Interaction Increasing Factors: Research on E-learning Content Design[*]

Hülya SOYDAŞ ÇAKIR, [1] **Erhan AKYAZI** [2]

Abstract

Interaction is one of the key elements for learning and it also has a significant role in increasing efficiency in e-learning programs. Several studies indicate that high level of learner and content interaction provided by e-learning programs brings learner satisfaction and achievement. During the learning process, content interaction provides an effective means to reach learning goals. Successful content design and adequate content interaction items are essential to sustain attention, provide motivation, achieve high levels of satisfaction of learning and provide significant increase in learning performance. In this study, perception and expectation of 236 e-learners are examined to observe the outcomes of content design in learning. The items required for content interaction are classified under three main topics as Attention-Motivation, Satisfaction and Learning Performance. The research model is based on how efficient design of these items helps to increase learner and content interaction. The increase of interaction will result in learner achievement. Therefore, the efficiency of the e-learning process will correlate with higher levels of learner-content interaction. Adequate and efficient content design contributes to effective learning.

Keywords: Interaction, information technologies, e-learning, content design

1. INTRODUCTION

Active learning methods that are beneficial for the learner are preferred in order to increase the efficiency in education. Interaction plays an important role in e-learning applications in order to increase effectiveness of education. In this study, it is discussed how to increase the interaction required for e-learning to become more efficient for the learner. The importance of content interaction for increasing learner success in the e-learning environment is being investigated. Accepting that an e-course with sufficient interactive e-learning content is increasing the success of the learner, the perception of items required for content interaction are examined.

High level of interaction makes it possible to gain attention, to provide motivation, to achieve high levels of satisfaction and provide significant increases in learning performance. Interaction provides active learner participation in the instructional and performance improvement process. Interaction allows learners to adapt learning experiences to meet their own specific abilities and needs. It enables the new ideas to be classified, to be transferred to present concept frameworks and promotes intrinsic motivation for the learner (Wagner, 1997). Instructional interaction is defined as a sequence of events that is engaging the learner in meaningful activity, providing feedback and influencing learning (Shank, 2003). Interaction defines all attitudes of individuals and groups with each other. It is commonly defined as a continually evolving process like communication (Simpson & Galbo, 1986). According to Jonassen, interaction points to activity between two organisms (Jonassen, 1988). Being interactive meant that the user could intervene and change content of the environment they were accessing (Lister, Dovey, Giddings, Grant & Kelly, 2009). Two properties were identified for

interaction; the direction of communication and control over the communication process. These features; adaptable and applicable to explain the different levels of human-human, human-system and human-content interaction (Jones, 2003). Interaction can take place in a wide range of information and communication technologies, from low degree such as the use of interactive television or touch screens to high-level applications such as virtual reality where multiple functions are used. The user entering a command with a keyboard or making a selection with the mouse may create a certain restriction for the interaction that may occur. The selections can only mark operations previously programmed on the computer. Although technological elements are pointed out from this perspective, interaction always has a social and communicative dimension (Andrews & Haythornthwaite, 2002). Interactivity is process related and is a variable property of communication settings, not a characteristic of the medium. It is the dimension of the relationship between message series and in particular the closeness of subsequent messages to the previous ones. Researchers state that communication is mostly related to the aim of interaction. The interaction primarily places shared interpretive contexts. Interactivity is associated with the dimensions of acceptance and satisfaction and also related to items such as motivation, learning and cognition (Rafaeli & Sudweeks, 1997).

E-learning can be interpreted as an innovative approach for the presentation of student-centered, interactive, facilitative and adequately designed learning environment to anyone, anytime and anywhere using the features and resources of various digital technologies. Innovative learning methods are taking place in our lives in addition to traditional education approaches. E-learning is considered as a product of these new innovative learning methods by the support of digital technologies (Khan, 2005). Interactions have positive impact on learners' sense of community and continuous use intention of e-learning platforms (Luo, Zhang & Qi, 2017). E-learning courses should be designed to facilitate more targeted, intentional and engaging interactions (Abrami, Bernard, Bures, Borokhovski & Tamim, 2010). Content interactions should be used adequately to provide quality learning experiences.

1.1. Content Design

Content is a central element for each e-learning program. Some key considerations should be considered when developing an e-learning program for selection of content type. Designing learning materials for learners using new technologies will not be the same as designing lecture notes for traditional education. Attention should be paid to the format and appropriate use of psychology.

The research findings emphasize that the main factor that improves students' learning is the use of technology rather than technology itself. The content of a well-designed interaction carries learning from recognition and understanding to higher levels such as analysis, synthesis and evaluation (Erlich, 2009). Interaction is regarded as part of a system in which the learner is not only a passive information receiver, but also a contact with the learning material that responds to human activities. Interaction enables active learner involvement in the process of teaching, training and performance development. It allows learners to adapt their learning experiences to meet their own abilities and needs. Giving responsibility to the learners also promotes participation and initiation of interactions (Weiser, Blau & Eshet-Alkalai, 2018). The most practical method of designing an effective interactive learning experience is to consider the goals and objectives of the specific learning experience. In this respect, it is much more convenient and effective to start choosing the strategies and tactics necessary to achieve the desired results in learning experience. So, interaction can serve as a product of clearly conceptualized, well-designed and well-developed training. It enables classifying new ideas and transferring them to existing concept frameworks, providing internal motivation for learners (Wagner, 1997). Applications that allow the knowledge to be permanent and to be connected with real life serve for the purpose of learning. Many researches emphasize the importance of active participation and collaboration among learners to ensure effectiveness in online learning (Swan, Shen & Hiltz, 2006).

Figure 1. Educational objectives of revised Bloom's Taxonomy

The collaboration of instructional designers and project team is essential in the process of successful content development. Content design needs to be done with effective planning with interface, navigation, technical elements and others. Learning content should be motivating and attractive, clear and appropriate to the level of education provided. Designing the content by using activities helps to increase learner engagement (Rayens & Ellis, 2018). Accessible resources and communication activities appropriately planned between learners and instructors contribute to learning.

1.2. Relationship between Content and Interaction

Basic items in the interaction can be defined as content, process and structure. Content refers to the topic or task that people are working on. The procedure expresses the emotional, intellectual and behavioral dynamics among the participants. When content is more easily identifiable and reviewable it receives more attention (Jaques & Salmon, 2007). The interactivity of the courses is an important feature including techniques that prompt high psychological engagement for learning (Calvin & Mayer, 2016).

Content is one of the basic elements of a course design. Learners may have perception about the activities they encounter with the content. They report high levels of satisfaction in the courses those they think well designed. Diversity and activities in content should be consciously addressed in order to support interactions that make learning enjoyable (Wilson & Albion, 2009). Learners who like practicing prefer activities that include real-life experiences, simulations and similar exercises. For the learners who prefer visual elements, applications such as virtual tours, animations and concept mapping are effective. Consequently, when content is designed and distributed sufficiently, it will become more enriching and engaging for learners (Bonk & Zhang, 2008). In education, different methods are used for course transfer as Bloom's Taxonomy, Keller's ARCS model and Gagne's Nine Events which are widely known ones. These models provide guidance in creating an interactive content. Learning objectives are summarized under three major domains by Benjamin Bloom as cognitive, psychomotor and affective domains. Six categories in the cognitive domain as knowledge, comprehension, application, analysis, synthesis and evaluation form Bloom's hierarchical structure (Bloom, 1956). In 2001, a group of psychologists, theorists, researchers and specialists published a revision of Bloom's Taxonomy pointing to a more dynamic conception shown in Figure 1 (Anderson & Krathwohl, 2001). The content created using these categories will include different instructional activities.
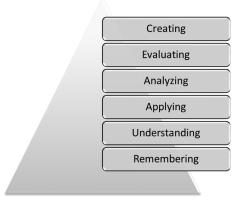
Figure 1. Educational objectives of revised Bloom's Taxonomy (derived from Anderson & Krathwohl, 2001, p. 268)

The ARCS Model, which was developed by Keller based on studies on motivation and instructional design, consists of four main categories that take into account motivation and performance in the learning process (Figure 2) (Keller, 1987).
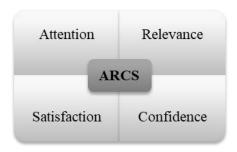

Figure 2. Categories of ARCS Model

Engaging learner with full attention is an essential feature of learning. Content of the learning material should therefore be designed as to arouse curiosity. Relevance is also equally important for the motivation of the learner, and the learner should believe that the content for learning is relevant to their context. It should also be ensured that the content meets the learning objectives. Other than these requirements, expectations from the learner should be established very clearly, and constructive feedback should be provided to build confidence in the learner. In order to serve appropriate learning content to each learner adaptive e-learning environments should be designed (Premlatha & Geetha, 2015). The content design should enable the learner to apply knowledge while acquiring new skills. To keep the learner motivated, it is useful to experiment different content supported with simulations, applications and games. The learners can be rewarded by praise and certification when target performance is achieved.

Integrating interactive applications into syllabus design to improve content may help increase motivation and facilitate learning outcomes. Modified content with interactive applications should encompass clear objectives, relevant examples and appropriate content activities which will affect and improve learner performance by facilitating learning (Chua & Montalbo, 2014; Keller, 2010).

In his book published in 1965, Gagne created a nine-step process which he coined as Nine Events of Instruction to describe different teaching methodology These nine steps are used for interaction in syllabus design in the conventional approach to achieve learning (Figure 3). The same nine steps can also be applied to interactive applications. A well-defined instructional design approach assists the production of effective learning materials (Hirumi, 2002).
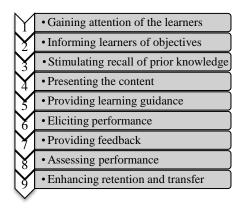

Figure 3. Gagne's Nine Events of Instruction (Gagne, Briggs & Wager, 1992)

Learning experience should be engaging to guarantee learner interest in the learning process. Engagement in the learning process enables the learner to apply their knowledge, transfer it into the real world and therefore, retrieve the information far more easily (Schone, 2007). The major prerequisite of learner engagement is successful content design. E-learners report higher levels of satisfaction if they consider the course to be well-designed. Therefore, it is essential that content design conforms to basic methodology principles of teaching which is connecting learning objectives with material design. In order to promote interaction, content should be entertaining and include a variety of activities.

2. METHOD

This research is held to examine and evaluate the perceptions and attitudes of the e-learners toward content interaction increasing factors in e-learning programs. The relationship between proper content design and sufficient content interaction levels are asked to the participants under different definitions.

In the study, undergraduate and graduate students attending to an e-learning course were selected as the research universe. A survey research was prepared in order to evaluate the perception of e-learners. Participants were expected to be attending at least one e-course and to answer research questions for a particular e-course they have attended. Students were contacted one-to-one and asked to fill in questionnaires consisting of four leaflets or to participate online in the questionnaire loaded in the Marmara University Survey System. 247 students attending an e-learning course participated in the research. The questionnaire form of 11 of the students participating in the study was excluded from the evaluation due to incomplete or incorrect completion. The answers of the remaining 236 participants were analyzed and interpreted. The valid questionnaires participating in the study are analyzed by SPSS (Statistical Packages for Social Sciences) software. Descriptive findings have been presented and these findings were first evaluated by the demographic characteristics of the learners. Descriptive statistics were used to analyze the data. Then, the analysis findings of the research were presented and different tests were used for the advanced analysis.

Survey study has been prepared in accordance with the purpose of the research to be conducted. The literature and research on content interaction in e-learning were used for the survey questions. As a result of the literature review, the interaction items are summarized under 3 main topics (Table 1). Those topics are, Attention- Motivation, Satisfaction and Learning Performance. The main topics are not declared to the participants, but only the sub-items are asked to be identified. Totally 37 sub-items are asked for the opinion of learners to determine at which level each item provides interaction in e-learning. Then the learners are asked to clarify that at which level the same item is found in their e-learning program. They verified those levels by six grades as (1) Any, (2) Few, (3) Some, (4) Enough, (5) Much, (6) Totally.

29

Table 1. Interaction Items and Sources

Attention - Motivation Items:	Sources (Authors & Organisations):
Having user-friendly content design	
Allowing learners developing ideas by content applications	
Making learner to pay attention and remain engaged by content design	
Having sufficient time and attention of the instructor in the program	Allen (2008)
Arousing curiosity of the learner by content design (e.g. audio-music, image-video)	Chickering & Ehrmann (1996) Driscoll & Carliner (2005) Hannafin & Hooper (1989) Holmberg (1995)
Evaluating learning by using some applications like tests, etc.	Ice, Akyol, Swan & Richardson (2010) Keller (1987)
Using social media applications	Khan (2005)
Arousing desire in learning process by content applications	Pallof & Pratt (2005)
Arousing confidence of the learner by the feedback of true/false answers or by similar applications	Salmon (2002) Spratt(2009)
Satisfying the student's sense of winning and rewarding	Sharp & Huett (2006)
Providing scheduling opportunity for the learner (individual/academic calendar)	Tu & Yen (2007) Wagner (1997)

Satisfaction Items:	Sources (Authors & Organisations):
Ease of use	
Proper processing of course materials	
Reaching technical support by using different instruments (e.g. phone, e-mail)	Allen (2003)
Meeting expectations by the represented content	Blackboard Inc.(2011)
Being of the content close related to the subject	Hillman, Willis & Gunawerda (1994) Jung, Choi,
Having subjects complementing each other	Lim & Leem (2002)
Sufficiency of the including content	Lewis & Whitlock (2003)
Having sufficient feedbacks	Novitzki (2009)
Having on-time feedbacks	Roblyer & Wiencke (2004)
Feeling comfortable while using the content	Sun, Tsai, Finger, Chen & Yeh (2008) Swan (2001)
Reaching to content whenever required	Thurmond & Wambach (2004)
Availability of reaching to content again if desired	UWG-DDEC (2006)
Availability of the content to reach much information (e.g. links, rich media content)	Wilson (2007)
Existence of the content applications having opportunities to make practice (e.g. exercises, projects)	
Designing of the content suitable to the e-learning environment	

30

Learning Performance Items:	Sources (Authors & Organisations):
Giving the objectives and requirements at the beginning of the course in order to succeed	
Using of the knowledge gained from the course in the following applications	Ally (2004)
Using content applications those enable the learner for recalling of the prior knowledge	Blackboard Inc.(2009) Chickering &Ehrmann (1996)
Using applications for understanding the subject better (e.g. animation, simulation)	Dabbagh (2007) Gagne (1985)
Giving opportunity for different learning styles in the program	Hannafin & Hooper (1989)
Providing performance evaluation of the learner by the program (e.g. evaluation exams, tests)	Naidu (2006) Schone (2007)
Providing learner self controlled learning by making their own choices	Shank (2003)
Enabling to explore by content	Stevens & Viles (2006)
Directing learner to research by content	Swan, Shen & Hiltz (2006) Urdan & Weggen (2000)
Increasing attention and retention rates by content	Van Dam (2007)
Forming desire to succeed in the program	Wilson & Albion (2009)

3. FINDINGS

E-learners are aged between 18 and 48 participating in the research. The average age of the participants is nearly 27. There are 96 females (nearly 41%) and 140 males (nearly 59%) e-learners. 72 (30,5%) participants are married, and 164 (69,5%) of them are single due to the level of average age. The participants are asked for their internet usage familiarity. Most of them are using the internet 3-5 hours or more in a day. Less than 20% of the learners are using it less than 1 or 2 hours. For most of the participants, the program which they are attending is their first experience of e-learning. Only 31,8% of them have attended any other e-learning programs in the past. When they are asked if they prefer to attend another e-learning course, nearly 75% of the learners inform positive attitude toward attending any other e-learning programs in the future. The e-learners are asked how much they are satisfied with the interaction level of the content of their e-course. They inform that they are satisfied with interaction level of their e-learning program with majority frequency (nearly 40%). 30% of them inform that they are less satisfied with the interaction level of the course. Only 10% of the participants are totally not satisfied with the interaction level of their e-learning program. When the e-learners are asked if the content of their course is appropriate to be designed as an e-course, most of the learners (68%) accept that the course content is appropriate for being designed as an e-learning course. In the research, participants are asked whether they would recommend their e-course to other students, nearly 37% of the participants inform that they strongly recommend and 20% of them inform that they highly recommend their e-learning program to others.

Cronbach's coefficient (α) is used to test reliability and the value 0.80≤ α< 1.00 is considered to be highly reliable. The results for each interaction item of the study prove that research is quite reliable (Table 2).

Table 2. Reliability Statistics

	Cronbach's Alpha	N of Items
Attention-Motivation	.932	11
Satisfaction	.958	15
Learning Performance	.955	11

By the use of correlation analysis remarkable accepted hypotheses are summarized. As one of the accepted hypotheses by the result of Chi-square test at 0.001 level of significance, there is a positive correlation between satisfaction degree with the content interaction level of the e-course and the desire to participate in another e-learning program later. It is observed that those who are satisfied with the content interaction level of the taken e-course have a positive attitude for joining another e-learning program later.

As another hypothesis accepted by the result of Chi-square test at 0.001 level of significance, there is a relationship between the degree of content interaction level satisfaction of the e-course and the degree of recommending e-learning program to the others. Those who were not quite satisfied with the content interaction level of the e-learning program they received, state that they will either not recommend the program or recommend it at a significantly low level. Those, on the other hand, who were highly satisfied with the content interaction level of the course would strongly recommend the program.

There is also a relationship between the degree of satisfaction of the content interaction level of the e-course and the degree to which the course content is appropriate to be designed as an e-learning program as an accepted hypothesis. The result of Chi-square test is at 0.001 level of significance. The majority of the participants who were not satisfied with the content interaction degree of e-learning believe that the content of the lesson is not appropriate for e-learning. On the

contrary, the participants who were satisfied with the content interaction degree of the e-learning program, believe that the content of the lesson is appropriate for e-learning.

According to the research, the satisfaction degree of e-course content interaction level is highly low between ages 18 and 23 (Table 3). Positive attitude to the e-learning programs tends to increase as the age of participants increases. There is a correlation between age groups and the agreement of that content applications increases interaction (Table 4). With the growth of age, the attitude to e-learning programs changes. Post-graduate programs being designed much detailed and much concerned about learners' needs are one of the factors increasing satisfaction in elder ages. E-courses which have poor interaction levels are considered as boring by the learners. Using ordinary content causes loss of attention. Young learners pointed out those negative designs and proved the importance of content interaction.

Table 3. Cross results for the difference between satisfaction degree of e-learning content interaction and different age groups

		How much are you satisfied with the content interaction level of this e-course?					Total
		Any	**Few**	**Some**	**Enough**	**Much-Completely**	
Age Group	18-23	20	18	15	24	8	85
	24-30	3	9	19	43	19	93
	31 and over	1	3	8	30	16	58
Total		24	30	42	97	43	236

Table 4. The analysis of correlation between satisfaction degree of e-learning content interaction and different age groups

	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	44,613	8	0,000
Likelihood Ratio	45,045	8	0,000
Linear-by-Linear Association	36,513	1	0,000
N of Valid Cases	236		

The research indicates a significant difference between the importance of items to provide interaction in e-learning and the existence of the same item in the learners' present e-courses. The learners agree that the items under the topics of Attention-Motivation, Satisfaction and Learning Performance provide interaction in e-learning programs. Attention and motivation have to be provided during the process as learners voted in the research.

3.1. Difference Analysis of Interaction Increasing Factors

Interaction factors are analysed through Paired-samples t test in the research. Table 5 demonstrates the standard and average deviation values for 37 factors under "opinion" and "current situation" columns, the "t" value of test results and the "P" value of whether any different results of the test results are meaningful or not.

The result of the analysis indicates that for all the given factors of 0.001 significance level, there is a difference between "opinion" and "current situation". There is measurable distinction between the factors that participants believe contributes to e-learning program and that the same factor takes place in the e-learning program they received.

Table 5. Difference analysis of interaction increasing factors

		(Opinion)			(Current Situation)				
		"To what extent do you agree that this item provides interaction in e-learning?"			"To what extent is this item included in your e-learning program?"				
		Mean	N	Standart Deviation	Mean	N	Standart Deviation	t	p
1.	Having user-friendly content design	4,56	236	1,138	3,48	236	1,232	13,063	0,000
2.	Allowing learners developing ideas by content applications	4,47	236	1,12	3,33	236	1,21	13,192	0,000
3.	Making learner to pay attention and remain engaged by content design	4,68	236	1,143	3,33	236	1,221	15,39	0,000
4.	Having sufficient time and attention of the instructor in the program	4,8	236	1,08	3,64	236	1,231	13,112	0,000
5.	Arousing curiosity of the learner by content design (e.g. audio-music, image-video)	4,87	236	1,092	3,25	236	1,261	16,785	0,000
6.	Evaluating learning by using some applications like tests, etc.	4,54	236	1,089	3,36	236	1,231	14,73	0,000
7.	Using social media applications	4,56	236	1,196	3,06	236	1,37	16,242	0,000
8.	Arousing desire in the learning process by content applications	4,78	236	1,115	3,36	236	1,252	15,278	0,000
9.	Arousing confidence of the learner by the feedback of true/false answers or by similar applications	4,67	236	1,159	3,29	236	1,318	15,522	0,000
10.	Satisfying the student's sense of winning and rewarding	4,4	236	1,27	3	236	1,348	15,397	0,000
11.	Providing scheduling opportunity for the learner (individual/academic calendar)	4,53	236	1,139	3,61	236	1,346	10,283	0,000
12.	Ease of use	4,86	236	1,2	3,92	236	1,279	10,944	0,000
13.	Proper processing of course materials	4,84	236	1,248	3,81	236	1,363	11,71	0,000
14.	Reaching technical support by using different instruments (e.g. phone, e-mail)	4,85	236	1,073	3,64	236	1,279	13,373	0,000
15.	Meeting expectations by the represented content	4,84	236	1,137	3,68	236	1,206	13,812	0,000
16.	Being of the content close related to the subject	5	236	0,954	4,07	236	1,197	12,784	0,000
17.	Having subjects complementing each other	4,86	236	0,98	4	236	1,137	12,306	0,000
18.	Sufficiency of the including content	4,94	236	1,068	3,69	236	1,207	14,504	0,000
19.	Having sufficient feedbacks	4,76	236	1,209	3,47	236	1,312	14,086	0,000
20.	Having on-time feedbacks	4,7	236	1,226	3,42	236	1,311	13,565	0,000
21.	Feeling comfortable while using the content	4,84	236	1,087	3,96	236	1,266	11,212	0,000
22.	Reaching to content whenever required	5,03	236	1,099	4,17	236	1,235	11,348	0,000
23.	Availability of reaching to content again if desired	4,99	236	1,074	4,22	236	1,232	10,062	0,000
24.	Availability of the content to reach much information (e.g. links, rich media content)	4,89	236	1,113	3,36	236	1,245	16,407	0,000
25.	Existence of the content applications having opportunities to make practice (e.g. exercises, projects)	4,84	236	1,199	3,25	236	1,311	16,502	0,000
26.	Designing of the content suitable to e-learning environment	5,04	236	1,131	3,66	236	1,218	15,436	0,000
27.	Giving the objectives and requirements at the beginning of the course in order to succeed	4,5	236	1,208	3,52	236	1,27	12,341	0,000
28.	Using of the knowledge gained from the course in the following applications	4,58	236	1,234	3,58	236	1,307	12,344	0,000
29.	Using content applications those enable the learner for recalling of the prior knowledge	4,64	236	1,123	3,53	236	1,273	13,161	0,000

33

30.	Using applications for understanding the subject better (e.g. animation, simulation)	4,82	236	1,211	3,09	236	1,354	17,122	0,000
31.	Giving opportunity for different learning styles in the program	4,34	236	1,27	3	236	1,322	15,156	0,000
32.	Providing performance evaluation of the learner by the program (e.g. evaluation exams, tests)	4,54	236	1,2	3,41	236	1,303	13,761	0,000
33.	Providing learner self controlled learning by making their own choices	4,48	236	1,218	3,31	236	1,288	13,332	0,000
34.	Enabling to explore by content	4,78	236	1,104	3,26	236	1,303	15,818	0,000
35.	Directing learner to research by content	4,76	236	1,169	3,34	236	1,358	14,654	0,000
36.	Increasing attention and retention rates by content	4,8	236	1,185	3,33	236	1,308	14,973	0,000
37.	Forming desire to succeed in the program	4,8	236	1,209	3,56	236	1,378	13,257	0,000

In this research, total score of effectiveness of contribution to e-learning interaction and the score of attending the e-learning program have been taken into consideration to calculate the content interaction factors under the three categories. All these scores have been compared to Sample Pairs t-tests. The results under Opinion are demonstrated as (A) and results under Current Situation are indicated as (B). Total scores seem to differentiate according to 0.001 meaningfulness level. Although participants think that Attention-Motivation, Satisfaction and Learning Performance items provide interaction in e-learning, there is a significant difference between their views that they are included in the e-learning program (Table 6).

Table 6. Analysis of score differences in Opinion and Current Situation

	Mean	Standart Deviation	Standart Deviation Mean	t	Significance
A. Attention-Motivation Total	4,6252	0,88043	0,05731	19,101	0,000
B. Attention-Motivation Total	3,3363	0,99659	0,06487		
A. Satisfaction Total	4,8856	0,88961	0,5791	17,774	0,000
B. Satisfaction Total	3,7537	0,97309	0,06334		
A. Learning Performance Total	4,6402	0,99217	0,99217	17,998	0,000
B. Learning Performance Total	3,3552	1,10354	1,10354		

In this research, scores of interaction factors of Attention-Motivation, Satisfaction and Learning Performance under "Opinion" and "Current Situation" have been analysed separately based on different variables. All the scores for each group have then been evaluated through Independent Sample Pair t-test to conclude whether there is a difference between participants who would like to attend another e-learning program and participants who would not like. Research finding suggests significant difference between participants who would like to attend another e-learning program and participants who would not like to under total interaction scores of Attention-Motivation, Satisfaction and Learning Performance of "Opinion" and "Current Situation". Those who would like to attend another e-learning program seem to agree more than those who would not like to further attend an e-learning program in that all items provide interaction in e-learning. The total scores of descriptive finding for different age groups for current e-program have further been tested via One-way ANOVA to see whether there are any differences between age groups.

34

Table 7. Difference analysis of "Current Situation" factors and different age groups

ANOVA

Current Situation Attention-Motivation Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39,32	2	19,66	23,603	0,000
Within Groups	194,082	233	0,833		
Total	233,402	235			

Current Situation Satisfaction Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41,757	2	20,878	26,911	0,000
Within Groups	180,768	233	0,776		
Total	222,525	235			

Current Situation Learning Performance Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	44,409	2	22,204	21,399	0,000
Within Groups	241,773	233	1,038		
Total	286,181	235			

The test results reveal that there is a significance between total scores of interaction factors of Attention-Motivation, Satisfaction and Learning Performance under "Current Situation" among different age groups (Table 7). Compared to all participants, learners between the ages of 18-23 claimed that interaction items were less involved in their e-learning program. In a similar manner, Attention-Motivation, Satisfaction and Learning Performance items under "Opinion" were tested through One-way ANOVA to search whether there were any differences among different age groups or not. Test results indicated that participants between the ages of 18-23 agreed less with the idea that content applications were increasing interaction compared to other age groups. Higher age groups have a different attitude towards e-learning programs, mainly, they conveyed more satisfaction if post-graduate programs were prepared in more detail and learner needs were taken more into consideration.

3.2. Analysis of Content Interaction

In the last part of the research, learners were asked how much of the commonly used interactive applications were contributing to interaction in e-learning (Table 8). The responses were analysed through Friedman Test to be able to rank the applications (Table 9).

Table 8: Content Interaction Application Ranking

Content Interaction Application	Mean Rank
Visual, video, presentation apps	4,32
Providing efficient and on time feedback	4,29
Click for further information	4,11
Technical support	3,98
Various simulations	3,81
Dynamic links within and outside the program	3,79
Various formats of evaluations	3,70

35

Table 9. Friedman Test Statistical Table of content interaction applications

N	236
Chi-Square	26,791
df	6
Asymp. Sig.	,000

Analysis results demonstrate that visual, video and presentation applications get the highest mean rank. The lowest one is the various formats of evaluation. Factors that increase content interaction in e-learning are classified as Attention-Motivation, Satisfaction and Learning Performance. As a result of the research, there is a significant difference between any interaction item that learners believe that it contributes to interaction in e-learning and the status of the same item in their e-course. The fact that Attention-Motivation, Satisfaction and Learning Performance factors provide interaction in e-learning falls into the "enough-much" band. Learners also emphasize the importance of content design in e-learning programs. Among these factors, learners support that attention and motivation are especially important and should be sustainable throughout the program. The item which learners believe provide highest interaction under Attention-Motivation factor is its ability to arouse curiosity which can be maintained through the use of applications such as sound, music, visuals and videos. It is deliberately important for learners that the instructor in the program allocates enough time and attention. Learners strongly agree that content interaction highly contributes to maintaining interaction through arousing the will to learn during the program process. Other factors that increase interaction in e-learning can be listed as; content design is interesting and continuous, feedback for correct and wrong answers is confidence building, content design is user friendly and social media applications are somehow adapted in the program.

Learners seemed to agree with the fact that the same Attention-Motivation factors in their e-learning program was in the "some-enough" band. They believe that gain and reward after the program was not satisfactory enough. Use of social media in the present e-learning programs is not efficient yet either. Learners do not find the interest arousal level of the existing programs very high. Feedback mechanisms do not tend to build confidence in learners. Similarly, learners claimed that providing an outlet for opinion forming, that the design is interesting and continuous, that it helps create awareness in the learner about their improvement, and that it is user friendly regarding Attention-Motivation factors where content design dominates turned out to be a little higher than the mean average. The item regarding providing the student with the opportunity of careful planning and scheduling and the fact that instructors allocate enough time and attention although has the highest mean average, it still below the desired level.

The mean average of agreeing with the fact that 15 technical items affect interaction in e-learning under satisfaction band is slightly higher than those under Attention-Motivation band. Students highly agree that the following items in the given order strongly affect interaction in e-learning; content design is in accordance with the e-learning environment, the content is accessible and the content is closely related with the topic. If all these items are provided, it is believed that content interaction will improve. The items that most learners agreed would highly contribute to interaction in e-learning are as availability of reaching to content again if desired, sufficiency of the including content, availability of the content to reach much information, proper processing of course materials, having subjects complementing each other, reaching technical support by using different instruments, meeting expectations by the represented content, feeling comfortable while using the content, existence of the content applications having opportunities to make practice. Finding these items reflecting satisfaction in the current e-learning program ranked in "much" band. From the same list, the items of highest mean average are; availability of reaching to content again if desired, reaching to content whenever required, being of the content close related to the subject and having subjects

complementing each other. Research results suggest that these four items ranked higher than the others in e-learning program.

Learners in the research believe that factors under Learning Performance contribute to interaction in the "enough-much" band. In this group, it is accepted that use of animations to explain topics and the design of the course aimed to maintain and sustain interest will provide intrinsic motivation which will increase the interaction. The item under learning performance with the lowest mean average is that, e-learning addresses different learning styles, as they are not sufficiently embedded into the program. Among the 11 items under this title, the least addressed item is related to giving opportunity for different learning styles. Similarly, applications used for explaining topics and many other factors of learning performance seem to be under the expectations.

In brief, learners agree that factors increasing Attention-Motivation, Satisfaction and Learning Performance positively influence content interaction. However, they do not rank highly in terms of being present in the program. Learners are quite aware that content interaction increasing factors are very important in e-learning programs. They hold the expectation that e-learning programs should be designed within the framework of their own syllabus with high content interaction.

4. DISCUSSION and CONCLUSION

E-learning is widely used in many graduate and post-graduate programs as well as distance education and as a portal of learning for all age groups supporting the opportunity of lifelong learning. Learners are more active and autonomous that they can plan on their own, have confidence and are open to innovations by e-learning applications. Such applications provide variation in learning by learning environment, materials, methods used and distribution. Executing a class in the digital environment does not only require technological infrastructure but it also requires a new design (Allen, 2008; Khan, 2005). The course and content design should be considered in detail as the main steps in the e-learning process for the achievement of both learner and institution. Interaction is a key concept in e-learning process providing efficiency and qualified learning experience (Swan, 2001; Weiser et al., 2018; Wilson, 2007).

Learner-content interaction contributes to learning and success in the e-learning environment (Erlich, 2009; Luo et al. 2017; Thurmond & Wambach, 2004). In e-learning environments, presenting a course in conventional methods where information is presented isolated, will be conceived as boring and meaningless. An e-learning program should never mean transferring an existing course into a digital platform without being redesigned. It will be more advantageous if interaction element is used in such a way that learner is interested, motivated, content and demonstrates improvement in performance. Design has a prominent effect on encouraging the participant to learn more (Chua & Montalbo, 2014; Hirumi 2002). Applications which motivate and satisfy the participant during the learning process will be beneficial. With the help of content interaction, it is possible to retain information. With the positive contribution of interaction, information can easily be stored in memory and recalled when the same information is desired. Learner motivation can similarly be maintained through content interaction (Ally; 2004; Keller, 2010; Rayens & Ellis, 2018). Fluent and flexible course flow with adequate content design provide efficient learning experiences. Considering the positive contributions of active learning for the learner, content interaction applications in e-learning should be carefully arranged.

As a result of the research, learners have positive attitude towards e-learning. However, as factors providing content interaction are not yet at the desired level, learners tend to have a less positive attitude towards current e-courses. The more widespread and appropriate use of content interaction items will be useful in eliminating dissatisfaction. Programs with structures of interactive e-learning content provide success for institutions, instructors and learners. It is crucial to consider content interaction in design and dissemination of the course. Content design should be done with an

expert team and all conditions should be met for the interaction. Learners should be encouraged to learn and allowed to be more active in the learning process in order to create efficient e-learning programs.

5. REFERENCES

Abrami, P. C., Bernard, R. M, Bures, E. M., Borokhovski, E. & Tamim, R. (2010, July). Interaction in distance education and online learning: Using evidence and theory to improve practice. The Evolution from Distance Education to Distributed Learning 2010 Research Symposium, Bloomington, Indiana, July 20-23.

Allen, M. W. (2003). Michael Allen's guide to e-learning: Building interactive, fun and effective learning programs for any company. New Jersey, USA: John Willey & Sons, Inc.

Allen, M. W. (2008). *Best practices in online course development*. In Handbook for workplace learning proffessionals (pp. 251-270). In E. Biech (Ed.), The American Society for Training & Development (ASTD), Maryland: United Book Press.

Ally, M. (2004). *Foundations of educational theory for online learning*, In T. Anderson & F. Elloumi (Eds), Theory and practice of online learning (pp. 3-31), Canada: Athabasca University.

Al-Rawahi, N. M., & Al-Balushi, S. M. (2015). The effect of reflective science journal writing on students' self-regulated learning strategies. *International Journal of Environmental and Science Education, 10*(3), 367-379. doi: 10.12973/ijese.2015.250a

Anderson, L. W. & Krathwohl, D. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York, USA: Longman.

Andrews, R. & Haythornthwaite, C. (2007). The SAGE handbook of e-learning research. Wiltshire: Cromwell Press Ltd.

Blackboard Inc. (2011) Blackboard exemplary course program rubric. Retrieved from https://www.evansville.edu/centerforlearning/downloads/Course-Development-Process/Blackboard-Exemplary-Course-Rubric.pdf

Bloom, B. S. (1956). *Taxonomy of educational objectives: Book 1 Cognitive domain*. New York, USA: Longman.

Bonk, C. J. & Zhang, K. (2008). *Empowering online learning*. San Francisco, USA: Wiley & Sons Inc.

Chickering, A. & Ehrmann, S. C. (1996). Implementing the seven principles: technology as lever, *AAHE Bulletin*, October, 3-6.

Clark, R. C. & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*, Fourth Edition, New Jersey: Wiley & Sons, Inc.

Chua, C. & Montalbo, J. (2014). Assessing students' satisfaction on the use of virtual learning environment (VLE): An input to a campus-wide e-learning design and implementation. *Information and Knowledge Management*, *3*(4), 108-116.

Dabbagh, N. (2007). The online learner: Characteristi*cs and pedagogical implications.* Contemporary Issues in Technology and Teacher Education, *7*(3), 217-226.

Driscoll, M. P. (2000). *Psychology of learning for instruction*. Second edition. Boston, USA: Allyn & Bacon.

Driscoll, M. & Carliner, S. (2005). *Advanced web-based training strategies: Unlocking instructionally sound online learning*. San Francisco: John Wiley & Sons, Inc.

Erlich, Z. (2009). *Integrating new technologies to promote distance learning*. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice & K. Schenk (Eds.), Encyclopedia of distance learning (pp. 1228-1243), Second edition, Hershey, USA: IGI Global.

Gagne, R. M. (1985). *The conditions of learning and the theory of instruction*. Fourth edition. New York, USA: Hlot, Rinehart and Winston.

Gagne, R. M., Briggs L. J. & Wager W. W. (1992). *Principles of instructional design*. 4th Edition. Orlando, USA: Harcourt Brace College Publishers.

Hannafin, M. J. & Hooper, S, (1989). An integrated framework for cbi screen design and layout. Computers in Human Behaviour, *5*(3), 155-165.

Hillman, D. C., Willis, D. J. & Gunawerdena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *The American Journal of Distance Educatio*n, *8*(2), 30-42.

Hirumi, A. (2002). The design and sequencing of e-learning interactions: A grounded approach, *International Journal on E-Learning*, *1*(1), 19-27.

Holmberg, B. (1995). The evolution of the character and practice of distance education, *Open Learning, 10*(2), 47-53.

Ice, P., Akyol, Z., Swan, K. & Richardson, J. C. (2010). *The relationship between indicators of the community of inquiry framework and online student retention*. In S. Gülseçen & Z. A. Reis (Eds.), Third International Conference on Innovations in Learning for the Future 2010: e-Learning (pp. 256-266). İstanbul: T.C. İstanbul Kültür University Publication, No: 125.

Jaques, D. & Salmon, G. (2007). *Learning in groups: A handbook for face-to-face and online environments*. Oxon, UK: Routledge.

Jonassen, D. H. (1995). Supporting communities of learners with technology: A vision for integrating technology in learning in schools. *Educational Technology*, *35*(4), 60-63.

Jones, S. (2003). *Encyclopedia of new media: An essential reference to communication and technology*. New York: Sage Publications, Inc.

Jung, I., Choi, S., Lim, C. & Leem, J. (2002). Effects of different types of interaction on learning acheivement, satisfaction and p*articipation in web-based instruction. Innovations in Education and Teaching International, 39*(2), 153-162.

Keller J. M. (1987). Development and use of the ARCS model of motivational design. *Journal of Instructional Development*, *10*(3), 2-10.

Keller J.M. (2010). *Motivational design for learning and performance: The ARCS model approach*. New York, USA: Springer.

Khan, B. H. (2005). *Managing e-learning strategies: design, delivery, implementation and evaluation*. Hershey: Information Science Publishing.

Lewis, R. & Whitlock, Q. A. (2003). *How to plan and manage an e-learning programmme*. Cornwall, UK: MPG Books Limited.

Lister, M., Dovey, J., Giddings, S., Grant, I. & Kelly, K. (2009*). New media: A critical introduction*. Second edition, Oxon: Routledge.

Luo, N., Zhang, M. & Qi, D. (2017). Effects of different interactions on students' sense of community in e-learning environment. *Computers & Education*, 115, 153-160.

Naidu, S. (2006). *E-learning a guide of principles, procedures and practices*. 2nd revised edition, Commonwealth Educational Media Centre for Asia (CEMCA). New Delhi: Aishi Creative Workshop

Novitzki, J. E. (2009). *Necessities for effective asynchronous learning*. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice & K. Schenk (Eds.), Encyclopedia of distance learning (pp.1468-1474), Second edition, Hershey, USA: IGI Global.

Palloff, R. M. & Pratt, K. (2005). *Collaborating online: Learning together in community*. San Francisco, USA: Jossey-Bass.

Premlatha, K. R. & Geetha, T. V. (2015) Learning content design and learner adaptation for adaptive e-learning environment: a survey. *Artificial Intelligence Review*, 44, 443-465.

Rafaeli, S. & Sudweeks, F. (1997). Networked interactivity. *Journal of Computer-Mediated Communication*, 2(4).

Rayens, W. & Ellis, A. (2018). Creating a student-centered learning environment online. *Journal of Statistics Education*, 26(2), 92-102.

Roblyer, M. D. & Wiencke, W. R. (2004). Exploring the interaction equation: Validating a rubric to assess and encourage interaction in distance courses. *Journal of Asynchronous Learning Networks*, *8*(4), 25-37.

39

Shank, P. (2003). Interaction with instructional content in e-learning programs or courses. The Elearning Guild, Survey Series / October 2003. Retrieved from https://www.elearningguild.com/pdf/1/survey-oct03.pdf

Salmon, G. (2002). *E-tivities: The key to active online learning*. London, UK: Kogan Page Limited.

Schone, B. J. (2007). Engaging interactions for eLearning. ElearningPulse. Retrieved from https://faculty.mercer.edu/codone_s/tco425/2012/EngagingInteractionsForELearning

Sharp, J. H. & Huett, J. B. (2006). Importance of learner-learner interaction in distance education. *Information Systems Education Journal*, *4*(46), 3-10.

Simpson, R. J. & Galbo, J. J. (1986). Interaction and learning: Theorizing on the art of teaching. *Interchange, 17*(4), 37-51.

Sun, P. C., Tsai, R. J., Finger, G., Chen Y. & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical actors influencing learner satisfaction, *Computers&Education*, 50, 1183-1202.

Swan, K. (2001). Virtual interactivity: Design factors affecting student satisfaction and perceived learning in asynchronous online courses, *Distance Education*, *22*(2), 306-331.

Swan, K., Shen, J. & Hiltz, S. R. (2006). Assessment and collaboration in online learning. *Journal of Asynchronous Learning Networks*, *10*(1), 45-62.

Thurmond, V.A. & Wambach, K. (2004). Understanding interactions in distance education: A review of the literature. *International Journal of Instructional Technology and Distance Learning*, *1*(1), 9-33,

Tu, C. H. & Yen, C. J. (2007). *A study of multi-dimensional online social presence*. In R.V.Nata (Ed.), Progress in Education, 14, 41-68. New York, USA: Nova Science Publishers, Inc.

Urdan, T. A. & Weggen, C. C. (2000). *corporate e-learning: exploring a new frontier, equity research*, WR Hambrecht + Co., March.

Wagner, E. D. (1997). Interactivity: from agents to outcomes. *New Directions for Teaching and Learning*, 71, 19-26.

Weiser, O., Blau, I. & Eshet-Alkalai, Y. (2018). How do medium naturalness, teaching-learning interactions and students' personality traits affect participation in synchronous e-learning? *The Internet and Higher Education*, 37, 40-51.

Wilson, J. (2007). *An examination of the relationships of interaction, learner styles and course content on student satisfaction and out comes in online learning*. Dissertation Doctor of Education, Faculty of Education, University of Southern Queensland.

Wilson, J. & Albion, P. (2009). *Interaction, learner styles and content in online courses: Implications for teacher preparation*. In I. Gibson, R. Weber, K. McFerrin, R. Carlsen, D. Willis (Eds.), Proceedings of SITE 2009-Society for Information Technology & Teacher Education International Conference, 571-578.

40