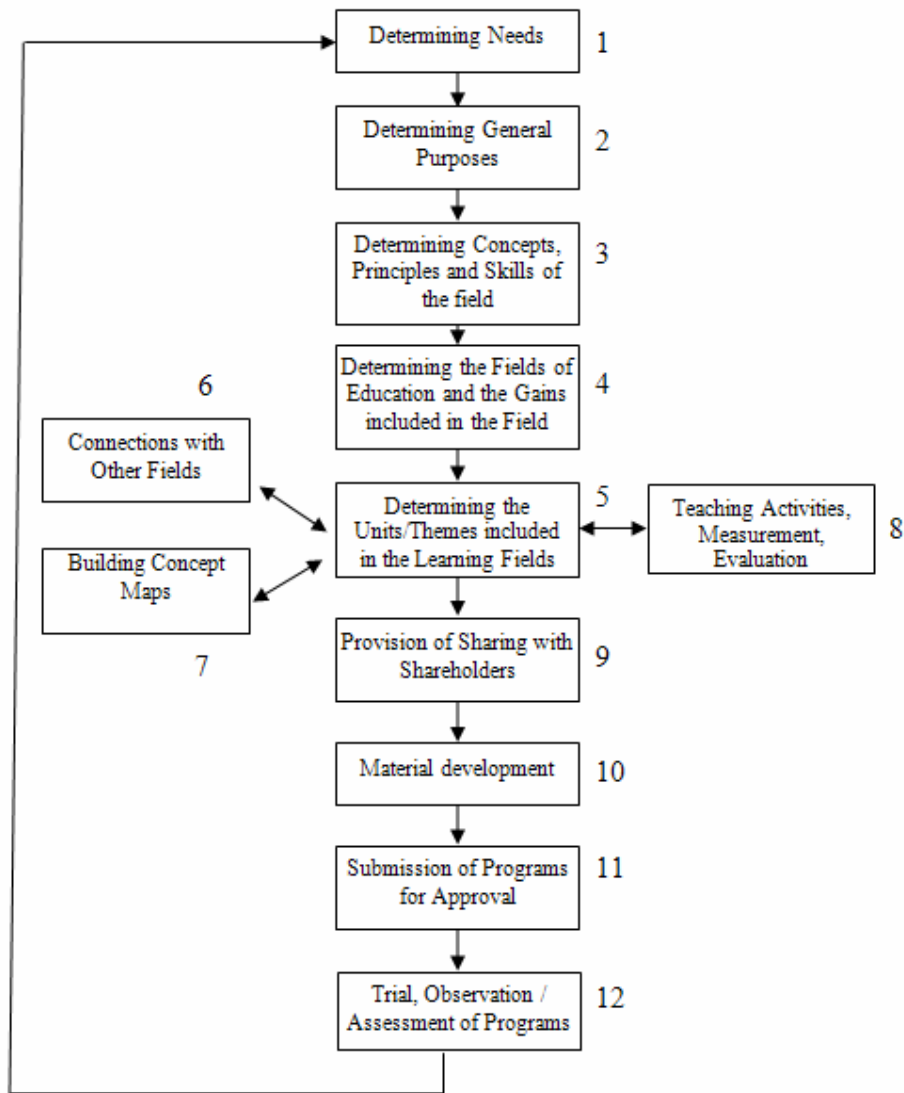


Figure 1 Program Development Model of the Educational Board of Turkey

METHOD

The study is conducted using the experimental model with post-test control group. Specifically, in line with the program development model designed by the Educational Board of Turkey in the context of student-centered approach, a new prototype program has been developed. Then, out of two research populations matched in terms of computer literacy, curriculum of the Ministry of National Education on spreadsheets for the primary education 2nd grade elective computer course (Educational Board of Turkey, 1998) was applied to the First Group, while the curriculum developed by the researchers was applied to the Second Group (Appendix 1). While determining identical groups with respect to computer literacy, computer lesson averages of the first Semester in 2005-2006 school year were considered. Final test data obtained at the end of the training were utilized in the comparison stage of the two different curricula that were applied.

Research Population

Research population of the study consisted of 2nd stage 7th grade students of the 75. Yıl Mesut Yılmaz Primary School in Pendik Town of the Istanbul Province, in 2005-2006 School Year. In the study that was conducted with 121 students, considering computer lesson grade point averages of the students at the end of the 1st Semester, a total of 3 classes were examined and 2 classes identified to be statistically closer to each other were included in the study as research populations. Students in the research population had not received any training on spreadsheets previously. Table 1 shows the distribution of the students in groups.

Table 1. Student Distributions

Groups	Num. of student	Female	Male
Group A	41	20	21
Group B*	41	18	23
Group C	39	22	17

* Was not included in the research population of the study since a significant difference from other groups was identified in analysis conducted before the application.

Data Collection Tools

Applied Examination

It has been developed by the researchers to measure the success of the students having completed their education in line with two different curricula. A total of 19 behaviors in 5 categories named spreadsheet creation, organizing information, conducting mathematical operations and interpreting the relation between variables by means of graphics have been evaluated in the examination consisting of 30 questions. The behaviors desired to be gained by students are identified in accordance with the EU standards and European Computer Driving Licence (ECDL) (<http://www.ecdl.org.tr>) depending on the age group and knowledge levels, and were used after required arrangements in line with the pilot application (Table 2).

Table 2 Behaviors to be measured in the examination

	Behaviors	Question number
1	Starts a spreadsheet program.	Ability to create spreadsheets in desired format (1, 2, 3, 4, 5, 13, 17, 20, 21, 22)
2	Creates a new spreadsheet.	
3	Saves a spreadsheet.	
4	Enters numbers or letters in a desired cell or cells.	
5	Enters a symbol to desired cell or cells.	
6	Copies the contents of a range of selected cells.	
7	Moves the contents of a range of selected cells.	
8	Deletes the contents of a range of selected cells.	
9	Knows how to format desired cell or cells.	
10	Groups data by creating spreadsheets.	
11	Is able to organize the desired data.	Ability to organize data (17, 20, 21, 22)
12	Knows the priorities in arithmetical and logical operations.	Ability to perform mathematical operations (6, 7, 14, 15, 16, 18, 19)
13	Uses arithmetical and logical formulae in a spreadsheet application.	
14	Copies formulae by using auto fill.	
15	Uses standard Excel functions (add, average, sum, max, min etc.) in a spreadsheet application.	
16	Creates a graph from data transformed into tables	Creating graphs (8, 9, 10, 11, 23, 24)
17	Is able to change graph type.	
18	Is able to correct or change a diagram or graph.	
19	Explains the relation between variables by interpreting the graph.	Ability to explain the relation between variables by means of the graph. (25, 26, 27, 28, 29, 30)

A consistency of 83.26% has been determined in the behaviors desired to be measured, as a result of the studies with 3 computer teachers in order to determine the content validity of the prepared examination. Inter-rater reliability of the test has been calculated as 0.88 (Cronbach alpha). The examination developed has been performed under observation of two teachers being applied in the computer classes, and questions numbered 1, 7, 16, 24 have been evaluated as a result of the teachers' observations.

Application

Applications have been performed in line with the annual plan given in Attachment 1 in the spring semester of 2005-2006 school year. The annual plan has been divided in units to include targeted gains, subject hierarchy, education techniques and materials to be used. In line with the annual plan prepared, a total of 10 lessons have been given over 5 weeks, projectors and worksheets have been used during the application. Worksheets have been developed by the researchers in line with examples from daily life related to the subjects "ability to create

spreadsheets in desired form”, “ability to organize data”, “ability to conduct mathematical operations”, “ability to create graphs”, and “ability to interpret the relation between variables by means of a graph”. Appendix 2 gives the sample worksheets used during the application.

The study respected the parallelism and integrity of the spreadsheet curriculum with programs of other lessons, in this context also science lessons have been included in the study. In the process that attempted to address “spreadsheets” and “movement” subjects together, science and computer teachers planned common activities and continued the lessons together.

FINDINGS

Primarily, the research attempted to identify whether the research populations are equivalent in terms of success in computer lessons, and success points of the students at the end of the 1st Semester in computer lessons have been considered to determine the experimental and control groups. “One-way Anova Test” has been used in group comparisons, and the “Scheffe” test has been utilized to determine from which group the difference that is obtained as a result of the analysis originates.

Table 3. *One-way Anova Test Results According to I. Computer Points*

	Sum of Squares	sd	Mean Square	F	Sig.
Between Groups	3307,43	2	1653,72	7,09	,001
Within Groups	27729,18	119	233,01		
Total	31036,62	121			

According to the test results given in Table 3, a significant difference in grade averages of the 7th classes was determined at the end of the 1st Semester [$F_{(2-119)}=7,09$, $p<0,05$]. As a result of the “Scheffe” test, which was conducted to determine which group is favored by the difference between the groups, a difference in group B was identified, and therefore the group B was excluded from the study. According to test results, groups A and C are equivalent groups, and there is no significant difference between the “New Spreadsheet Curriculum” and their initial levels before the start of their lessons. In the light of these findings, it can be said that the groups A and C, which were to be used as experimental and control groups, are equivalent.

Effect of the New Curriculum on “Spreadsheet Creation” Success

The 1st hypothesis tested in the study involves comparison of the curriculum of the Ministry of National Education with the new curriculum in terms of “spreadsheet creation” success. Results of the t test conducted after the application for this purpose can be seen in Table 4.

Table 4. *The independent t-test results related to the difference between “Spreadsheet Creation” success points of experimental and control group students.*

Group	N	Mean	Sd	df	t	p
Control	41	7,37	1,52	78	7,46	0,00
Experimental	39	9,41	0,78			

Test results indicate that regarding the success in “spreadsheet creation”, the experimental group applying the new curriculum is more successful than the control group applying the curriculum of the Ministry of National Education ($t=7,46$, $p<0,05$).

Effect of the New Curriculum on “Ability to Organize Data” Success

The 2nd hypothesis tested in the study involves comparison of the curriculum of the Ministry of National Education with the new curriculum in terms of the “ability to organize data” success. Results of the t test conducted after the application for this purpose can be seen in Table 5.

Table 5. *The independent t-test results related to the difference between “Ability to Organize Data” success points of experimental and control group students*

Group	N	Mean	Sd	df	t	p
Control	41	2,46	1,07	78	6,09	0,00
Experimental	39	3,67	0,62			

Test results indicate that regarding the success in the “Ability to Organize Data”, the experimental group applying the new curriculum is more successful than the control group applying the curriculum of the Ministry of National Education ($t=6,09$, $p<0,05$).

Effect of the New Curriculum on “Ability to Perform Mathematical Operations” Success

The 3rd hypothesis tested in the research involves comparison of the curriculum of the Ministry of National Education with the new curriculum in terms of “ability to perform mathematical operations” success. Results of the t test conducted after the application for this purpose can be seen in Table 5.

Table 6. *The independent t-test results related to the difference between “Ability to Perform Mathematical Operations” success points of experimental and control group students*

Group	N	Mean	Sd	df	t	p
Control	41	3,27	1,53	78	6,33	0,00
Experimental	39	5,13	1,03			

Test results indicate that regarding the success in “Ability to Perform Mathematical Operations”, the experimental group applying the new curriculum is more successful than the control group applying the curriculum of the Ministry of National Education ($t=6,33$, $p<0,05$).

Effect of the New Curriculum on “Ability to Interpret the Relation Between Two Variables” Success

The 4th hypothesis tested in the research involves comparison of the curriculum of the Ministry of National Education with the new curriculum in terms of “ability to interpret the relation between two variables” success. Results of the t test conducted after the application for this purpose can be seen in Table 5.

Table 7. *The independent t-test results related to the difference between “Ability to Interpret the Relation between two variables” success points of experimental and control group students*

Group	N	Mean	Sd	df	t	p
Control	41	2,95	2,08	78	2,69	0,01
Experimental	39	4,33	2,51			

Test results indicate that regarding the success in “Ability to Interpret the Relation Between Two Variables”, the experimental group applying the new curriculum is more successful than the control group applying the curriculum of the Ministry of National Education ($t=2,69$, $p<0,05$).

RESULTS, DISCUSSION, SUGGESTIONS

This research has developed a prototype curriculum to be used in elective computer lessons for the primary school 2nd stage 7th grade students. The newly developed curriculum has been compared with the current curriculum of the Ministry of National Education in terms of computer lesson successes of the students, and following results have been obtained in line with the resulting findings.

In accordance with the findings obtained as a result of the study, the new curriculum has been identified to be more successful than the curriculum applied by the Ministry of National Education in terms of “spreadsheet creation” success. To provide a basis for more advanced subjects in spreadsheet applications, the students have to attain the ability to “create spreadsheets” primarily. While “spreadsheet creation” is not included in the curriculum of the Ministry of National Education, it has a privileged status in the new curriculum. Research results in terms of the students’ success have been influenced positively by the examples from daily life included in the application process of the new curriculum, and also by the utilization of worksheet prepared in this context.

According to the results of the study, it has been identified that students being educated in line with the new curriculum can organize data better than the students applying the curriculum of the Ministry of National Education. In other words, it has been seen that students being trained in line with the new curriculum can distinguish data in categories and classes and place them as desired in spreadsheets more successfully. In general, regarding the understanding of the subjects, how and in which hierarchy the subjects shall be taught is of great importance. Therefore, for a student using the spreadsheet program (MS Excel), the ability “to organize information” represents a stage in understanding proceeding subjects. The new curriculum developed in this perspective includes “the ability to organize data”. However, no content or purpose is available in the curriculum of the Ministry of National Education regarding this subject.

It is among the aims of the developed curriculum to enable students to perform “mathematical operations” using the spreadsheet program (MS Excel). In line with this aim, it is among the targets of the new curriculum to “provide students the skills to perform mathematical operations with basic formulae” in MS Excel. However, in the curriculum of the Ministry of National Education, there is no target or any activity related with the “calculation” function, which is one of the basic characteristics of spreadsheet programs. As a result of the study findings, it has been found out that “performing mathematical operations” success of students trained in line with the new curriculum is higher than the students trained in line with the curriculum of the Ministry of National Education.

According to research results, when comparing the “ability to interpret the relation between two variables” success, students applying the new curriculum are identified to be more successful than students applying the curriculum of the Ministry of National Education. In providing this result, the practice-oriented approach adapted in the new curriculum in the subjects of “creating graphics” and “interpreting graphics”, practices in line with sample studies taken from daily life, and the purpose of teaching the student the logic of graph creation have been effective.

Study findings indicate that the new curriculum developed in line with EU standards is more successful than the curriculum of the Ministry of National Education regarding general success in computer lessons. These results are supported by the study (Özdener and Öztok, 2005; Baki and Tatlı, 2006) investigating and comparing the curriculum of the Ministry of National Education according to EU standards regarding the success of students. Furthermore, teaching of the subjects constituting the basis in the right order, and transforming the computer lesson to a tool that can be used also in other disciplines have affected the success of the new curriculum positively.

As a result of the applications performed in the study, it has been seen that the curriculum of the Ministry of National Education for the primary education elective computer lessons is inadequate for the requirements of our age, and insufficient for the developing information and communication technologies. Study findings not only emphasize the content of the lesson, but also identify the hierarchy within which the lesson should be provided. Among the factors increasing success is the fact that the new curriculum has been developed considering the behaviors the students can use in their daily life in line with the European Union computer literacy standards.

The Ministry of National Education decreased the elective computer lesson hours in primary schools from 2 hours to 1 hour per week as of 2005-2006 school year. It is obvious that 1 lesson hour per week will not be sufficient for providing computer lessons in which practical application is more important than theoretical information, but also for providing the education required for the student to use computers in his daily life and in other lessons. Specifically, this alteration coming in a period when efforts are made to expand computer-supported training will affect computer training negatively.

In the light of the acquired information, we believe that this study conducted for the subject of “spreadsheets” will serve as a guide in adaptation of the computer lesson to other subjects. In this context, it will be favorable to revise and reorganize the elective computer lesson curriculum of the Ministry of National Education for primary education in line with EU standards and in the light of the newly developed curriculum.




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




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

Appendix 1: Newly Developed Curriculum






Abilities and Activities in Units

UNIT	ABILITIES	ACTIVITY EXAMPLES	REMARKS
BASIC INFORMATION ON THE SPREADSHEET PROGRAM and ENTERING DATA AND MAKING ARRANGEMENTS IN CELLS	<p>Aim 1: Ability to create spreadsheets in desired formats</p> <p>Behaviors:</p> <ol style="list-style-type: none"> 1. Starts a spreadsheet program. 2. Creates a new spreadsheet. 3. Saves a spreadsheet. 4. Enters numbers or letters in a desired cell or cells. 5. Enters a symbol to desired cell or cells. 6. Copies the contents of a range of selected cells. 7. Pastes the contents of a range of selected cells. 8. Deletes the contents of a range of selected cells. 	<p>Spreadsheet Examples: Students are asked to bring ready examples of spreadsheets to the next lesson.</p> <p>Examples from Daily Life: Examples are given from tables they use in daily life, at school, and people around them use. Importance of tables is emphasized.</p> <p>Preparing Tables: Table preparation methods and techniques by means of projection are shown to students. Format characteristics are shown and applied.</p> <p>Preparing sample tables: Students are asked to prepare a sample table in the distributed worksheets in the spreadsheet program. Important aspects of table preparation are emphasized. The teacher identifies the required format characteristics on the table and asks the students to color and format the sample table as desired.</p>	<p> Teacher distributes a “sample table” worksheet to all students in the classroom.</p> <p>: Students are shown how to format the sample table by means of projection.</p> <p> Students are asked to use the prepared tables in their daily lives and in other lessons.</p>







: In-Class Activity : Worksheet : Relating to Other Lessons : Out-of-School Activity : Teaching Material Used






Abilities and Activities in Units

UNIT	ABILITIES	ACTIVITY EXAMPLES	REMARKS
MENU OPERATIONS	<p>Aim 1: Ability to create spreadsheets in desired formats</p> <p>Behaviors:</p> <ol style="list-style-type: none"> 1. Know how to use cell formatting functions. 2. Creates tables to group data. <p>Aim 2: Ability to organize data.</p> <p>Behavior:</p> <ol style="list-style-type: none"> 1. Acquires the ability to organize desired data. 	<p> Preparing sample tables: Continue to prepare the sample table on the worksheet distributed to students. Explain once again the aspects to be respected when preparing tables. Teacher identifies the required formatting characteristics of the table once again, and asks the students to color and format the sample table as desired.</p> <p> Ready data given to students. They are asked to classify these data in categories. Discuss how to transform the data in separate classes into tables. Discussion results are transformed into a table by means of projection and the table providing the best result is identified. Methods required to transform data into tables are identified.</p> <p>Sample Work: Students are asked to prepare a league fixture.</p> <p> Students are asked to prepare a multiplication table.</p>	<p> Teacher distributes a “sample table” worksheet to all students in the class.</p> <p>: Students are shown how to format the sample table by means of projection. Sample tables used to organize data are attempted to be prepared by means of projection.</p> <p> Students are asked to use the prepared tables in their daily lives and in other lessons.</p> <p> Students are asked to prepare a multiplication table.</p>

: In-Class Activity : Worksheet : Relating to Other Lessons : Out-of-School Activity : Teaching Material Used

Abilities and Activities in Units

UNIT	ABILITIES	ACTIVITY EXAMPLES	REMARKS
USING FORMULAE AND FUNCTIONS	<p>Aim 3: Ability to perform mathematical operations</p> <p>Behaviors:</p> <ol style="list-style-type: none"> 1. Knows the priorities in arithmetical and logical operations. 2. Uses arithmetical and logical formulae in a spreadsheet application. 3. Copies formulae by using the autofill function. 4. Uses standard Excel functions (add, average, round up) in a spreadsheet application. 	<p> Preparing a Multiplication Table: Students are asked to prepare a multiplication table that was asked to be prepared in the previous lesson by using mathematical operations in the spreadsheet program.</p> <p>Examples from Daily Life: Students are asked to make calculations they can use in daily life. In this direction, sample calculations are performed.</p> <p> They are asked to make the area calculations of geometric figures in spreadsheet program by using area calculation formulae used in the Mathematics lesson. Examples: Square, Rectangle, Triangle and Cylinder</p>	<p> Teacher distributes a “multiplication table preparation” worksheet to all students in the class.</p> <p> Sample work is shown to students by means of projection. Mathematical operations and simple formulae are shown to the students by means of projection.</p> <p> Students are asked to use the prepared tables in their daily lives and in other lessons.</p> <p> They are asked to make the area calculations of geometric figures in spreadsheet program by using area calculation formulae used in the Mathematics lesson. Examples: Square, Rectangle, Triangle and Cylinder.</p>

: In-Class Activity : Worksheet : Relating to Other Lessons : Out-of-School Activity : Teaching Material Used

Abilities and Activities in Units

UNIT	ABILITIES	ACTIVITY EXAMPLES	REMARKS
CREATING GRAPHS	<p>Aim 4: Ability to create graphs</p> <p>Behaviors:</p> <ol style="list-style-type: none"> 1 Creates a graph of data transformed into tables 2. Able to change graph type. 3. Makes corrections or changes on a diagram or graph 	<p>☞: Evaluation of works asked to be done in science lesson.</p> <p>Examples from Daily Life: Students are asked to give examples of graphs they see around. Discuss where graphs are used.</p> <p>📖: Daily temperatures: Students are given worksheet indicating daily temperature values. They are asked to create graphs according to the type of graphs required on these sheets.</p> <p>📖: Speed – Time Students are distributed worksheets indicating speed-time values. They are asked to create graphs according to the type of graphs required on these sheets.</p> <p>☞: Evaluation of activities asked to be done in the previous science lesson. Results transformed into graphs.</p> <p>📖 Most viewed TV series: Students are interviewed on most viewed TV series. They are asked to make a cake graph according to the results of these interviews.</p>	<p>📖 Teacher distributes a “daily temperature”, “speed and time” and “most viewed TV series” worksheet to all students in the class.</p> <p>📖: Students are shown a sample table by means of projection. Stages required to be observed while preparing graphs are shown to the students by means of projection.</p> <p>☞ Students are asked to evaluate the results of activities made in science lessons in the spreadsheet lesson and transform them into graphs.</p> <p>☞ Speed – Time graphs and science lesson subjects are related.</p>

📖: In-Class Activity 📖: Worksheet ☞: Relating to Other Lessons ☒: Out-of-School Activity 📖: Teaching Material Used

Abilities and Activities in Units

UNIT	ABILITIES	ACTIVITY EXAMPLES	REMARKS
GRAPH INTERPRETATION	<p>Aim 5 Ability to interpret the relation between variables by means of graphs</p> <p>Behaviors: 1 Interprets the graphs and explains the relation between variables.</p>	<p>Examples from Daily Life: Students are previously asked to bring examples of graphs they see around. These samples are interpreted.</p> <p>⌘: Activities required in the science lesson are reevaluated. The question of “What must be considered when interpreting graphs?” is discussed. When to use Graphics displays and types is discussed.</p>	<p>📖 Teacher makes sample graphs all students in the class and asks to evaluate these graphs.</p> <p>📄: Students are shown a sample work by means of projection. Which factors to consider when interpreting graphs is shown to the students by means of projection.</p> <p>⌘ Students are asked to evaluate the results of activities made in science lessons in the spreadsheet lesson.</p> <p>⌘ Speed – Time graphs and science lesson subjects are related.</p>

📄: In-Class Activity 📖: Worksheet ⌘: Relating to Other Lessons 🏠: Out-of-School Activity 📄: Teaching Material Used

Appendix 2: A sample of worksheets used.

Spreadsheet Lesson Worksheet

Activity Number: 6

Activity Name: Preparing a Speed-Time Graph

Subject: Preparing a line graph in the MS Excel program

Purpose: Creating the graph by using tables previously given in spreadsheet program.

Instructions:

- Prepare the tables in the MS Excel program as shown below.
- Select Table 1 and click on the “Chart” in the “Insert” menu.
- Select “XY (Scatter)” graph in the chart wizard, Step-1
- Click on the next button on Step-2.
- On the Step-3 enter “time” and “velocity” as titles of X and Y axes.
- Finish the chart wizard with “Finish” button.
- Create the two other graphs using the same procedure as provided above.

Table 1		Table 2		Table 3	
Time	Velocity	Time	Velocity	Time	Velocity
1	10	1	10	1	10
2	20	2	50	2	11
3	30	3	80	3	12
4	30	4	90	4	13
5	30	5	95	5	20
6	40	6	98	6	35
7	50	7	99	7	55
8	60	8	100	8	75
9	60	9	101	9	100
10	70	10	102	10	130

