THE EFFECTIVENESS OF INTERACTIVE INSTRUCTION CD DESIGNED THROUGH THE PRE-SCHOOL STUDENTS

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ABSTRACT

The current study focuses on the effectiveness of interactive instruction CDs which was designed for pre-school students. Sixty-seven second grade students who were taking "Computer Teaching in Pre-School Education" at Anadolu University, Education Faculty, and Department of Pre-school Education participated in the current study. The data were collected in the fall semester of 2006. The data collection procedure lasted for 14 weeks. "Computer Aided Instructional Tool Evaluation Scale" was developed to analyze the current data. The aim of the scale instrument is to determine the effectiveness of interactive instruction CDs designed for the pre-school students. Descriptive survey was used to examine the resulting opinion of the students. For the research question, Arithmetic Mean (X), Frequency (f) and percentage (%) scores was used.

Keywords: *Interactive Computer Aided Instruction, Computer Use in Pre-school, Interactive Instructional CD*

1. INTRODUCTION

The opportunities of the century changed through new technological approaches in every field. One and the most important of these fields are education and instructional systems. Through the technological changes students of this century need to understand the opportunities and advantages of the new approaches. The effective use of technological opportunities by students and teachers on education is the requirement of new technological world.

Barr (1990) emphasizes "If we wish to prepare students for life-long learning, we must begin to introduce them to the tools which they will use in the careers they pursue after their formal education is completed".

Technological advances with multimedia changes the way of information, sources of information and the communication. The pace of changes in technology also changes educational approaches and offers new opportunities to the instructional systems. A technological approach which includes multimedia application and contains text, graphics, and all other media has become increasingly important for students in schools. The use of the multimedia opportunities makes the instruction readily available, more affordable, and limitless accessible, easily comprehensible. The role of technology in every step of the instructional systems is the requirement of today's world.

Technology gives the learners control over their learning. New technologies allow learners to access information easily, a process which should also be monitored by instructors (Rakes, Flowers, & Cakes, 1999). Interactive learning environments supported through technology allow learners to access information and learn through different techniques, which differentiate them from traditional applications (McCorduck, 1994). Even though a consensus on the exact type of symbol systems to develop learning does not exist yet, the importance of visual and audio symbols in instruction is indispensable (Bolter, 1996).

Two points should be considered in developing technology supported instructional design. The first one focuses on technology itself and describes the structure of software and design. The second one focuses on the question whether the design will influence the learning-teaching endeavors (Mishra, 2004). Technology supported instructional environments facilitate transforming abstract information to real-life settings; sustain using new information in practical applications; reflect real situations, problems and sample cases; and equip

students with experiences which have references in the real world (Grabinger, 1999; Jonassen, 2002).

Technology aided instructional applications in schools have become widespread, from pre-schools through the university level. Instructional technology use in pre-schools help students learn effectively and increase learning enjoyment through game-based instruction.

The technology is a place where children can have fun while exploring the many exciting things through its opportunities. Technology is also a way for children to demonstrate self-direction and independence. If technology can be used effectively in classrooms, children's learning opportunities will multiply. A successful experience with technology depends on how the technology is integrated into the classroom (Dodge, D., L Colker, & C. Heroman 2002).

The researches below support the effectiveness and requirement of using multimedia opportunities for instructional systems in pre-schools and early childhood: Clements (1999) maintains that "Technology can change the way children think, what they learn, and how they interact with peers and adults" (Clements, 1999). He also recommends technology as a tool for improving children's learning through exploration, creative problem solving, and self-guided instruction (Clements & Samara, 2003). Haugland (2000) supports teacher implementation of technology in classrooms with children 3 and 4 years old if they are allowed plenty of time to experiment and explore. In a study conducted in 2001, University of South Carolina researchers reported that learning computer skills gives preschoolers who might not excel socially or academically a chance to be good at something else their peers respect. That study also showed how computer use can encourage cooperation and collaboration among preschoolers. (Freeman, N., & Somerindyke, J. 2001).

Cordes and Miller (2000) report that an international group of physicians, scientists, and researchers called for a moratorium on computers in preschools and early elementary grades believe that computers interfere with healthy physical and mental development.

McKinnon, Nolan & Sinclair (1996) in their study concluded that "sustained computer use enables students to become not just technologically literate but it also enabled them to become producers of knowledge as they analyzed data and information and developed propositions"

Effectively use of technology for instructional systems requires successful adoption of technology opportunities to the instructional programs. Integrating multimedia opportunities consist of hardware and software proficiency, instructional proficiency, detailed design proficiency. Slowinski (2000) suggested that full integration of a technology plan within a school should "be advantageous to teachers, be compatible with needs and expectations, be simple to use, be easily tried without a huge commitment to change, and be observable and modeled by staff who embrace technology".

Jonassen, emphasizes (1985) "rather than creating problems to which we apply our most popular interactive technology, we need to develop design processes which identify the required components of interactive, adaptive instruction" It means the main purpose of creating interactive instructions and the components of interactivity must be carefully examined and defined. Also, Milheim (1996) and Weller (1988) define interactivity having components of quantity and quality of interactions. Quantity refers to the number of interactions and quality refers to the learner being able to control more of the interactions within the lesson. According to Bork (1992) degree and quality of interaction are aspects of interaction that should be considered because they have a promise of being represented quantitatively. The degree of interaction also can be defined as the number of interactions that occur and compared to the total learning process.

Learners must be able to easily focus on learning materials without having to make an effort to figure out how to access them (Lohr, 2000). An effective user interface can fulfill that requirement.

Moore and Clark (1983) argued that most reported academic gains were directly attributable to the increased attention imparted to the instructional design when new technology were considered and adopted for educational purposes.

The advantages of interactivity are (teacher-learner, learner-learner, and learner-content); student centered control of pertinent information and mechanisms for the learner to discuss the ongoing shaping of their knowledge (Wells, 2001).

Clements & Samara (2002) reported a design process for adopting technological approaches to the instructional systems with the following steps:

- drafting curriculum goals

- building an explicit model of children's knowledge and learning in the goal domain
- creating an initial design
- investigating components of the software design
- assessing prototypes and curriculum (with one-on-one interviews with students and teachers)
- conducting pilot tests (in a few classrooms)
- conducting field tests in numerous classrooms
- publishing the materials

The principles of instruction, the student features and expectations need to be determined to evaluate and choose appropriate technological application through the followings steps above. So the children using the technological application could easily identify opportunities, solve problems and develop appropriate adaptations to technology.

The opportunities with multimedia technologies for children include sounds, pictures, photographs, animations, graphics and other devices. All these devices gain children's attention. Developmentally appropriate software engages children in creative play, mastery learning, problem solving, and conversation. The children control the pacing and the action. They can repeat a process or activity as often as they like and experiment with variations. They can collaborate in making decisions and share their discoveries and creations (Haugland & Shade 1990).

Well-designed or carefully chosen early childhood technological tool (instructional CD, games, web pages and etc.) enable children to use technology effectively. Like all educational materials, software should reflect the world children live in. (Haugland & Shade 1994).

Fischer and Gillespie (2003) describe their research in a Head Start classroom. Their findings suggest that (1) open-ended software programs encourage children to explore and extend beyond their thinking, (2) computers are just another option in the classroom, (3) computers help bridge concrete and abstract thinking, and (4) technology stimulates cooperative behaviors among children. They also report that the teacher encourages children to help others who may be struggling with computer use.

Technology use in instructional systems refers to much more applications. It should include interactive learning environments, web based instructional environments, and computer aided instructions, e-mail groups, video conference systems and also the technological tools; digital cameras, handheld computers, and other devices.

One of the effective applications of technology aided instruction is interactive instructional CDs. Interactive instructional CDs are effective designs which include texts, sounds, pictures, photographs, illustrations, animations, videos and other multimedia modes. Interactive instructional CD design is constructed on the principle of user-centered instruction. This principle requires interactive instructional CDs to provide students with individual excitement along with triggering their sensation and perception. Through this excitement, interactive instructional CDs provide a well-qualified instruction as well. If these tools are prepared with these instructional purposes in mind, interactive instructional CDs encourage students to learn more effectively.

2. AIM OF THE RESEARCH

In this paper, an approach was proposed to introduce the effectiveness of interactive instructional CDs which was designed for pre-school students.

The research question is what are the criteria of selecting effective interactive instructional CDs at pre-school level?

The research question was expanded by the questions below:

- What are the students' opinions regarding the content features of the selected instructional CDs for pre-schools for the research?
- What are the students' opinions regarding the visual, audio and audio-visual features of the selected instructional CDs for pre-schools for the research?

3. METHOD OF THE RESEARCH

The purpose of this research study was to determine the effectiveness of interactive instruction CD as an instructional tool designed through the pre-school students. Sixty-seven second grade students who were taking "Computer Teaching in Pre-School Education" at Anadolu University, Education Faculty, and Department of Pre-school Education participated in the current study. The data were collected in the fall semester of 2006. The data collection procedure lasted for 14 weeks.

"Computer Aided Instructional Tool Evaluation

Scale" was developed to analyze the current data. The aim of the scale instrument is to determine the effectiveness of interactive instruction CDs designed for the pre-school students.

The reliability study of "Computer Aided Instructional Tool Evaluation Scale" was made with thirty-five second grade students who were taking "Computer Teaching in Pre-School Education" at Anadolu University, Porsuk Vocational School, and Department of Child Development.

Internal consistency coefficient of Cronbach Alpha for the Reliability of "Computer Aided Instructional Tool Evaluation Scale" was .92. "Computer Aided Instructional Tool Evaluation Scale" was also checked for validity by expert views.

At the first part of the research all participants attended to the "The Education of Interactive Instruction Tool Evaluation" lecture for six weeks (18 hours). The participants examined and evaluated eight (8) different instructional CDs which were designed for pre-school students through the lecture.

At the second part of the research, 20 instructional CDS which was sold (book stores, internet media and etc.) was determined (20 different CDs' except the CDs used for "The Education of Interactive Instruction Tool Evaluation" lecture). The 20 interactive instructional CDs were determined for the purpose of evaluation over attainable Turkey Scale. Descriptive survey was used to examine the resulting opinion of the students. For the research question, Arithmetic Mean (X), Frequency (f) and percentage (%) scores was be used.

Table 1: Research Sample

Research Sample (Number)	Attandence to the Research (Number)
67	67

Table 2: Attributes of the Research Sample

Attribute	Number	Percentage
Gender		
Female	66	%98.5
Male	1	%1.5

4. FINDINGS AND DISCUSSION

"Computer Aided Instructional Tool Evaluation Scale" which was developed to analyze the effectiveness of interactive instruction CDs as an instructional tool designed through the pre-school students consist of four different subscales determined as "Content Features, Visual Features, Audio Features, Audio-Visual Features' and 26 items of items of these subscales. The sample scale instrument includes 4-point Likert scale type questions responses that are scored from 1 to 4 and correspond to "1=disagree", "2= neither agree nor disagree", "3=agree", "4=strongly agree".

Items which arithmetic means' is over $\bar{x} \geq 3$ are sufficient feature of interactive instruction CDs which was designed for pre-school students. Items which arithmetic means' is under $\bar{x} \geq 3$ are insufficient feature of interactive instruction CDs which was designed for pre-school students.

The Kolmogorov-Smirnov test (KS-test) was used to determine the distribution is normal or not. The distribution is at left hand side of the scale. Calculated low standard deviation score reflects that there is no significant difference between participants' opinion.

Table 3: Content Features (N=67)

Survey Items	**Arithmetic Mean**	**Standart Deviation**
Content is age-appropriate	2,2317	,68051
Content is clear and simple	2,2154	,67526
Content offers practice applications	2,2029	,74598
Content offers meaningful animations, sounds, audio video and etc.	2,1010	,77023
Content is accessible to all children	2,1433	,67945
The features of use is appropriate for child	2,1721	,64496
Child can use independently and without adult assistance	2,0990	,68449
Child can set the pace of movement through leaving the content and exit at any time	2,3750	,68656
Content offers choices that child can control	2,2260	,65216
Content engages children to exploration, thinking and problem-solving activities	2,0240	,69813
Child or teacher can set the level of difficulty	1,9933	,90499
Feedback is meaningful for the children	1,9413	,76335
Total items score	25,7250	5,31087

The table 3 reflects the findings of "Content

Features" of interactive instruction CDs which was designed for pre-school students, present total arithmetic mean as $\sum \bar{X}$ = 25,72 and total standard deviation score as ∑S= 5,31. The most insufficient item of the "Content Features" is "*Feedback is meaningful for the children (graphic, sounds and etc.)"*. Arithmetical mean of this item is 1.94. The most sufficient item of the "Content Features" is "*Child can set the pace of movement through leaving the content and exit at any time"*. Arithmetical mean of this item is 2.37. Other ten items except these two items' arithmetical mean scores changes between highest and lowest scores. But also low standard deviation score reflect that there are no significant changes on the views of students between the "Content Features".

According to the findings the "Content Features" of interactive instruction CDs which was designed for pre-school students are not qualitatively sufficient enough for instructions.

Table 4: Visual Features (N=67)

Survey Items	Arithmetic Mean	Standart Devation
Composition is appropriate for child	2,1644	,62886
Screen Design, content and image	2,1587	,68310
The colors used for instructional content is appropriate for child's perception	2,3904	,70027
There is sufficient contrast between background colors and design and instructional content	2,2288	,74427
Navigations is appropriate for child	2,1577	,67695
Typographical features are appropriate for children	1,4837	,64610
Total items score	12,5837	2,58461

The table 4 reflects the findings of "Visual Features" of interactive instruction CDs which was designed for pre-school students, present total arithmetic mean as $\sum \bar{X}$ = 12,58 and total standard deviation score as ∑S= 2,58. The most insufficient item of the "Visual Features" is "*Typographical features are appropriate for child (clear text, free of typos and grammatical appropriation"*. Arithmetical mean of this item is 1.48. The most sufficient item of the "Visual Features" is "*The colors used for instructional content is appropriate for child's perception"*. Arithmetical mean of this item is 2.39. Other four items except these two items' arithmetical mean scores changes between highest and lowest scores.

According to the findings the "Visual Features" of interactive instruction CDs which was designed for pre-school students are not qualitatively sufficient enough for instructions.

Table 5: Audio Features (N=67)

Survey Items	Arithmetic Mean	Standart Deviation
Character sounds are appropriate for child	1,9106	,83400
Scene music is appropriate for child	1,9077	,82381
Navigation sounds are appropriate for child	1,9615	,80847
Instructional sounds are appropriate for child	1,9346	,81702
Total items score	7,7141	2,77411

The table 5 reflects the findings of "Audio Features" of interactive instruction CDs which was designed for pre-school students, present total arithmetic mean as $\sum \bar{X}$ = 7,71 and total standard deviation score as ∑S= 2,77. The most insufficient item of the "Audio Features" is *"Scene music is appropriate for child"*. Arithmetical mean of this item is 1.90. The most sufficient item of the" Audio Features" is *"Navigation sounds are appropriate for child"* Arithmetical mean of this item is 1.96. Other two items except these two items' arithmetical mean scores changes between highest and lowest scores. But also low standard deviation score reflect that there are no significant changes on the views of students between the "Audio Features".

According to the findings the "Audio Features" of interactive instruction CDs which was designed for pre-school students are not qualitatively sufficient enough for instructions.

The table 6 reflects the findings of "Audio-Visual Features" of interactive instruction CDs which was designed for pre-school students, present total arithmetic mean as $\sum \bar{X}$ = 7,76 and total standard deviation score as ∑S= 2,61. The most insufficient item of the "Audio-Visual Features" is *"Content scenario is appropriate for child (design includes meaningful scenario through instruction)"*. Arithmetical mean of this item is 1.90. The most sufficient item of the "Audio-Visual Features" is *"Animation contents are appropriate for child (character and character sound)"*.

Table 6: Audio-Visual Features (N=67)

Survey Items	Arithmetic Mean	Standart Deviation
Contents include meaningful and interesting animations through increasing motivation	1,9433	,72469
Animation contents are appropriate for children	1,9558	,77121
Characters designed for animations are appropriate for children	1,9567	,79159
Content scenario is appropriate for children	1,9067	,77494
Total items score	7,7625	2,61820

Arithmetical mean of this item is 1.95. Other two items except these two items' arithmetical mean scores changes between highest and lowest scores. But also low standard deviation score reflect that there are no significant changes on the views of students between the "Audio-Visual Features".

According to the findings the "Audio-Visual Features" of interactive instruction CDs which was designed for pre-school students are not qualitatively sufficient enough for instructions.

5. CONCLUSION

Effective use and choose of interactive learning tools engages students to use new and emerging information and communication technologies. Teachers may use films, slides, overhead projectors, and the latest technology in teaching, including computers, telecommunication systems, and video discs. The use of computer resources, such as educational software, internet and other devices exposes students to a vast range of experiences and promotes interactive learning. Through the technological opportunities in instructional systems, students can communicate with students in other countries to gather information (Bureau of Labor Statistics 2005). The increasing use of multimedia opportunities presents different educational approaches to the student. Information and communication technology become part of teacher's instructional repertoire along with the increasing accountability demanded of early childhood and elementary grades (Cuban, 1986). Clark (1994) concluded that media and technology could be used to make learning more efficient (enable students to learn faster), more economical (save costs), and/or more equitable (increase access for those with special needs).

The basic components interactive instructions CDs include a high level of interactivity, interface, graphics, audio, video, text, graphics, comprehensive navigation and animation. Effective interactive instructions CDs encourage students for independent learning. The components of an interactive learning CDs include structured interactions that encourage learning but provide flexibility to allow the student to learn effectively. These components make interactive learning adaptable for the user; provide learners individualized pace, content and easy access. The effective use of interactive instruction CDs require high levels of interaction which means high quality and high frequency of interaction, support learning environments, improve the quality of instruction that allow user to get an individualistic approach to the content of instruction increase interest, motivate students to active participation to the instruction, provide discussion among students related the instruction and through these components carefully developed interactive instruction CDs present student centered instruction.

Interactive CDs have positive effects on learning and they are more motivating for students, if the contents are designed carefully through the students' learning needs, audio-visual and mental perception and individual preferences. It means that there is a directly correlation between interactive instruction CDs quality and student learning quality.

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