INTERACTION IN THE INTERNET-BASED DISTANCE LEARNING RESEARCHES: RESULTS OF A TREND ANALYSIS

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ABSTRACT
In this research, the articles concerning interaction in the Internet-based distance learning, which were published in three most outstanding journals in 2003, 2004 and until March of 2005, have been examined and classified. The research provides opportunities for discussing topics, methods and some other variables. It is thought that, the research will be useful for reviewing current researching trends concerning interaction and displaying what kinds of potential researches about this topic can be done, and bringing up the deficiencies of the field.

Keywords: Interaction, internet-based distance learning, trend analysis

INTRODUCTION
As distance education theories reviewed, it will be seen that in almost all of them, for example in Wedemeyer's and Moore's *autonomy and independence* theories; in Holmberg's *interaction and communication* theory, in Moore's *transactional distance* theory; in Simonson's *equivalency* theory; in Paulsen's *cooperative freedom* theory, and even in the approach of Peratton, in which he emphasizes the uniqueness of distance education, usually the word "interaction" is mentioned. Lately, it is a fact that in the Internet-based distance learning researches the word "interaction" is seen by some how. Actually, although all of the theoreticians and practicians mention interaction, it is not so easy to find out the cues showing exactly how this interaction is implemented or should be implemented.

It is possible to see various definitions of interaction in the related literature. For instance, Lee and Gibson (2003) briefly define the interaction as *"reciprocal communication among the participants"*. On the other hand, Song (2003) expresses as *"interaction occurs between two or more people in order to explain point of views and conflicting points"*. Garrison (1993) defines the web interaction as *"bilateral interaction of two or more people in a learning context"*.

It is known that popularity of distance education has increased especially in the area of adult education. Distance learning has also been assessed as an appropriate option in the bachelor's and post graduate degrees. However, although there's no related official statistics, some anecdotal evidences and some institutions' own statistics show that completion and satisfaction rates of such courses are low (Russo & Campbell, 2004). Carr (2000) explains this situation as it will never be able to provide the personal interaction that starves learners for the lesson. As Russo and Campbell (2004) quoted the answer of the question "why is it so" is associated to the relevance of communication characteristics of the delivery medium; to weakness of the medium (Rice, 1993; Trevino, Lengel, & Daft, 1990); to scarcity of social cues (Culnan & Markus, 1987); to absence of the speech characteristics, such as tone of voice, intensity and speed, and non-verbal cues, which carry relational information, the text-based interaction that dominates online courses is unemotional and undersocial (Walther & Burgoon, 1992). This also decreases the satisfaction relating personal interest and interaction. If learners think that the online classes "are impersonal or isolated", they may cut off their physical or mental contacts with the given lesson (Russo & Campbell, 2004).

The purpose of this work is bringing up the trends related with Interaction in the Internet-based distance learning in order to try to find out the missing cues in the researches about implementation as mentioned above. It is also witnessed that similar trend analysis are conducted in the related literature. For instance, Lee, Driscoll, and Nelson (2004) have made content analysis about the past, present and future of distance education researches between the years 1997-2002. Similarly, Lee et al. (2004) state that Berge and Mrozowski (2001), based on the Sherry's (1995) categorization system, Anglin and Morrison (2000), and Koble and Bunker (1997) have also conducted trend analysis about distance education.

When glancing at the table called as "Distance Education Research Specific Topics by Key Word" in the research by Lee et al. (2004), it will be seen that in the 278 articles that they reviewed, the rate of the exactly key word "interaction" is 9.4% (26 articles), the rate of the key words "collaboration", "learner's satisfaction" and "videoconferencing", which are thought to be in an indirect relation with interaction, is in total 14.4% (40 articles) and the general sum of both the key word "interaction" and the key words indirectly related with

interaction is 23.74% (66 articles), and this rate is almost equal to ¼ of all of the articles that were reviewed. This shows how vital is interaction for distance education.

METHOD

In this research, these three journals -*American Journal of Distance Education* (AJDE)*, Quarterly Review of Distance Education* (QRDE) and *Distance Education* (DE) - have been reviewed because they are prominent journals of this field, because they had also been chosen in other trend analysis researches and because they are reachable in the online data base of Gazi University Library (the researcher studies in this university). Because of the reason that EBSCOHost Academic Search Premier, an online data base reached from Gazi University Library, allow the oldest common date for full text searching these three journals is 2003, and the upper time limit for them is 12 months prior to the day the study is conducted (March, 2005), so the articles between 2003 and March 2005 have been examined and 25 of them, that are about interaction in Internet-based distance learning, have been reviewed. The distribution of these articles is presented in Table 1.

Table 1: Distribution of the Reviewed Articles According to Years and Journals

	2003		2004		2005		
	Volume (Issue)	n (%)	Volume (Issue)	n (%)	Volume (Issue)	n (%)	Total
AJDE	17(1)-17(4)	4 (16%)	18(4)	1 (4%)	19(1)	1 (4%)	6 (24%)
QRDE	4(3)-4(4)	4 (16%)	5(2)-5(3)	4 (16%)	6(1)	1 (4%)	9 (36%)
DE	24(1)-24(2)	5 (20%)	25(1)-25 (2)	5 (20%)	--	--	10 (40%)
Total		13 (52%)		10 (40%)		2 (8%)	25 (100%)

For the period of 2003-2005, totally 6 articles in AJDE (Volume 17 Issue 1-Volume 19 Issue 1), totally 9 articles in QRDE (Volume 4 Issue 3-Volume 6 Issue 1) and totally 10 articles in DE (Volume 24 Issue 1-Volume 25 Issue 2) have been reviewed.

Classification

Lee et al. (2004) developed a new kind of topic classification system, based on the categorization systems of Sherry (1995), Phipps and Merisotis (1999), and Khan (1997): This system is consists of design-related, development-related, management-related, evaluation-related, institutional and operational-related, and theory and research-related topics. In this research, a title, called "combination of topics", has been added in addition to the titles that take place in the classification system, which was developed by Lee et al. (2004). This newly formed topics classification method is summarized in Table 2.

Table 2. Classification of Topics

Topic	design-related topics	development-related topics	management-related topics	evaluation-related topics	institutional and operational-related topics	theory and research-related topics	combination of topics
Explanation	• needs assessment • course scheduling • course design • instructional strategy development • course material design • visual design	• course support system and material development • web-based learning management system building • online tools development • online testing system development	• learning resource management • troubleshooting, • attrition rate • faculty and staff support • learner support • technical support	• program quality control • assessment of learning outcomes • benefits and cost analysis • return on Investment • evaluation of supporting system	• administration • academic affairs • accreditation • certification • policy • payment • budgeting	• distance education theory building • review of literature • introduction to new research methods • culture and gender issues • learning style • history of distance education • copyright law	• a study synthesizing two or more topics

Lee et al. (2004) base their new categorization system that they formed for research method to the categorization system of Berge and Mrozowski (2001), of Koble and Bunker (1997), of Anglin and Morrison (2000), and of Klein (2002). The system is also used in this research, is composed of design-related, development-related, management-related, evaluation-related, institutional and operational-related, and theory and research-related topics. This classification system is shown in Table 3.

Table 3. Classification of Research Methods

Research Method	Explanation
theoretical inquiry	a theoretical review of literature and conceptual study for proposing new ideas in distance education
experimental research	a study examining the effect of independent variable(s) on dependent variable(s)
case study	a study aimed at investigating a single individual, group, program, or organization, qualitatively
evaluation research	a study aimed at determining the impact of project, program, model, or software
developmental research	a study aimed at designing, developing, and evaluating an existing or newly developed model, process, product, or technique
survey research	a study addressing the distribution and return of responses in a nonexperimental situation
combination of inquiries	a study synthesizing two or more research methods

RESULTS

The distribution of the topics in the reviewed articles according to years and journals are shown in Table 4. According to this table, while no article was found under the titles of design topics, management topics and institutional and operational-related topics, under the title of development topics, one each articles (4%) have been reviewed in 2003 and 2004. One of these articles was published in QRDE, while the other one was published in DE journal. Of the 13 articles (52%) that are assessed under the title "evaluation topics", 5 (20%) were published in 2003, 6 (24%) were in 2004 and 2 (8%) were in 2005. AJDE and DE shared four each and QRDE shared five of them. The number of articles which exists under the title "theory and research topics", both were published in 2003 and one of them was published in QRDE, while the other one was published in DE, is only 2 (8%). Nevertheless, 5 (20%) of 8 (32%) articles containing more than one topic, fall to 2003 and 3 (12%) of them fall to 2004. 2 (8%) of these 8 articles are in AJDE, 2 (8%) of them are in QDRE and 4 (16%) of them are in DE. It is observed that the reviewed articles have been categorized mostly under the title of evaluation topics, and most of them have been published in the year 2004, and most of them were published in the journal DE. In general, the reason of the fact that the minimum number of articles were published in the year 2005 stems from the inability of reviewing that year entirely.

Table 4. Distribution of Topics According to Years and Journals

Years/Journals / Topics	2003	2004	2005	Total	AJDE	QRDE	DE	Total
design-related topics	--	--	--	--	--	--	--	--
development-related topics	1 (4%)	1 (4%)	--	2 (8%)	--	1 (4%)	1 (4%)	2 (8%)
management-related topics	--	--	--	--	--	--	--	--
evaluation-related topics	5 (20%)	6 (24%)	2 (8%)	13 (52%)	4 (16%)	5 (20%)	4 (16%)	13 (52%)
institutional and operational-related topics	--	--	--	--	--	--	--	--
theory and research-related topics	2 (8%)	--	--	2 (8%)	--	1 (4%)	1 (4%)	2 (8%)
combination of topics	5 (20%)	3 (12%)	--	8 (32%)	2 (8%)	2 (8%)	4 (16%)	8 (32%)
Total	13 (52%)	10 (40%)	2 (8%)		6 (24%)	9 (36%)	10 (40%)	

The distribution of research methods according to years and journals are listed in Table 5. According to that, of the 3 (12%) articles which used the theoretical inquiry method, 2 (8%) were published in QRDE, and 1 (4%) was published in DE. Of the totally 6 (24%) articles, which were assessed as "experimental research", 2 (8%) were published in 2003, and the other 4 (16%) were published in 2004. Distribution of these articles according to journals is as follows: 1 (4%) in AJDE, 2 (8%) in QRDE and 3 (12%) in DE. It is witnessed that mostly the "case study" method was opted in the researches. This method was used in 7 articles (28%) in 2003, two each (8%) in 2004 and in 2005. Distribution of these articles according to journals is: four each (16%) in AJDE and DE; and 3 (12%) in QRDE. It is seen that, the only article (4%) which used the "survey research" method was published in DE, in 2004. One article (4%) in 2003 and 3 (12%) articles in 2004 were assessed as "combination of inquiries". Of these 4 (16%) articles, one each (4%) were published in AJDE and QRDE, and 2 (8%) were published in DE. There are no articles which were appraised as "evaluation and developmental research". Most of these articles were published in 2003, while the minimum number of those articles was published in 2005. Again, this may be explained with the scarcity of the articles that were reached in 2005.

Table 5. Distribution of Research Methods According to Years and Journals

Years/Journals / Research Methods	2003	2004	2005	Total	AJDE	QRDE	DE	Total
theoretical inquiry	3 (12%)	--	--	3 (12%)	--	2 (8%)	1 (4%)	3 (12%)
experimental research	2 (8%)	4 (16%)	--	6 (24%)	1 (4%)	2 (8%)	3 (12%)	6 (24%)
case study	7 (28%)	2 (8%)	2 (8%)	11(44%)	4 (16%)	3 (12%)	4 (16%)	11 (44%)
evaluation research	--	--	--	--	--	--	--	--

developmental research	--	--	--	--	--	--	--	--
survey research	--	1 (4%)	--	1 (4%)	--	--	1 (4%)	1 (4%)
combination of inquiries	1 (4%)	3 (12%)	--	4 (16%)	1 (4%)	1 (4%)	2 (8%)	4 (16%)
Total	13 (52%)	10 (40%)	2 (8%)		6 (24%)	8 (32%)	11 (44%)	

In the researches, percentage, ANOVA, discourse analysis, factor analysis, frequency, content analysis, MANOVA, t test, open-ended questions, z test, cross table, multiple regression, structural equation modeling, correlation, Pillai's trace and two-way contingency table were used as statistical methods. As also seen in Table 6 percentage, ANOVA, factor analysis, content analysis, t-test and correlation were most frequently used ones among these methods.

Table 6. Distribution of the Statistics Used in the Researches According to Years and Journals

Years/Journals Statistics	2003	2004	2005	AJDE	QRDE	DE	Total
Percentage	1	3	1	1	2	2	5
ANOVA	1	2	--	--	1	2	3
Discourse analysis	--	--	1	--	1	--	1
Factor analysis	2	2	--	--	1	3	4
Frequency	--	2	--	--	--	2	2
Content analysis	1	2	--	1	1	1	3
MANOVA	--	1	--	--	1	--	1
t test	1	2	--	1	--	2	3
Open-ended questions	1	1	--	--	1	1	2
z test	1	--	--	1	--	--	1
Cross table	--	1	--	--	--	1	1
Multiple regression	1	1	--	--	--	2	2
Structural equation modeling	--	1	--	--	--	1	1
correlation	1	2	--	--	--	3	3
Pillai's Trace	--	1	--	--	--	1	1
Two-way contingency table	1	--	--	--	1	--	1

It has been found out that in the reviewed articles the data collection tools like survey, interview, examination of discussions, open-ended questions, close-ended questions, scale, rubric, DAT, TAT, observation, and field notes were used: Of these methods, most frequently used ones are survey (6 articles – 24%) and interview (4 articles – 16%). The distribution of data collecting tools can be seen in Table 7.

Table 7. Distribution of Data Collecting Tools According to the Publications

Instruments	n
Survey	6
Interview	4
Examination of discussions	2
Open–ended questions	2
Close–ended questions	2
Scale	3
Rubric	1
DAT	1
TAT	1
Observation	2
Field Notes	1

As the number of the participants is examined in the reviewed articles; there can be seen 13 articles that used participants between numbers 1-100, 3 between 101-200 and 3 articles, more than 200. On the other hand, the number of participants that were participated in the researches was not mentioned in 3 articles. In those researches, 4 of the distributed courses were about foreign language, 1 was about religion, 9 were about

education, and 10 of them were about various themes. Meanwhile, it was not mentioned what the distributed course was about in 2 researches. One of the presented courses was adult education, one was in-service training, 9 were on the graduate degree, another 9 were on undergraduate degree and 2 were on the high school level. In 2 researches, no information was given about the level of the course. On the other hand, as the countries where the researches were conducted is examined, it is understood that 9 of them were done in the USA, 4 were in Canada, each two were in Korea and Australia, and each one were conducted in Egypt and Trinidad & Tobago. When assessed from the point of examined messages, it is seen that, 1 article examined less than 1000 messages, while 4 of them examined messages between 1000-10.000. There are 3 articles in which number of messages is not declared.

The articles concerning interaction vary among each other by variables as seen in Table-8. These variables may be listed as follows: gender, satisfaction, access, transactional distance, Garrison's Comprehensive Model, cultural differences, time, transporting message (in communication), linguistic barriers, motivation and intention, instructional design, high-level thinking skill, cognitive load, self-direction, experience of technology, capabilities of technology, dominant style, individual differences, course necessities, differences of using media, and task design.

Table 8. Distribution of the Variables Concerning Interaction According to the Publications

Variable	n	Variable	n	Variable	n
Gender	1	Linguistic Barriers	1	Dominant style	2
Satisfaction	2	Motivation and intention	1	Individual differences	1
Access	1	Instructional design	1	Course necessities	1
Transactional Distance	2	High-level thinking skill	1	Differences of using media	1
Garrison's Comprehensive Model	1	Cognitive load	1	Task Design	1
Cultural Differences	1	Self-direction	1		
Time	2	Experience of technology	2		
Transporting message (in communication)	1	Capabilities of technology	2		

The types of the software that were used in these researches were also reviewed and distribution of these software is summarized in Table 9. According to that, it is seen that learning management system software or forum software such as, first of all, WebCT, and besides Blackboard, FirstClass, vClass, WiredClass, Quick Messenger, Centra (a synchronous text-based chat software) and SiteScape Forum, or web page editors such as FrontPage, or content analysis software, such as Transcript Analysis Tool (TAT) are used.

Table 9. Distribution of the Software Used in the Researches According to the Publications

Software	Blackboard	Centra	FirstClass	TAT	FrontPage	SiteScape Forum	vClass	WebCT	WiredClass	Quick Messenger	RealAudio
n	2	1	2	1	1	1	1	5	1	1	1

It is seen that various interaction types are mentioned in the reviewed articles. Table 10 shows that the most mentioned interaction types as social, learner-instructor, learner–learner and learner–content interactions.

As the learners' Internet-based learning experiences are examined, it is seen that five each of the articles were published in 2003 and 2004, and two articles were published in 2005. Two each of them were published in

AJDE and QRDE, while eight of them were published in DE. Learners' experiences took place in 9 of them, especially in one of them an average of 2.6 years of learners' experiences took place. In one of these articles experienced and inexperienced learners were categorized in different groups, but in another article it has been mentioned that the learners did not have any experience.

Table 10. Distribution of Interaction Types According to the Publications

Interaction	Social	Learner-instructor	Learner-learner	Learner-content	Learner-interface	Psychological	Learner/instructor-tools	Learner–media	Learner–knowledge	Learner-institute or staff
n	9	17	19	12	4	1	1	1	1	1

The length of application periods have also been reviewed in these 25 articles. Table 11 shows that, the most preferred period is one semester (8 researches) among the studies.

It is seen that 16 of these articles examined the interaction in an online discussion environment. It has been determined only in four of experimental researches blended learning was practiced among all of them.

Table 11. Distribution of the Application Periods According to the Publications

Time	1 semester	1 week	2 semesters	8 and 15 weeks	3 semesters	4 semesters	4weeks	7-8 weeks
n	8	1	2	1	1	1	2	1

DISCUSSION

As the results of this research are scrutinized, it is seen that publications related to interaction were most frequently conducted in the *years* 2003 (52%) and 2004 (40%). The reason of the scarceness of the researches conducted in 2005 (8%) is that, it could not be possible to reach all of the articles published in 2005. These articles are mostly publicated in DE (40%) and QRDE (36%) journals, while the number of articles in AJDE is relatively few (24%). "Evaluation" (20%) is studied mostly as *topic*, while the topics "management" and "institutional and operational-related" are not studied at all. The "design" topic is assessed as "combination of topics", since it was studied with other topics. Among the *research methods*, the most studied method is "case study" (44%); on the other hand "evaluation" and "developmental" methods have been studied together with other methods. The least studied method is "survey" (4%).

The most used *statistical techniques* are percentage and factor analysis. These techniques are followed by ANOVA, content analysis, the t-test and correlation. The most preferred data collecting tools are surveys and semi-constructed interviews. In most of them, they have worked with less than 100 participants.

In the researches, researchers have not opted for a certain *course*, though; they have mostly concentrated on education. Applications have been generally conducted in 1 *semester*. Researches have been mostly performed in *USA*. The mostly used *software* is WebCT.

Interaction is reviewed as its relation with different *variables*. The three *types of interaction* (learner-learner/instructor/content) that mentioned by Moore (Moore & Kearsley, 2005) and social interaction themes

have also been dealt with. It is seen that Distance Education is the journal which has mostly mentioned learners' *previous e-learning experiences.*

Methodological deficiencies of the researches are another important point For example, in some of the articles, there are no information about the course topic, or the level of the course, or in which country the application is managed, or number of the participants that participated in the application, or, if any online discussion has been executed, the quantity of the reviewed messages, or what kinds of software(s) were used.

As a general look at the researches is taken, such a question comes to mind: "Does the fact that the learners were of graduate education, have an effect on such an intensive interaction?" In other words, because the learners' educational levels are high, it might have an effect in their success in interaction. Another question in mind is: "Can, courses given in the studies be evaluated as student centered (in other words: students being satisfied and benefiting from the optimum level of interaction that is provided) as it is related to the learners' experiences of distance learning?" However, similarly it brings in mind such a question like "Is it necessary of the instructors' experiences, or not?" Naturally, the most critical function in performing the interaction, in organizing the environment, and in coaching learners belongs to the instructor.

CONCLUSION

The distribution of the articles (except for editorials, book summaries, and etc.) in the mentioned journals (American Journal of Distance Education, Quarterly Review of Distance Education and Distance Education) in the mentioned periods (2003, 2004 and until March 2005) can be seen in Table 12. According to this, totally 138 articles have been published; 37 of them are in AJDE, 72 in QRDE, and 29 in DE. 25 of these articles are about interaction in the Internet-based distance learning. In other words, the percentage of interaction theme in all of the articles reaches 18% approximately. It is thought that, if the researcher was able to reach all of the articles that were published in 2005, the rate would have been higher. Anyway, even this rate alone is high enough and even this number underlines the significance of this subject in the related literature.

Table 12. Total Number of Articles That Were Published In These Journals

AJDE	n		QRDE	n		DE	n
19(1) - Mar2005	4		6(1) - Spring2005	9		26(1) - May2005	2
18(4) - Dec2004	4		5(4) - Winter2004	7		25(2) - Oct2004	6
18(3) - Oct2004	4		5(3) - Fall2004	9		25(1) - May2004	7
18(2) - Jul2004	3		5(2) - Summer2004	6		24(2) - Oct2003	7
18(1) - Mar2004	5		5(1) - Spring2004	8		24(1) - May2003	7
17(4) - Dec2003	4		4(4) - Winter2003	10			
17(3) - Sep2003	5		4(3) - Fall2003	10			
17(2) - Jul2003	4		4(2) - Summer2003	7			
17(1) - Mar2003	4		4(1) - Spring2003	6			
Total	37		**Total**	72		**Total**	29

Nevertheless, there is indefiniteness in the related literature. While social; learner-instructor; learner-learner; learner-content are frequently mentioned as types of interaction, number of studies concerning the implementation of these interaction types are very few. The designers especially emphasize the significance of the learner-content type of interaction, however, indefiniteness of implementation of these methods create hardness for the practitioners. On the other hand, the fact that practitioners do not share their experiences (if they have any) with the literature, do not ease the efforts of theoreticians in determining the required standards, in this field. Sims (2003) also emphasizes this point, when he quotes the comment of Kristof and Satran (1995):

"… Interaction is the use of new areas by the people, when they improve ideas, information and arts, in the same way with their usual methods, when they communicate with each other. The essence of a good interactive communication is a strong message and an open presentation. Creativeness and an able implementation are still desired, in the designing process. Here, the new variable is the option of the target audience …"

It is envisaged that the results of this trend analysis contain outcomes that will be useful for expanding the future studies in this area. Besides, it is thought that even the enlargement of this work or its repetition with other topic titles may alone become a new research subject.

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