

A Survey of the Effectiveness of Instructional Design ADDIE and Multimedia on Learning Key Skills of Futsal

Kobra Azimi^{1*} Jafar Ahmadigol¹ and Hasan Rastegarpour²

¹MSc Student of Educational Technology, Kharazmi University, Tehran, Iran

²PhD of Educational Technology, Kharazmi University, Tehran, Iran

*Corresponding author's Email: Kobraazimi@yahoo.com

ABSTRACT: The present study aimed to evaluate the impact of ADDIE instructional design and multimedia on learning key skills of futsal. The study method is experimental and is applied in terms of purpose. The study population is all female students of Kharazmi University in first half of academic year 2012-2013 being selected by convenient sampling method as 36 people (in three groups of 12 experimental and control group). The data collection measure to evaluate key skills of futsal is skill tests of Futsal as dribble, Shoot, passing and control as inspired by "physical fitness, skill and mental evaluation tests". The reliability of test is evaluated by split half test. For data analysis, descriptive statistics mean and standard deviation and inference statistics of variance analysis/university covariance is used to test the comparative difference. The study findings show that 1-The students trained by multi-media have high scores mean (performance) compared to the students trained by traditional method. 2-The studies trained by ADDIE model have high scores mean compared to the students learning Futsal by traditional method of key skills.

Key words: Instructional Design, ADDIE Instructional Design Model via Multimedia, Traditional Training, Students.

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INTRODUCTION

Purposeful training requires that the teacher besides required awareness regarding textbook has adequate skill regarding design, teaching, management and its evaluation. Training is via the items a person deals from the past. By progress of communities and the change in learning theories, the necessity of considering this issue is increased. Also, in the current complex and advanced world, to educate skillful force in society, we should rely on instructional system with empowerment of educating skillful and specialized forces of communities (Dick and Carey, 2001).

The definition of training can be changed based on the views of educational theorists but generally training is the set of decisions and measurements taken or implemented in order that students achieve specific instructional goals. These goals as consolidating field are the center of instructional activities and decisions and act as a criterion to determine the success or failure of training, student and teacher (Fardanesh, 2013).

Like any other organized system, training needs previous planning and design as mentioned "instructional design" in education system. Design is a regular method for planning, development; assessment and management of an instructional process and all these elements participate one by one in instructional design (Kemp, 2004).

Thus, instructional design is prescription or prediction of good instructional methods to achieve required changes in knowledge, skills and emotions of learners. Instructional design is a systematic design to be sure of instruction quality as referred to

identification, growth and development and applying specific training methods to achieve definite instructional goals for specific content and specific students (Reigelut, 1983, as cited Fardanesh, 2009).

Although there are many instructional design models in instructional design literature, most of them are based on objective (systematic) and constructive approaches. As ADDIE model is based on objective approach, this study besides explaining systematic instructional design deals with the application of this model in training key skills of Futsal.

System Instructional Design

The formation of system attitude and its application in education namely in instructional planning can prepare the system instructional design models. In this approach, the underlying paradigm is general theory of systems rooted in theoretical works of Bertalanffy and some theorists as Silvern (1965), Barson (1967) applied this theory in education. The system instructional design models are shown by input, process and output (Seels, 1995). The important feature of this model is its linear nature and these stages are formulated as their time sequence is very important (Vrasidas, 2000). The process of instructional design and required activities in each stage is shown in the Figure 1.

The most general model drawing design process with systematic approach is ADDIE model. This model was presented in 1975 by Florida State University and the Army selected it as the main model of instructional planning (Clark, 2006). This model is as follows: Analyze: Detection and evaluation of existing condition; Design: Determining achieving the determined goals; Develop: Selecting media and

required instructional strategies; Implement: Instruction implementation in learning environment;

Evaluate: Evaluation of efficiency and effectiveness of presented instruction by teacher (Rossett, 2006).

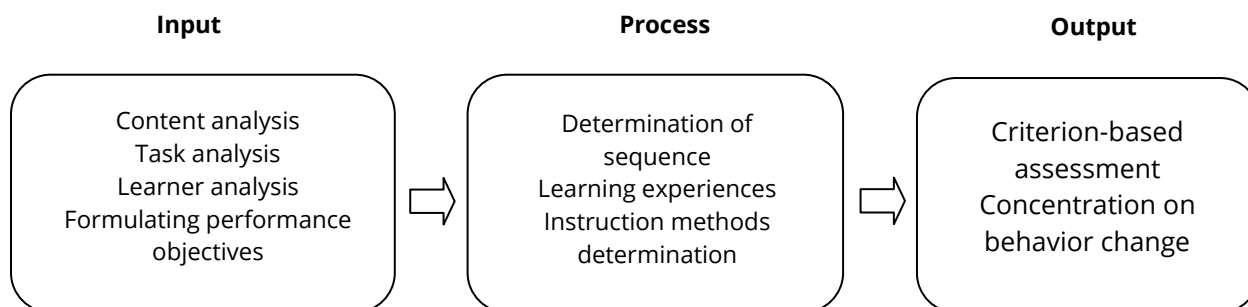


Figure 1. The process of system instruction design (Vrasidas, 2000).

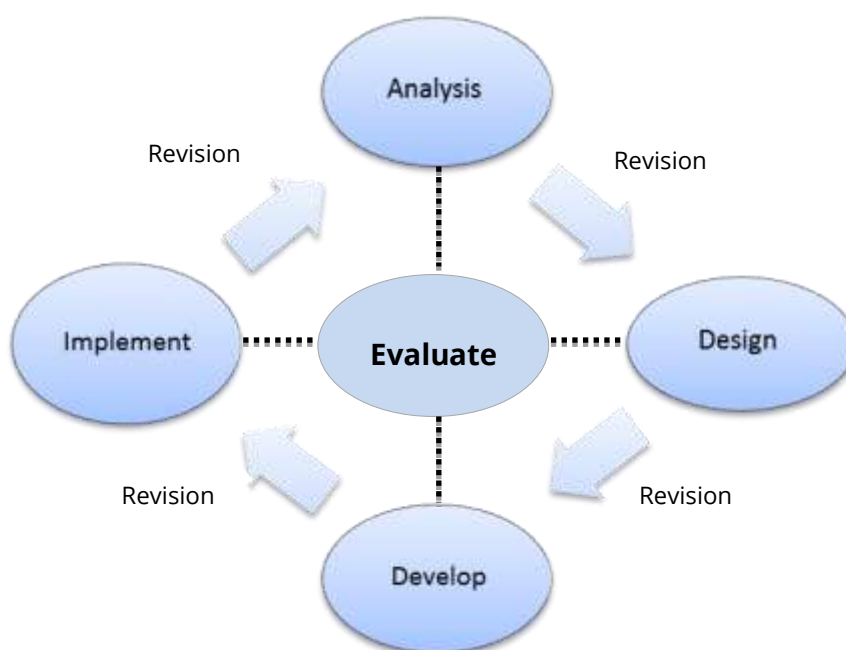


Figure 2. The process of system instruction design model ADDIE (Reiser, 2007)

Thus, any instruction requires a previous plan. This design includes instructional activities and all new applied tools and technologies in instruction process.

New educational technologies allow the teacher transfer many items with attraction and deep effect to students. One of the most important and new educational technologies is multimedia (Barati, 2004). Using multimedia as Film can lead to effective communication between teacher and learner. The true application of media prevents the adverse effect of some communication barriers as distraction and audience encountering. The media can lead to high motivation in learners and easy achieving to educational goals is increased (Amirteimouri, 2003).

Thus, instruction has close and mutual relation with all dimensions of society ranging from culture to economy, politics, industry, citizenship, business. If we view instruction as specialized, we reach a type of

education as our problem and why we use efficient teaching less and not only we less enjoy educational methods, we don't experience deep and stable learning?

In existing educational system, instructional interactions are not improved (Starr, 2003). Learning situations of learners are based on classroom (Kamar, 2007). The aim of instruction is collecting knowledge and memorizing the items by students; deep and stable learning, instructional design and applying new instructional technologies in learning fields higher than knowledge namely in psychological-motor field and physical education are not considered or are rare.

As one of the branches of educational sciences, physical education plays important role in fulfilling education goals of adolescents and children and this field has many physical, cognitive and social benefits as justifying its position in educational system. It is

worth to mention that healthy thought is in healthy body and this important goal is achieved by regular instructional design and using new technologies in sport instruction process.

In addition to creating happiness in human morale, sport can lead to improvement of health and physical power and human behavior is based on the integrity of a person, it means that soul is based on body and body is dependent upon soul. The researches show that physical pains are with psychological disorders and vice versa. To be familiar with this issue, some similar studies are evaluated briefly. Unfortunately, there is no study showing the impact of this model and multimedia on Futsal instruction. Thus, we refer some researches regarding the impact of different instructional design models ADDIE and multimedia.

Shahbeigi (2010) in a study "the impact of instructional design of Merrill and ADDIE on learning and memorizing of epidemiology textbook of students of medical sciences University of Yazd" found the following results: The learning and memorizing of students being trained by instructional design model of Merrill and ADDIE is higher than the students trained by common method of class and textbook. Also, in three methods, over time stability of learning was reduced but this amount was less in presented instruction by Merrill and ADDIE instructional design.

Bayranvand (2007) in a study "the impact of using ADDIE instructional design on academic progress of mathematics" found that : students of experiment group trained by ADDIE model had better performance compared to control group being trained by traditional method and academic achievement motivation of experiment group students is higher than that of control group.

Another study is conducted by Rasuli (2011) as "the impact of instructional multimedia on learning of students in science textbook". The study was conducted on 60 people as pre-test and post-test. The results showed the positive impact of teaching by multimedia.

Lee (2006) conducted a study and applied ADDIE model for multimedia development based on project-based learning. He presented his instruction based on the stages of the presented model and found that ADDIE model is effective as instructional design model for this instructional unit and framework of this model facilitates these projects for learners.

As it was said, the application of sciences and educational technology findings, using instructional design and multimedia in education are the variables receiving much attention from researchers of educational technology and the unavoidable impact of using educational and multimedia design in learning-teaching process and considerable impact of sport on

full physical, mental and social aspects show the importance of this issue. Thus, this study aimed to evaluate the effectiveness of ADDIE instructional design and multimedia on learning key skills of Futsal as passing, shooting, ball control and dribble and the following hypotheses are evaluated:

Instruction via ADDIE instructional design model is effective on learning key skills of Futsal compared to traditional instruction.

Instruction via multimedia is effective on learning key skills of Futsal compared to traditional instruction.

MATERIAL AND METHODS

The present study evaluated the impact of ADDIE instructional design and multi-media on learning key skills of Futsal. The study method is quasi-experimental and based on pre-test and post-test with control group. The study population is all female BA students of Kharazmi University in academic year 2012-2013. The study population is selected by convenient sampling as 36 students and are divided in three equal groups of 12 people by traditional, multimedia and ADDIE methods equally. After attributing sample members to groups, based on the features of each model, an instructional program 90min is presented in 10 sessions.

To evaluate key skills of Futsal, skill tests of Futsal as Dribble, Shooting, Passing and control are used being inspired by the book " physical fitness, skill and psychological assessment tests". At the same time and under similar conditions, pre-test was performed on three groups (12 people). For experiment group (a) learning skills via ADDIE instructional design model, a predesigned plan is implemented in 10 sessions as follows:

First to fourth sessions are dedicated to training different passing, shooting, control or receiving ball. Each session is divided to training and practice and the players practice new skill as paired after learning each skill.

In fifth to ninth session, practice of skills and match with the learnt principles can be performed. Finally, in tenth session, pre-test is performed on players.

Experiment group (b), the players learning skills via instructional multimedia and after performing pre-test, training was presented via multimedia software, the players before entering field were watching Futsal instruction CD in ten sessions for 25 min and then practiced the learnt skill in the field. The skills training was similar to training via ADDIE model, the first four sessions of skills training were via CD and then practice in field and the rest of sessions is dedicated to practice and match. Pre-test is performed in the final session. Control group received traditional training.

In this study based on the study purpose and assumptions in the study purpose descriptive statistical methods (mean and standard deviation) and inferential (variance/ univariate covariance) is used to test difference (comparative) hypotheses. Leven's test is used for homogeneity of variances and Kolmogrov-Smirnov test to evaluate normality of data as one of the assumptions of university covariance analysis. The test validity is performed by the opinion of experts and by writing purposes of instructional course based on the book of "physical fitness, skill and psychological assessment tests", the test stages are raised, then are investigated by 5 experienced coaches in Futsal. Some stages of tests were eliminated and some principles were replaced. Finally, a test was applied including four main skills of Futsal as passing, Shooting, control and Dribble based on the support of experts.

The reliability is performed by split half method and the mean is 94.

RESULTS

36 Students participated in the study as 12 people in instruction group with design model ADDIE, 12 people in multimedia instruction group and 12 people in traditional method training.

The results of descriptive indices in Table 2 show that traditional group in pretest has mean 12.50, multimedia with mean 12.92 and third group based on ADDIE model, the mean is 12.42. In traditional group, multimedia and ADDIE, after applying experiment, it has mean 13.75, 15.08 and 15.58.

Table 1. Instructional Models and Number of Subjects in Each Group.

Name of instructional model	Number of subjects
Traditional	12
Multi-media	12
ADDIE	12

Table 2. Descriptive Indices:

	Traditional group		Multi-media group		ADDIE Group	
	Men	SD	Men	SD	Mean	SD
Pre-test	12.50	2.91	12.92	3.03	12.42	2.61
Post-test	13.75	2.73	15.08	2.43	15.58	1.73

The volume of three groups is 12.

This study applied pre-test before the study and key skills in Futsal learning are measured and after instruction based on traditional model, ADDIE and multimedia education, key skills of Futsal are re-measured. ANCOVA test is used to remove the impact of pre-test to define the required training is effective or not. To respond the hypotheses, descriptive indices, assumptions of covariance analysis and the values of covariance analysis test re used.

Study Hypotheses

- Instruction via ADDIE instructional design model is effective on learning key skills of Futsal compared to traditional training.

- Instruction via multimedia is effective on learning key skills of Futsal compared to traditional training.

ANCOVA analysis is the statistical test in which the impact of pre-test is excluded from dependent variable (learning key skills of Futsal) and based on establishing regression coefficient in the second stage, the difference between groups is dealt. Before performing this test, the required assumptions are reported.

To evaluate the establishment of regression coefficient assumption by covariance analysis, F value shows that regression coefficient ($F_{2,30}=3.20, p>0.05$) are homogenized in three groups (Table 3). This assumption is shown in Figure 1.

Table 3. Covariance analysis

	Sum of squares	df	Mean of squares	F	Significance level
Group	8.51	2	4.25	6.81	0.00
Pre-test	151.32	1	151.32	242.16	0.00
Pre-test*group	4	2	2	3.20	0.06
Error	18.75	30	0.63		

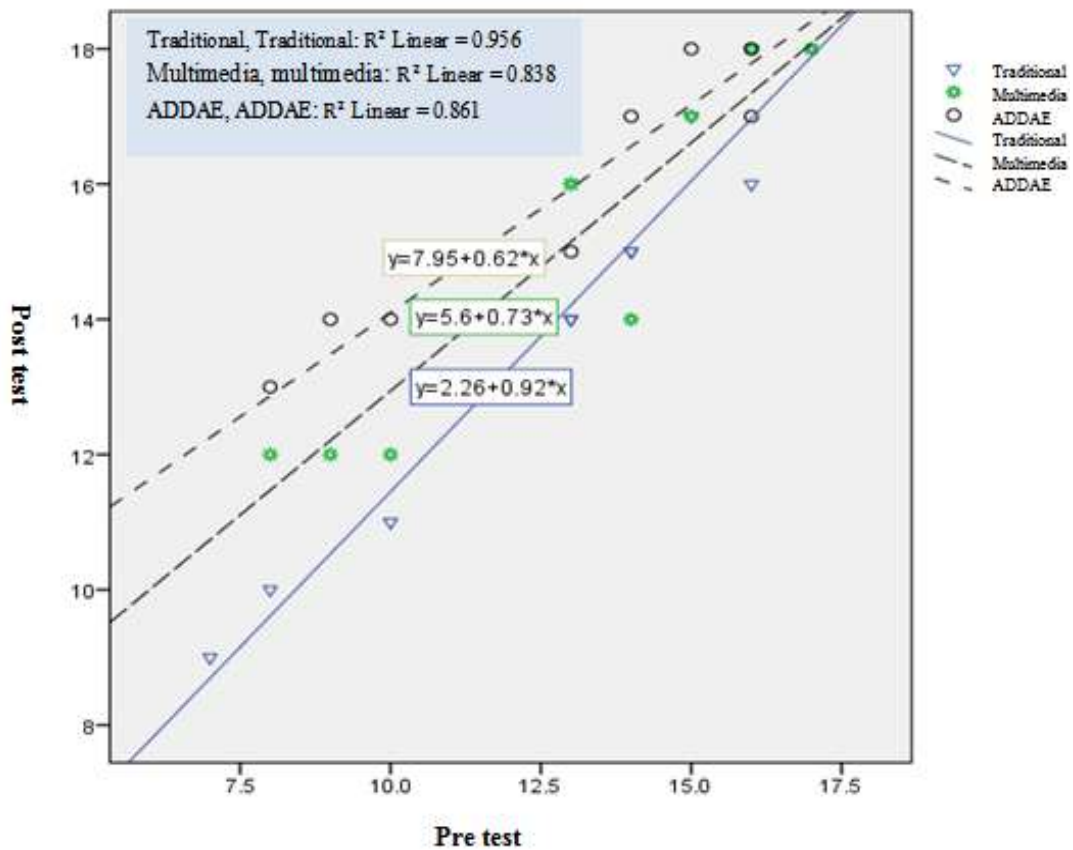


Figure 3. Homogeneity of regression coefficient

Also, covariance analysis test ($F_{1,30}=242.16$, $p<0.00$) regarding correlation between pre-test and post-test is supported. The results of normality (Kolmogrov-Smirnov) showed that in three traditional groups ($Z=0.50$, $p<0.97$), multimedia ($z=0.51$, $p<0.95$) and the group based on ADDIE model, ($z=0.74$, $p<0.63$) the dependent variable distribution is normal and three groups are equal in terms of variance homogeneity ($F_{2,33}=0.85$, $p>0.05$) (Table 4). After being sure of assumptions, univariate covariance analysis is

implemented. The results of covariance analysis (Table 5) showed that there was a significant difference between three groups.

After defining difference by LSD test, we can investigate difference (the numbers in the table of difference between means) and the results of the test (Table 6) showed that traditional group had significant difference with multimedia group and trained group based on ADDIE model. Also, Multimedia group had significant difference with ADDIE Group.

Table 4. Homogeneity of Variance Test (Leven's).

Variable	F	df1	df2	Significance level
Post-test	0.85	2	33	0.43

Table 5. Covariance Analysis (ANCOVA).

Group	Sum of squares	F	Significance level	Effect volume
Group	21.63	15.22	0.00	0.49
Error	22.74			

Table 6. LSD Test.

No.	Group	1	2	3
1	Traditional (control)	0		
2	Multimedia	1.02*	0	
3	ADDIE	1.90*	0.88*	0

Based on the information of Table 6, the comparison of the impact of two methods of teaching regarding public information is significant statistically. Thus, teaching via mobile is effective than traditional teaching method. Based on significance of covariance analysis test, it is inferred that mobile-based teaching compared to traditional method has high effect on learning of public information of students. The third question of study is supported. Mobile-based teaching has high effect compared to traditional method on learning of students.

CONCLUSION

The results of descriptive indices (Table 4-1) showed that group members trained by traditional method in pre-test with mean 12.50 and group members trained by multimedia method had mean 12.92 and it showed the lack of difference between the members of two groups in pre-test. As pre-test is used before study and key skills of learning Futsal are measured and are measured again after training based on traditional model, multimedia and ADDIE, univariate covariance analysis test is used to remove pre-test effect to show the required instruction was effective or not. In response to the first hypothesis, the results of covariance analysis showed that the impact of three methods of instruction on scores of students on key skills of Futsal had significant impact (at level smaller than 0.01). In other words, there was a significant difference between the scores of the students receiving training by three methods of traditional, multimedia and ADDIE. The mean of post-test of traditional and multimedia methods and LSD test showed that the group receiving training by multimedia method had better performance (mean of high scores) than the group training by traditional method. The interaction between instruction method and pre-test scores and simultaneous impact of them on post-test scores of student had not significant impact. One of the major reasons of using instructional multimedia in training and learning process is the role of various senses in learning. This type of training involves more than one sense in learning process and it has high impact on learning. It can be said training by this learning method is maximized via senses. In instructional multimedia, textbooks should be designed as both learner processing channels, 1- visual processing channel, 2- auditory processing channel can be involved. When both visual and auditory materials are used in an instructional media to present curriculum, the learners can learn well. In present study, multimedia instruction method enables the learners to use each of useful media in instruction and have combination of them for more learning. In other words, this

training method enables the learners apply other media as text, voice, image beside film to remove the shortcoming of each of media and apply their visual and auditory senses better for learning and improving key skills of Futsal.

Each of above media are used under specific conditions, For example using text is useful to perceive abstract concepts and image is used for learning and establishing required skills. It is worth to mention that in some cases the display of mentioned skill is realistic with voice and it has good impact on learning skill. This can display skill repeatedly for learner and by watching film many times and its repetition from the learner, the skill is learnt. Such educational method enables the students to observe key skills repeatedly and stop the movie and analyze its various stages and use this capability for much learning and understanding.

REFERENCES

- Amirteimouri, MH. (2003). *Instructional media*. Tehran: Sasan Publishing.
- Barati, A. (2004). *Instructional multimedia design and presenting a proposed model based on constructive approach*. MA thesis. Psychology and Educational sciences. Tehran. Kharazmi University.
- Barson J (1967) *Instructional Systems Development: a Demonstration and Evaluation Project*. US Office of Education, Title II-B project OE 3-16-025. East Lansing, MI: Michigan State University.
- Bayranvand, F. (2009). The effect of instructional analysis, design, development implementation, evaluation (ADDIE) model on academic achievement in mathematics. *Journal of applied psychology*, 3(11): 74-84.
- Clark, D. (2006). *Introduction to Instructional System Design*. Retrieved from: <http://www.nwlink.com/~donclark/hrd/sat1.html>
- Dick, W. and Carey, L. (2001). *The systematic design of instruction* (5th ed.). Allyn & Bacon.
- Fardanesh, H. (2009). *Theoretical foundations of instructional technology*. Tehran: Samt Publishing.
- Fardanesh, H. (2013). *Instructional design foundations, approaches and applications*. Tehran: Samt Publishing.
- Kamar, N. and Ong'ondo, M. (2007). *Challenge of M-learning on social change*. Egerton University. Retrieved from http://www.informatik.uniulm.de/DE/intra/bib/2007/IMCL/papers/76_Final_Paper.
- Kemp, J. E. (2004). *ISU college of Education*. Available: <http://ed.isu.edu/addie>

- Lee, Y. (2006). Applying the ADDIE instructional Design model to multimedia Rich project-based learning Experiences in the Korean classroom. The Department of Instructional Design and Technology. 20 (3): 345-360
- Rasuli, T. (2011). The impact of instructional multimedia on learning of students in Sciences. MA thesis. Psychology and educational Sciences University, Tehran: Kharazmi University.
- Reiser, R. (2007). Trend and Issues in Instructional Design and Technology. New Jersey: Pearson Education Inc.
- Rossett, A. (2006). Instructional Technology. Available: <http://en.wikibooks.org/>
- Seels, B. (1995). Instructional Design Fundamentals. New Jersey. Englewood
- Shahbeigi, F. (2010). The impact of instructional design of Merrill and ADDIE on learning and memorizing Epidemiology of students of Medical Sciences University of Yazd. MA thesis. Psychology and Educational Sciences University. Tehran: Kharazmi University.
- Silvern, L. C. (1965). Basic analysis . Los Angeles: Education and Training Consultants Company.
- Starr, S. (2003). Application of mobile technology in learning & teaching: m-learning, learning & teaching enhancement unit (LTEU). Briefing paper.
- Vrasidas, C. (2000). Constructivism versus objectivism: Implications for interaction, course design, and evaluation in distance education. International Journal of Educational Telecommunications, 6(4), 339-362.