

The effect of combined and Non-combined basic Science study courses on Students educating Digital on Telephone art of Storytelling

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ABSTRACT- Statistical population of this study included all boy students at third grade elementary level in Tehran District 3. Study sample consisted of 120 students selected by convenient sampling from third grader students in one elementary school. Research methodology was two-factor factorial design (factorial experiment). Study tools were researcher made dramatic audio stories and a learning test. Validity of the study tool was confirmed by experts, i.e. advising and counseling university professors. Reliability of the study tool was confirmed by researcher through test-retest method. Data analysis was performed by descriptive and inferential statistics through two-way analysis of variance and Tukey's post hoc test. The findings of this study show higher learning in students attending in integrated curriculum compared to students attending in nonintegrated curriculum. The findings also show higher learning through telephony storytelling compared to traditional learning method, i.e. classroom teaching. Furthermore, findings show higher learning effects from the interaction between integrated curriculum and telephony storytelling compared to either one alone. © 2014 Bull. Georg. Natl. Acad. Sci.

Key words: Curriculum, Integrated Curriculum, Nonintegrated Curriculum, Digital Storytelling, Science

Recent rapid advances have changed our views of educational system and encouraged educational experts to adopt more efficient approaches and curricula.

The main question facing the educational system is how effectively and efficiently map students' learning and development. Disciplinary system has been unable to answer this question satisfactorily over its long dominance of the educational system. Insensitivity to the primary needs of students and social problems is the main cause for the failure to provide the required efficiency.

Integrated curriculum was proposed by educational planners as an approach to address the current problems of educational system (Maleki, 1387/2008). It has been one of complicated and challenging subjects in education. It was proposed as an approach to address many shortcomings and faults in discipline or subject oriented educational system. Information and knowledge explosion, fragmentation and dispersion of discipline or subject based curriculum, and lack of connectivity between curriculum and personal-social realities of learners' life have attracted the attention of experts towards integrated curriculum.

Fantini and Weinstein advocated the inclusion of reality in curriculum. They stated that current human challenges together with important national and international issues that have undesirable effects on our personal and social relations and need to be addressed today, make us wonder why we have students spent so much time on memorizing useless information such as order and names of kings and country leaders, exact dates of events and the like. We

never deny the importance of general information but worry about why our educational system demands spending so much time on reviewing these facts. This approach deprives students from the opportunity to learn important issues making our educational system incapable of achieving its important and various objectives (Shabani, 1387/2008).

Educational philosophers, scholars, experts, and theoreticians have long focused on curriculum design as the main task of educational system. This attention lies in the fact that it is impossible to achieve educational objectives without proper planning no matter how precise those objectives may be.

How curriculums are to be planned and what approaches should be adapted in order for us to overcome the present shortcomings? And, how can we increase learning opportunity by removing the division lines between various disciplines and adapting an integrated approach?

Some advocates believe that integration of different subjects will provide students with the opportunity to develop critical thinking in learning core subjects that are required for future advancements (Carnegie Council on Adolescent Development, 1998). Curriculum integration may help students in the following cognitive areas: 1) shaping deeper understanding, 2) imagining larger mental images, 3) linking the primary concepts to each other, 4) doing higher level tasks, 5) elevating the ability to acquire higher skills, and 6) promoting divergent thinking (Belin, 1994; George, 1996; Mason, 1996; Vars & Beane, 2000; Jacobs, 1989; and Roegge & Ferej, 1995).

Many studies on core curriculum have demonstrated that integration improves students learning, motivate them for more learning, and support the development of problem solving skills (Czerniak, 2007). Improved learning interest, elevated motivation, increased logical attitudes, improved group mentality, stronger positive belief in school system, and effective participation in classroom are some of the effects expected from integrated curriculum (Mac Iver, 1990; Jacobs, 1989, and Vars, 2000).

The findings of research conducted around the world point to effectiveness of integrated curriculum. Yet, the educational system in Iran has not adopted it. Educational programmers in Iran recommend integrated curriculum as an educational method in the introduction of elementary school books. Nevertheless, the contents of educational programs in Iran still remain fragmented and far from conforming to integrated teaching methods.

Storytelling has a long history in Iranian culture. It is very well adapted by Iranians and may effectively be adaptive as a means for programming integrated curriculum at elementary level.

More than two decades ago, Bruner wrote that "in contrast to our vast knowledge of how science and logical reasoning proceeds, we know precious little in any formal sense about how to make good stories" (Bruner, p. 14). Making good stories is always a challenging process, especially for science educators who have not, for the most part, received training in the humanities and who usually have not had the opportunity to develop creative writing skills. Moreover, expository writing, especially the textbook variety, tends to be devoid of human interest and lacks natural humanistic engagement.

Bruner recommended that we convert our efforts at scientific understanding into the form of narratives as a way to change this situation (1996, p. 125). Bruner reflected a shift in emphasis in cognitive psychology, which was mirrored, in the 1980's and 1990's, by science educators who were becoming interested in contextual teaching and the use of narrative forms (Klassen, 2009).

Egan (1989) pointed out that children could learn new material based on what they were capable of imagining. Furthermore, children's ability to understand emotionally complex stories proved that children's capability to understand complex topics are not limited. To Egan (1989), lesson planning – as well as news stories, dramatic works, and a number of other human activities - are most meaningful if they are built upon or understood in terms of a set of binary concepts. Children subconsciously expect to see opposite concepts to guide them through a story and to help them create anticipations for what may come next (Ohler, 2008).

Drake (2007) described the Narrative Curriculum as a model for curriculum Integration. He believed stories provide a way for learners to understand their lives and allow for learning in meaningful contexts. The disciplines will be embedded in the stories and in the questions arising from the stories, but they are not the organizing center.

Lauritzen and Jaeger (1997) created a narrative curriculum that begins with a story or story like context. Curriculum begins and ends in stories in a narrative model. The story is more than an anticipatory set to introduce subjects of study. Narrative curriculum is marked by its recursiveness. Learners return again and again to the story to connect their exploration to it. Not only are stories long remembered, but also the learning that is generated from and intertwined them is long remembered (Drake, 2007)

Despite the growing advocacy for the story approach, there have not been many experimental studies on the application of science stories in the classroom. A few related studies support the continual development of science stories as a teaching tool (Klassen, 2007 & 2009).

Application of stories in teaching subjects is not a new concept and good teachers have always considered stories as a useful tool for making learning experiences memorable. However, there is no established tradition of theoretical approaches and frameworks based on narrative or learning theories for application of stories in educational programs. It is possible that the dearth of classroom studies on the subject may, largely, be due to the absence of a well established theoretical foundation. Recently, the need for such a tradition has been addressed by several scholarly articles which go beyond simply advocating a story approach and begin to provide a theoretical background for science stories (Klassen, 2009).

Also it is not a new concept to use the latest technology to teach. What is entirely new, however, is the use of digital technology as a vehicle for teaching, training, and packaging educational content in a format that is both entertaining and interactive. This new approach often uses digital storytelling techniques and is effective for young learners. Interactive educational software for young learners often goes by the term edutainment which effectively expresses its intent as:blending educational content with entertainment in a way that makes the material appealing to the intended learners (Miller, C.H. 2008).

With the commitment for educational use of technology in classrooms and youth programs throughout the developed and developing world, digital storytelling and other forms of digital media publishing are becoming key parts of curricula and programming at many youth centers and after-school programs (Lambert, J. 2012).

A much broader role for digital storytelling in an integrated constructivist learning environment is assumed that may easily address science and math as well (Lambert, J.2012). According to Lambert (2012) this educational philosophy could be proven that if children remember the stories of their own learning processes and can readily apply their unique sets of strength and intelligences, they will develop their own strategies for learning.

Research Literature

A. Integrated Curriculum

A review of historical background shows that at the beginning of the twentieth century, curriculum fragmentation trend changed its direction toward rapid curriculum integration by educational thinkers and teachers (Murphy, 1993). Integration or combining educational subjects or contextual disciplines that are normally included separately in school curriculums are among interesting, challenging, and difficult issues in curriculum programming.

Erickson (2007) defined integrated curriculum as organization of educational contents under a common but mostly abstract concept. He believes that the objective of integrated curriculum should be the development and description of study subjects around important issues or subjects and as clearly as possible. This can be achieved through higher level of thinking like when students cross over the knowledge base and get involved in analyzing subjects and/or try its various combinations.

The interdisciplinary curriculum makes more explicit connections across the subject areas. Such curriculum revolves around a common theme, issue, or problem, but interdisciplinary concepts or skills are emphasized across subject areas rather than within them. The essence of interdisciplinary approaches is looking at things from more than one perspective (Drake, 2007).

Jacobs (1989) defined interdisciplinary as a form of knowledge perspective and curriculum approach that intentionally applies methodology and linguistic to more than one subject instead of applying them to single subject, problem, issue, and or experiment. He believes that disciplinary approach without attention to the connectivity and relations between subjects does not rely on descriptions. He cited Mit (1978) in his statement that disciplinary approach put emphasis on intelligent and intentional identification of the relationships between various subjects. In fact, it is a different approach that concentrates on important problems, development of issues, and life experiences. Curriculum integration is an organizational approach for learning common subjects or living skills that are required by members of society. It is a program built around real problems and issues faced by adolescences and adults. Its objective is to help students learn how to participate in a democratic environment (Beane, 1997). Integrated curriculum involves programming learning activities in such a way that related experiences in three areas of cognition, emotion, and sensory-motor are combined in a holistic format. Integration is a process that happens inside students and integrated curriculum is a program that provides for the learning activities that support this process (Rudy, et al, 1996).

Integrated curriculum is a step beyond making connection and integration between subjects to provide models for understanding of global issues. It contains a collection of programmed learning experiences that not only provides learners with general information and knowledge in the form of a model, system, or structure with a holistic view, but also increases learner's ability to understand and/or discover new relations. This approach helps students to create new patterns, systems, and structures (Dressel, 1958).

Mehrmohammadi (1379/2000) defines integration as combining contextual disciplines with educational subjects that are separately and individually included in the curriculum offered by the traditional educational system. Integrated curriculum is the outcome of intertwining independent educational subjects and/or professional disciplines. Such integration and intertwining usually do not take place without certain objective or organization. In other word, integrated programs are not mixtures of educational subjects; rather they are organized around a specific objective and focused on certain subject. Integrated curriculum represents a set of learning outcomes that are presented as a part of whole where learning is meaningful and transferable.

The evolving concept of core curriculum was originally tested in the famous eight year study sponsored by Progressive Education Association (Aiken 1942). Since then, more than 80 normative or comparative studies have been carried out on the effectiveness of integrated program (National Association for core curriculum 1984). In nearly every instance, students in various types of integrative / interdisciplinary programs have been performed as well or better on standardized achievement tests than students enrolled in the usual separate subjects (Vars, 1991).

Recent analyses of studies (National Association for Core Curriculum, 2000; Vars, 1996, 1997; Arhar, 1997) point to the same general conclusion: Almost without exception, students in any type of interdisciplinary or integrative curriculum do as well as, and often better than, students in a conventional departmentalized program. These results hold whether the combined curriculum is taught by one teacher in a self-contained or block-time class or by an interdisciplinary team (Vars & Beane, 2000)

Levitan (1991) reported that a change from a literature-based language arts program to a science-literature-based program for sixth graders resulted in higher achievement in majority of the students. Similar results are reported by Willett (1992) in a study of 87 fifth graders. Integrating the study of math with art resulted in higher posttest scores than those students who were taught mathematical concepts in isolation by the regular classroom teacher. The data indicate that the integration of art activities into mathematics and reading can enhance the learning of specific concepts (Levitan, 1991, p. 12). Similar results were reported by Friend (1984) in a study of mathematics and science integration with seventh grade students. (Lake, 2000)

Taft (2007) in her study found that there was a clear impact on achievement and attitudes of students through integration. In this study significant gains were realized in student attendance, unit and test marks. The purpose of the research was to examine the impact of integrating a unit in Physics 11 with history of science, language arts and social studies on the academic achievement, attendance and attitudes of high school students

“Student understanding and application of science concepts in the context of an integrated curriculum setting” is the title of a research in which it was concluded that integrated approaches to teaching science may be appropriate to engage students in using scientific knowledge as a tool to solve real-world problems, but raised some questions as to whether they improve conceptual understanding (Venville, Rennie, & Wallace, 2005).

B. Digital Storytelling

There is no specific research on the interaction of telephony storytelling and integrated curriculum either in Iran or elsewhere. Therefore, this section includes a few researches that can be considered somewhat related to this study as background literature.

Ardakani (1386/2007) studied the effect of teaching of scientific concepts by storytelling on learning of first grade elementary school girl students in Tehran. His findings showed that storytelling increased learning in the first grader elementary school students.

Cameron and Hutchison (2009) tested the effectiveness of a telephone-mediated language intervention on enhancing young children’s narrative expression. They found that telephone experience would affect both oral and written narrative expressions. Telephone intervention enhanced oral psycholinguistic and narrative productivity when compared to face-to-face treatment.

Cameron and Wang (1999) conducted another quantitative study under the title of "Frog, where are you? Children's narrative expression over the telephone." They adapted a story from a similar book to examine the difference between telling the story over the telephone and telling it face to face. They showed that media has significant effect on children's learning from storytelling.

Wu and Yang (2009) in another quantitative research studied the impact of multimedia storytelling on learners. They concluded that critical thinking, problem solving, and academic achievement were significantly improved by digital storytelling.

Linebarger and Piotrowski (2007) indicated that narrative skills are a critical component to the development of literacy and found that these skills are both developed and enhanced through exposure to well-structured stories in multiple media formats.

Research Objective

A. Primary Objective

The primary objective of this study was to examine the impact of integrated and nonintegrated science curriculums on learning of third grader elementary school students when science subjects are offered through storytelling over telephone.

B. Secondary Objectives

This study had three secondary objectives:

- 1) Examine the impact of integrated and nonintegrated science curriculums on learning of third grader elementary school students;
- 2) Examine the impact of telephony storytelling on learning science subjects in third grader elementary school students; and
- 3) Examine the factorial effect of integrated science curriculum and telephony storytelling on learning science subjects by third grader elementary school students.

Research Hypotheses

- 1) The learning level of students is higher in integrated curriculum than integrated curriculum.
- 2) The learning level of students is higher when using storytelling over telephone compared to traditional educational method.

- 3) The learning level of students is higher when integrated curriculum uses storytelling over telephone compared to nonintegrated curriculum based on traditional educational method.
- 4) The learning level of students is higher in integrated curriculum using storytelling over telephone compared to nonintegrated curriculum using storytelling over telephone.
- 5) The learning level of students is higher in integrated curriculum based on traditional educational method compared to nonintegrated curriculum based on traditional educational method.
- 6) The learning level of students is higher in integrated curriculum using storytelling over telephone compared to integrated curriculum based on traditional educational method.
- 7) The learning level of students is higher in nonintegrated curriculum using storytelling over telephone compared to nonintegrated curriculum based on traditional educational method.

Methodology

The methodology of this study was factorial design (factorial experimentation). Statistical population included all boy students at third grade elementary level in Tehran District 3. This study used convenient sampling for selection of its study sample because managers and teachers in some schools choose not to participate in this study, thus limiting the choice of sampling. As the result, one school was selected in Tehran District 3 of which 4 classes were selected for this study. Each class was randomly placed in one of four study groups. Each group had 30 students making the total study sample 120 students.

A researcher made learning test was prepared for data collection. This test contained 40 questions about different concepts taken from two lessons in third level elementary science book, namely, animal needs and earth water resources. The questions were arranged in various formats including four-choice, false or true, short answer, and explanatory questions.

This questionnaire was made available to third level elementary school teachers for testing and evaluation in order to determine its validity. The questionnaire was confirmed by advising and counseling professor after making several corrections. Validity of study questionnaire was confirmed by expert opinion. This questionnaire was tested on 15 third grader elementary students from another school. Upon evaluation of calculated coefficients and omission of unsuitable questions, 24 out of 40 original questions were judged to be suitable for this study.

Questionnaire reliability was measured by applying test-retest. Study tool was administered on two different occasions on the same students and reliability was measured at 0.73.

The selected classes for this study were randomly assigned to four study groups labeled A, B, C, and D. Groups A and C were, respectively, assigned for integrated and nonintegrated curriculums based on traditional education, i.e., classroom teaching. These two groups separately received six lessons in two consecutive weeks. Each group was tested separately at the end of program. Groups D and B were, respectively, assigned to receive integrated curriculum and nonintegrated curriculum by using digital storytelling over telephone.

Curriculum Design Method

Fogarty (2009) proposed ten different models for curriculum integration in his book. He explained one of these models named "connected" as follows:

Connected curricular model focuses on making explicit connections within each subject area, though major discipline areas remain separate. It connects one topic to the next, connects one concept to another, connects one skill to a related skill, connects one day's work to the next, or even connects one semester's idea to the next. The key to this model is to relate curricula within the discipline instead of assuming that students realize the connections on their own, automatically. In this way, students are aware of the flow of the content created by teacher. This flow enhances the connection between the various presented topics (Fogarty, 2009).

The present study adapted Fogarty's approach (2009) for establishing explicit connection between two selected lessons, namely, earth water resources (geology) and animal needs (biology). The lessons were prepared to be offered in classroom as well as telephony storytelling. Water was the connection between two lessons. Therefore, integrated curriculum was designed and written about water as the best explicit connection between two lessons.

This study used a completely different method for the production of digital storytelling as the one proposed by Center for Digital Storytelling (Lambert, 2013). The approach taken for the present study was teacher-centered digital stories proposed by Robin (2006) in order to cover all the standards that were applicable to integrated and nonintegrated curriculum.

Data analysis was performed on data collected from study samples using descriptive statistics (frequency, mean, standard deviation) presented on histogram graphs. Inferential data analysis including two-way analysis of variance and Tukey's post hoc test was used to evaluate research hypotheses. The tools used for data analysis included EXCEL and SPSS.

Research Findings

Hypothesis 1: *The learning level of students is higher in integrated curriculum than integrated curriculum*

Table 1: Two-way Analysis of Variance (Science Scores)

Sources of Variation	Sum of Squares	Degree of Freedom	Mean Square	F	Sig.	Volume Effect
Program Effect	41.4	1	41.41	7.90	0.006	0.106
Method Effect	193.8	1	193.80	36.98	0.000	0.242
Program-Method Interaction	21.3	1	21.25	4.06	0.046	0.103
Error	607.9	116	5.24			
Total	29896.3	120				

Table 1 shows that calculated F (7.90) for program effect on learning is significant with 1 degree of freedom over 116 at significant level of $p < 0.006$. Therefore, hypothesis 1 is confirmed indicating that the learning level of students in integrated curriculum was higher than students in nonintegrated curriculum. The volume effect of this factor was measured at 0.106.

Hypothesis 2: *The learning level of students is higher when using storytelling over telephone compared to traditional educational method.*

Table 1 shows calculated F (36.98) for method effect on learning is significant with 1 degree of freedom over 116 at significant level of $p < 0.000$. This is indicative of significant difference between two groups. Therefore, hypothesis 2 is confirmed. We can conclude that the learning level of students taking lessons over telephone was higher than students who received their lessons through traditional method. The volume effect of this factor was measured at 0.242.

Interaction index describes the study results that cannot otherwise be interpreted by independent effects of two or more variables. Interaction occurs when combination of two variables produces significant effect. Table 1 shows

that calculated F (4.06) for interaction effect on learning of two study variables is significant with 1 degree of freedom over 116 at significant level of $p < 0.046$. This is indicative of the fact that the effect of integrated curriculum when using digital storytelling over telephone is higher than when we do not use this media. The effect of study variables is cumulative. It means the effect of integrated curriculum will add to the effect of telephony storytelling. Furthermore, the interaction between integrated curriculum and telephony storytelling produces higher effect on learning than either one alone.

Table 2: Tukey's Post Hoc Test (Science Scores)

Groups		Mean Difference	Standard Error	Sig.
Integrated Curriculum - Traditional Method	Nonintegrated Curriculum - Traditional Method	0.33	0.591	0.943
Integrated Curriculum - Traditional Method	Integrated Curriculum - Telephony Storytelling	-3.38(*)	0.591	0.000
Integrated Curriculum - Traditional Method	Nonintegrated Curriculum - Telephony Storytelling	-1.37	0.591	0.101
Nonintegrated Curriculum - Traditional Method	Integrated Curriculum - Telephony Storytelling	-3.71(*)	0.591	0.000
Nonintegrated Curriculum - Traditional Method	Nonintegrated Curriculum - Telephony Storytelling	-1.7(*)	0.591	0.024
Integrated Curriculum - Telephony Storytelling	Nonintegrated Curriculum - Telephony Storytelling	2.01(*)	0.591	0.005

Hypothesis 3: *The learning level of students is higher when integrated curriculum uses storytelling over telephone compared to nonintegrated curriculum based on traditional educational method.*

Table 2 shows that mean difference of integrated curriculum with telephony storytelling and nonintegrated curriculum with traditional method is equal to 3.71, which is significant at $p < 0.000$. This means that the learning level of students taking lessons in integrated curriculum with telephony storytelling is significantly higher than students taking lessons in nonintegrated curriculum with traditional method.

Hypothesis 4: *The learning level of students is higher in integrated curriculum using storytelling over telephone compared to nonintegrated curriculum using storytelling over telephone.*

Table 2 shows that mean difference of integrated curriculum with telephony storytelling and nonintegrated curriculum with telephony storytelling is equal to 2.01, which is significant at $p < 0.005$. This means that the learning level of students taking lessons in integrated curriculum with telephony storytelling is significantly higher than students taking lessons in nonintegrated curriculum with telephony storytelling.

Hypothesis 5: *The learning level of students is higher in integrated curriculum based on traditional*

educational method compared to nonintegrated curriculum based on traditional educational method.

Table 2 shows that mean difference of integrated curriculum with traditional method and nonintegrated curriculum with traditional method is equal to 0.33, which is not significant ($p > 0.943$). This means that the learning level of students taking lessons in integrated curriculum with traditional method is not higher than students taking lessons in nonintegrated curriculum with traditional method.

Hypothesis 6: *The learning level of students is higher in integrated curriculum using storytelling over telephone compared to integrated curriculum based on traditional educational method.*

Table 2 shows that mean difference of integrated curriculum with telephony storytelling and integrated curriculum with traditional method is equal to 3.38, which is significant at $p < 0.000$. This means that the learning level of students taking lessons in integrated curriculum with telephony storytelling is significantly higher than students taking lessons in integrated curriculum with traditional method.

Hypothesis 7: *The learning level of students is higher in nonintegrated curriculum using storytelling over telephone compared to nonintegrated curriculum based on traditional educational method.*

Table 2 shows that mean difference of nonintegrated curriculum with telephony storytelling and nonintegrated curriculum with traditional method is equal to 1.7, which is significant at $p < 0.024$. This means that the learning level of students taking lessons in nonintegrated curriculum with telephony storytelling is significantly higher than students taking lessons in nonintegrated curriculum with traditional method.

Discussions

The primary objective of this study was to examine the effects of integrated and nonintegrated science curriculum on learning of third grade elementary students participating in a program offered through digital telephony storytelling. The results of testing on the first hypothesis show higher learning in students attending in integrated curriculum compared to students attending in nonintegrated curriculum. This finding conforms to the ones reported by Kinniburgh & Byrd (2008), Taft (2007), Doster (2004), Willey, et al (2005), National Research Institute for Combined Curriculum (2000), Schaefer (1996), Langlotz (1993), Gold, et al (1993), Tardash (1994), Willet (1992), Levitan (1991), and Friend (1984). These studies all showed higher learning in students attending integrated curriculum compared to students in nonintegrated curriculum.

The results of testing on the second hypothesis show higher learning through telephony storytelling compared to traditional learning method. This finding conforms to results from studies conducted by Cameron & Hutchison (2009), Blas, et al (2009), Wu & Yang (2009), Linebarger & Piotrowski (2007), Sadik (2008), Boltman (2000), and Cameron & Wang (1999). All these studies demonstrated higher effects from digital storytelling on students learning compared to traditional method.

The results of testing on the third hypothesis show students in integrated curriculum taking lessons through telephony storytelling achieved higher level of learning compared to students attending nonintegrated curriculum based on traditional method.

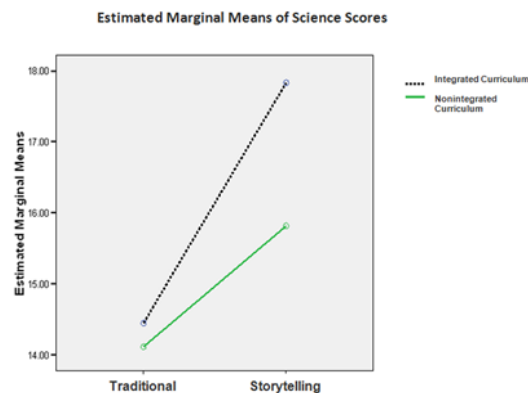
The results of testing on the fourth hypothesis show students in integrated curriculum taking lessons through telephony storytelling achieved higher level of learning compared to students attending nonintegrated curriculum taking lessons through telephony storytelling.

The results of testing on the forth hypothesis show that students in integrated curriculum based on traditional method did not achieve higher level of learning compared to students attending nonintegrated curriculum based on traditional method. This finding conforms to results reported by Schaefer (1996), Langlotz (1993), Willet (1992), Levitan (1991), and Friend (1984). Furthermore, the finding conforms to results of study by Teuscher (2008) who reported no significant difference between learning level of students attending integrated curriculum and students attending nonintegrated curriculum.

Failure to confirm forth hypothesis may lead to conclusion that integrated curriculum faces serious problems in classrooms including lack of proficiency on part of teachers in applying integrated approach, students' unpreparedness to benefit from integrated curriculum, unsuitability of educational environment, and lack of proficiency in teaching this type of curriculum. Furthermore, lack of proficiency on the part of curriculum programmers in applying integrated methods may be another contributing problem.

The results of testing on the sixth hypothesis show that learning level of students in integrated curriculum using telephony storytelling is higher than integrated curriculum based on traditional method.

The results of testing on the seventh hypothesis show higher learning level of students in nonintegrated curriculum using telephony storytelling compared to nonintegrated curriculum based on traditional method. This finding conforms to results from studies conducted by Cameron & Hutchison (2009), Wu & Yang (2009), and Boltman (2007).



The two lines in the above factorial graph are neither intersecting nor parallel. So, we can conclude that two study variables, i.e. curriculum and teaching method, have ordinal interaction. Ordinal interaction means that the difference between groups at one level of variable is higher than the difference between groups in other level of that variable. In other word, in case of telephony storytelling, integrated curriculum is more effective than nonintegrated curriculum. In case of traditional method, there is no significant difference between integrated curriculum and nonintegrated curriculum. The effect of integrated curriculum is dependent on whether teaching method is telephony storytelling or traditional. We can also say that integrated curriculum offered by way of storytelling over telephone is more effective than integrated curriculum based on traditional method.

Conclusion

This study makes the following conclusions:

- 1) Progressive students need coordinated and concurrent changes in all aspects of education.
- 2) Conservatism is not called for in providing concurrent changes in several educational variables. Otherwise, educational system will be deprived of the benefits resulting from the changes.
- 3) When teaching methods conform to curriculum programming (in this study, conformance between storytelling approach and integrated curriculum) we can observe synergic effects.
- 4) Holistic education is still a viable approach in educational system of developing countries.

ეფექტი კომბინირებული და არასამთავრობო კომბინირებული ძირითადი მეცნიერების სასწავლო კურსების შესახებ სტუდენტთა განათლების ციფრული ტელეფონით ხელოვნების სხვადასხვა დასაწყისში სტატისტიკური მოსახლეობა ამ კვლევაში ჩართული ყველა ბიჭი სტუდენტებს მესამე კლასის ელემენტარულ დონეზე თეირანში რაიონის 3. სწავლა ნიმუში შედგებოდა 120 შერჩეულ სტუდენტებს მოსახერხებელი შერჩევის მესამე კლასის მოსწავლეები ერთ დაწყებითი სკოლა. კვლევის მეთოდოლოგიის იყო ორი ფაქტორი დიზაინი (ქარხნის ექსპერიმენტი). სასწავლო ხელსაწყოები იყო მკვლევარი გააკეთა დრამატული აუდიო მოთხრობები და სწავლის ტესტი. მოქმედების კვლევის ინსტრუმენტი ჩატარებულმა ექსპერტიზამაც დაადასტურა, ანუ საკონსულტაციო და საკონსულტაციო უნივერსიტეტის პროფესორი. საიმედოობის კვლევის ინსტრუმენტი დაადასტურა მკვლევარი მეშვეობით საცდელი retest მეთოდი. მონაცემთა ანალიზი შესრულდა აღწერითი და დასკვნითი სტატისტიკის მეშვეობით ორი გზა ანალიზი ეწინააღმდეგება და პოსტი hoc ტესტი.

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