The Role and Potential of Interaction in E-Learning

Mohammad Ali Javadi Bora[1]   Hossein Najafi[2*]   Mohammad hossein nadi[3]   Mansoureh Ghorbani[4]
1.Assistant Professor, Farhangian University, Mazandaran, Sari, Iran
2.Assistant Professor, Department of Educational Sciences, Payame Noor University, Iran
3.MA in History and Philosophy of Education, University of Isfahan, Iran
4.MA in History and Philosophy of Education, Payame Noor University, Arak, Iran
* E-mail of the corresponding author: Hossien_najafi@pnu.ac.ir

Abstract
Interaction is widely accepted as essential to learning. The main challenge in distance education is to overcome the transactional distance by providing opportunities for interaction. Understanding the role of interaction in learning and how learning environments can be designed to allow for different forms of interaction is important for effective application of emerging technologies in education. The purpose of this paper is to draw conclusions about the importance of interaction in distant learning. It briefly reviews different types of interaction that have been proposed for distance education and examines the importance of evaluating distance learning environments designed for interactive learning. While we are not able to ascertain which type of interaction is the most important in distance education, it is the aim of this paper to provide more insights into this issue.
Keywords: distance education, interaction types, design of interaction-learning.

1. Introduction

Kearsley (1995) lists eight questions related to interaction the answers to which are critical to development of effective distance education programs and evaluation of current programs. These questions pertain to the effect of frequency of interaction, the type of learners, subject matter, learning objectives for which interaction is most critical, and the effect of interaction on learner satisfaction. Moreover, there are other questions related to cost, time requirements, and workload that are critical in the fast growing field of distance education.

These questions largely remain unanswered even though 20 years have passed since they were posed by Kearsley. Obviously, arriving at a single solution that would apply to diverse distance education contexts is unlikely. Each country, region, institution, and user group develops unique cultural practices and expectations with respect to their needs for and use of interaction. This is not to say that all applications are equally effective or efficient. Anderson (2000) argues that much of our practice in distance education is not "evidence based," and our actions and instructional designs are often grounded in untested assumptions about the value of modes of interaction (or lack thereof). Thus, research opportunities that focus on interaction in all its forms are boundless and critically important.

2. History of Distance Education

Understanding how the onset and development of a phenomenon often provides a deeper insight into why things are as they are. Plato said that "necessity is the mother of invention". Knowing the history of distance education is valuable, as it shows how necessities have changed and triggered inventions and how these inventions have shaped the instructional science and its delivery methods .Distance education has been around for over200 years. The first instance of distance education was offered through correspondence by mail. According to Moore (1990), distance education, referred to as correspondence study, began in the late 1800s.Correspondence study was developed in Germany by Charles Toussaint and Gustav Langenscheidt, who were both language teachers in Berlin. Since the early 1900s, distance education has been incorporated into the practices of many institutions. According to Meyer (2002), to reduce the travel demands for faculty members and students, institutions began utilizing available technologies such as telephones, videotapes, and television. These media-assisted methods continued to be used as distance education began to grow. In 1980s, satellite telecommunications was used to broadcast lectures and provide instruction to off-campus locations. From late 1980s to the 1990s, microwave-based interactive video was utilized until land-based interactive video was developed and used in the late 1990s. With the advent of the Internet, "a growing comprehension that education need not be site- or time-bound" began to develop throughout university and college settings (Chaney, 2006: 22).

3. History of Distance Education in Iran

Payam Noor University (PNU) is the first university in Iran to use distance education for higher education, beginning in 1971.In 1980-1987, distance education in Iran was discontinued. PNU resumed distance education in 1989by admitting about 5000 students in the fields of mathematics, chemistry, Persian literature and education. Since 1991, students are admitted through an entrance examination.

4.   Providing Adequate Support Services

The purpose of this research is to find the best way for student's support services in an interactive instructional program. The methodology involves interviews and surveys in a sample of educators and students.

According to preliminary findings, there are three groups of students at PNU. The first are independent or self-directed learners who are not tied to university learning facilities. They are learners with families and homes, motivated by a personal need to have access to a continuous education in formal higher education. Distance learning institutions usually provide them with a solution as they cannot come to the campus learning facilities. These learners have lots of responsibilities that must be managed on a daily basis. They are bound by time and place. They are very focused on the practical aspects of learning and bring their life experiences to the educational environment. The choice of distance learning program is based more on accessibility than reputation of the university. Finally, they prefer not to travel unless absolutely necessary.

The second group consists of a generation of technology users. These students seek greater control over learning experiences and typically are in close proximity to the university. They see technology as a fundamental tool to their education and flexibility in scheduling as a motivating factor. In their opinion, no one can have all the answers and demand online learning services. Because of their comfort with technology, they expand the educational opportunities available to them and join a network of learners. This extends instructional strategies.

The third group is degree seekers. Gaining a graduate or post graduate degree is the most important motivating factor for them. They are attracted to distance education institutions because of easy mass admission. Most of these students are unemployed. They always ask for support services that are, in Jackson's (2000) words, "organizationally sponsored functions or activities carried out for, with, or on the behalf of the learner to assist, support and/or extend their experiences".

Providing adequate support services for different groups of students is quite challenging administrative task. How can they be sure about the quality of provided services and students' satisfaction? What are the quality indicators? What strategies can be used for the evaluation of support services? This paper answers these questions by proposing an interactive learning environment that maximizes learner participation in the learning process.

5.   Interaction and Transactional Distance

The application of technology in distance education opens the doors to a new understanding of distance. Where the distance in distance education has been widely understood as a matter of geography, changing demographics in higher education are resulting in more students having commitments that may interfere with attendance at face-to-face classes and are taking advantage of opportunities to study part or all of courses and programs online or by other means typically associated with distance education. The theory of transactional distance appeared as early as 1972 and identified the distance in distance education as not merely a matter of geographic separation but a pedagogical concept addressing the psychological and communications space that separates learner and teacher (Moore, 1993). Such separation exists even within the face-to-face classroom. Teacher immediacy, the "perceived physical and/or psychological closeness between people" (Christophel, 1990: 325), encompasses such behaviors as smiling, appearing relaxed, and using humor, and has been found to modify motivation which, in turn, affects learning. Saba and Shearer (1994), conclude that distance is not determined geographically, but by the variety of transactions that occur between the leaner and teacher. This continuum challenges the idea of traditional versus distance education. As dialogue increases, transactional distance decreases. It is not location that determines the effect of instruction, rather the interaction between student and instructor.

Moore (1993) describes the extent of transactional distance as being a function of three variables: dialogue, structure and learner autonomy. Dialogue refers to purposeful interactions towards improved understanding by the learner and its extent and nature depend on the educational philosophy of course designers, personalities of teacher and learner, subject matter and environmental factors, especially but not only, the communications medium, which may be manipulated to vary transactional distance. Structure represents the elements of course design that support delivery in ways that are more or less flexible to meet individual learner needs. It is affected by the media used and by the educational philosophy of course designers, personalities of learners and institutional requirements. Depending upon the extent of dialogue and structural flexibility available in a distance education course, the transactional distance will be more or less. Low transactional distance courses provide clear directions and guidance through dialogue with an instructor within an open structure designed to support such interactions. Courses with higher transactional distance provide guidance through their tight structure with limited dialogue. The greater the structure and lower the dialogue, the more autonomy a learner must exercise in order to successfully negotiate the course.

Course design should aim to overcome transactional distance by a careful balance of structure and dialogue to meet the needs of learner for dealing with the course content. This is typically accomplished through design of the structure and selection of the media. Learner autonomy is the extent to which the learner, rather than the instructor, determines goals, learning experiences and evaluation of the experience. As it was mentioned

above learners vary. Some prefer high dialogue and low structure; others prefer low dialogue and high structure, which they navigate according to their own purposes. Distance education courses can be classified according to the degree of autonomy permitted. For example the first type of students who are identified as independent or self-directed learners, are not actually tied to their university's learning facilities and can manage with low dialogue and little structure, but the third type that is degree seekers who are less autonomous learners, tend to prefer more dialogue and structure while others prefer informal structure with high dialogue. Moore argues that the introduction of teleconferencing, including computer-mediated communication, to distance education permits learner-learner interaction that had been impossible previously and thereby offers the opportunity to reduce transactional distance while at the same time increasing the autonomy of learners.

Zhao et al. (2005) found that different distance education programs exhibit similar variations to what may be found among face-to-face classes. Interaction with peers and instructors is the key to effective distance education, with high instructor involvement being particularly beneficial and the inclusion of face-to-face interaction and a mix of synchronous and asynchronous interaction also having a positive effect. Live human instructors, rather than materials driven solely by computer, are needed for best results. The right mix of human and technology is beneficial with inclusion of some face-to-face interaction, where possible, or use of a substitute such as video to reduce the apparent distance. This research has much to tell about how to design more effective distance learning experiences.

The importance of interaction to learning is not a new discovery. Its importance in educational design, regardless of the underlying learning theory, has been widely recognized and it is "widely cited as the defining characteristic of computing media" (Swan, 2002: 4) especially in relation to learning. Moore (1989) described three forms of interaction in distance education: interaction between students and teachers, interaction between students, and interaction of students with content. He noted that interaction of learners with content is a defining characteristic of education because learning cannot occur in the absence of such interaction. Learner interaction with an instructor is often regarded as essential or highly desirable because an instructor can contribute a variety of functions that facilitate learning. Moore noted that learner interaction with other learners was a comparatively new addition to distance education, although it was often used in face-to-face classes for reasons such as convenience and economy that had little to do with learners' needs. New technologies, especially the Internet, have greatly increased the range of possibilities for all forms of interaction particularly learner-learner interaction at a distance and distance educators need to plan carefully for the appropriate mix among all forms of interaction.

Anderson and Garrison (1998) have expanded the discussion on interaction to include three other forms of interaction: teacher-teacher, student-student, and content-content (see Fig. 1).
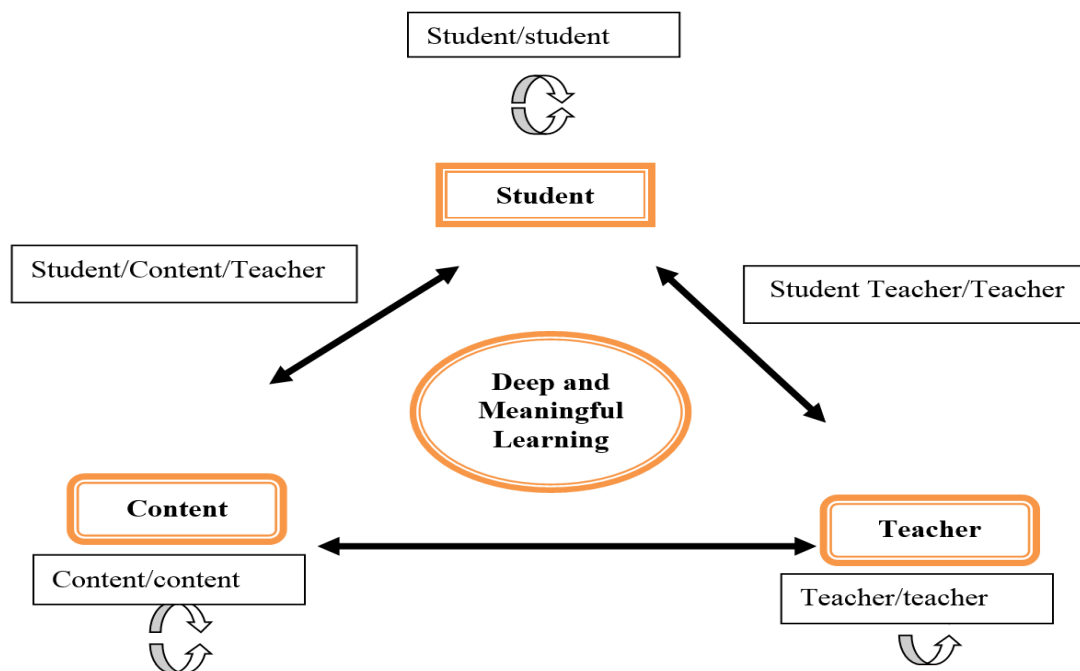

FIG.1. Modes of interaction in distance education (Source: T. Anderson and D. R. Garrison, 1998, in C. Gibson (Ed.), Distance Learners in Higher Education Madison, WI: Atwood Publishing, 1998).
From "Learning in a Networked World: New Rules and Responsibilities
.Harkening back to Dewey's reminder that education takes place within an existing social and environmental

context, it should be noted that Fig. 1 simplifies real life by omitting the larger sphere of interaction that exists outside the formal education. Interactions between students and teachers on the one hand, and their families, workplaces, and communities on the other hand, dramatically influence the context in which formal education takes place. Burnham and Walden (1997) refer to interactions of this kind as "learner-environment interactions." These interactions are conditioned by broader societal norms and expectations related to gender, age, social interest, and a variety of other sources of social status. They are very complex, often idiosyncratic, and generally lie beyond the scope of this paper. However, they cannot be ignored when situating this interaction model in any real situation.

Major concern to both educators and administrators are the high workloads and attendant costs that seem to be associated with interaction. From an administration perspective, Daniel and Marquis (1988: 342) noted that the costs of human interaction "tend to increase in direct proportion to the number of students". Berge and Muhlenberg (2000) report survey results that identify teacher concern about time requirements as the largest barrier to adopting networked forms of distance teaching. Shifter (2000) found that the related issue of lack of technical support provided by the institution and concern about faculty overload were top inhibiting factors for faculty members, whether they participated in distance education or not. Lash (2000) and Hislop (2000) found that once teachers become experienced with both the course content and the delivery media, the time requirements of Web-based courses and courses delivered face to face do not differ significantly. Rogers (1995) argues that Interaction must provide "relative advantage" to teachers who have become accustomed to a system that supports temporal restriction on teacher-student interaction.

6. Findings

Factor analysis was used to answer the main question of the research: "what is the most appropriate model for interaction-effectiveness in Iranian distance education system?"

Table 1:

Investigation of coefficients and significance status of CC indices in Iranian distance education system

Interaction-effectiveness indicators in distance education system	Path coefficients			Sig.
	Non-standardized	Standardized	t	
Technical equipment and support	13/0	22/0	17/3	0/0001
Educational equipment and support	07/4	34/0	06/3	
Website development	17/0	47/0	56/3	
Audiovisual educational material	63/0	73/0	65/7	
Teleconference	76/0	66/0	97/7	
Technical supports	64/0	65/0	69/5	
Holding face-to-face classes	76/0	65/0	67/6	
Audiovisual educational material	/580	64/0	18/7	
Interactive multimedia electronic material	48/0	52/0	76/5	
Implementation of learning management system	27/0	38/0	76/4	

Based on the data in table 1, the results show that the proposed model of parameters has high standardized and non-standardized path coefficients (factor loadings) and is a good predictor of interaction-effectiveness.

Table 2:

Fitting indices of factor analysis for interaction-effectiveness in distance education system

Indices	Chi-squared	df	P-Value	RMSEA	GFI
Fitting values	41/673	312	000/0	086/0	97/0

Results of table 2 show that the factor analysis model of the present research has a good fitting. In other words, considering the $\alpha \leq 0.05$ significance level and good fitness indices GFI and RMSEA, this model can be used for calculation of interaction-effectiveness in Iranian distance education system.

7. Conclusion

The interaction phenomenon in a distance and e-education setting is intertwined with many factors in an institutional setting. Thus, in order to have a better understanding of this phenomenon, there is the need for further investigations into this issue with a bigger picture in mind.

Interaction has never been an isolated issue which only matters between students and educators. It is actually related to the whole components of an institution. Cox (2005) applies the institutional theory to higher education institutions and concludes that six basic components underlie the institutions' capacity of offering distance education courses. These components are administrative commitment (allocating resources), student

support services (registration, advising, providing access), full-time online coordinator (assisting course development and online teaching issues), internal/external financial and technology resources (computers, online course management system), online professional development (developing faculty online knowledge), and adequate faculty participation (enough innovators supporting online education). From our findings, we can infer that the design of a distance education course or program is largely related to the amount of student interactions occurring in the course. Naturally, more student interactions were observed in courses or programs that encouraged student interaction and included it as part of student performance evaluation. Instructors play an important role in this respect. John Cowan, a renowned professor for his work in fostering learner-cantered courses in U.K. Open University, recommends instructors to include interactions part of the grade (Lebanon and Miller, 2005).If not, students can easily complete the course without interacting with their course providers, educators and other students.

However, in order to add the six basic components supporting distance education mentioned earlier, instructors need tremendous assistance from the administrators. The administrators need to enlist the help of financial and technology technicians, teachers' training staff, and a team of online program coordinators in order to provide a distance course successfully. In fact, all people affected by distance education programs should be responsible in improving the quality of the courses. Drawing from the successful experiences of Andrew and Young, the program and curriculum design largely affected the amount of student interaction in a distance education course. The design which clearly imbeds the component of promoting interactive activities has a better chance to increase students' satisfaction with the courses.

Validating the efficacy of interaction in distance education environments is not acute-and-dried process as one might think. Despite extensive research supporting the impact of interaction, there are also many unanswered questions about the value of each kind of interaction as they regard both traditional distance education programs and online programs.

8. References

Albion, P. R. & Ertmer, P. A. (2004). Online courses: Models and strategies for increasing interaction. Paper presented at the Tenth Australian World Wide Web Conference. Retrieved October 22, 2007.

Anderson (2003) Modes of Interaction in Distance Education: recent Development and research Questions. In Moore, M.G. and Anderson G. W. (Eds.) Hand Book of Distance Education, Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.

Anderson, T. & Garrison, D. R. (1998). Learning in a networked world: New roles and responsibilities. In C. Gibson (Ed.), Distance learners in higher education. Madison, WI. : Atwood Publishing.

Berge, Z., & Muilen burg, L. (2000). Barriers to distance education as perceived by managers and administrators: Results of a survey. In M. Clay (Ed.), Distance Learning Administration Annual 2000.

Burnham, B., & Walden, B. (1997). Interactions in distance education: A report from the other side. In Proceedings of the Adult Education Research Conference, Oklahoma State University.

Chaney, B. H. (2006). History, theory and quality indicators of distance education: A literature review. Retrieved from http://ohi.tamu.edu/distanceed.pdf.

Christophel, D. (1990). The relationship among teacher immediacy behaviours, student motivation, and learning. *Communication Education*, 39, 292-306.

Daniel, J., & Marquis, C. (1988). Interaction and independence: Getting the mix right. In D. Stewart, D. Keegan, & B. Holmberg (Eds.), *Distance Education: International Perspectives* (pp. 339-359). London: Rutledge.

Hislop, G. (2000). Instructor time for online learning. In Proceedings of the Sixth Asynchronous Learning Conference.

Kearsley, G. (1995). The nature and values of interaction in distance education. In Third Distance Education Research Symposium. University Park, PA: American Center for the Study of Distance Education.

Lesh, S. (2000). Asynchronous versus synchronous learning: A comparative investigation of the effectiveness of learner achievement and faculty time demands. Cambridge: Cambridge University Press.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, 3(2), 1-6.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical Principles of Distance Education* (pp. 22-38). London: Rutledge.

Rogers, E. (1995). *Diffusion of Innovations* (4th Ed.). New York: Free Press.

Saba, F. & Shearer, P. (1994) Distance in Education. In David H. Janssen (Ed.) *Handbook of Research for Educational Communications and Technology*. New York: Macmillan.

Swan, K. (2002). Learning effectiveness online: what the research tells us. In J. Bourne & J. Moore (Eds.), *Elements of Quality Online Education: Practice and Direction* (pp. 13-46). Needham, MA: Sloan Consortium.

Zhao, Y., Lei, J., Yan, B., Lai, C., & Tan, H. S. (2005). What Makes the Difference? A Practical Analysis of Research on the Effectiveness of Distance Education. *Teachers College Record*, 107(8), 1836-1884.

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