

Interaction in Distance-Learning Courses

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The article provides an in-depth analysis of previous literature that led to the understanding of the four interactive components of “e” learning and how we can utilize these components to maximize the positive and minimize the negative results of “e” learning. The four interactive dimensions of “e” learning are the following three originally described in Moore’s editorial (1989): (1) interaction with the content, (2) interaction with the instructor, (3) interaction with the students, and an additional new fourth dimension, *interaction with the system*, which considered all of the new computer technology since his article. In our viewpoint we will highlight the impact that this fourth technological interactive dimension has on the results of “e” learning. The question then is not “to ‘e’ or not to ‘e,’” since “e” learning is already an essential factor of our contemporary learning environment. The question is how to “e”, based on the understanding of the four interactive components of “e” learning, and the understanding that these four types of interactions are different from the ones we are accustomed to in the traditional learning environment.

Introduction

Although studies and statistics show that between 20 and 30% of those students who begin a distance-learning¹ course do not finish it (Kearsley, & Lynch 1996; Rovai, 2002; San Francisco State University, 2003²), in the last few years there has been sharp growth in the size of the distance-learning market (Educational News, 2002; Fry, 2001; Little, 2001; Picciano, 2002; Schoech, 2000).

Researchers have considered and analyzed different aspects of the distance-learning format of education, as compared with traditional “face-to-face” delivery, yet many issues relating to distance learning remain unanswered, and others still require significantly more research.

¹In this paper, the terms *distance learning*, *distance education*, *e-learning*, and *online learning* will be used interchangeably.

²For example, the San Francisco State University Online experienced high incomplete rates of 20% versus on-campus rates of approximately 5%. (Retrieved November 26, 2003, from <http://online.sfsu.edu/dereport.htm>.)

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One of the most important factors relating to e-learning is the element of interaction (Moore, 2001; Picciano, 2002). Interaction in the context of distance learning has traditionally been divided into the following three categories, as introduced by Moore (1989): (a) Interaction with content; (b) interaction with the instructor; and (c) interaction with the students. A fourth category of interaction should be identified, considered, and analyzed in the context of e-learning. This fourth category, which we refer to as *interaction with the system*, plays an important role in the learning process in general, and in the e-learning process in particular.

The amount of student interaction is seen as likely to improve distance-learners’ educational experience (Andrusyszyn, Iwasiw, & Goldenberg, 1999; Wright, Marsh, & Miller, 2000). Therefore, it is important for instructors to develop means of creating dialogue with the students.

In this article, we will first present the general benefits of distance learning. We will then briefly examine the phenomenon of dissatisfaction with e-learning courses, from the students’ perspective. Our examination will suggest that the main factor which influences the students’ satisfaction or dissatisfaction with a distance-learning course is the “interaction” factor. We will then consider this factor in more detail, taking into account the four different types of interaction. Thereafter, we will introduce a model, which clarifies the relationship between the different types of interaction.

The Benefits of e-Learning

The benefits of e-learning have been discussed in many articles (Carswell, Thomas, Petre, Price, & Richards, 2000; Little, 2001; Shotsberger, 2000). In a survey we conducted,³ university students who participated in distance-learning courses cited the following advantages of e-learning:

- Freedom to decide when each lesson will be learned
- Lack of dependence on the time constraints of the lecturer
- Freedom to express thoughts, and ask questions, without limitations

³The survey was conducted as part of the research which was carried out in the framework of a master’s thesis (Marcus, 2003). The research group that was surveyed was comprised of 130 students who participated in fully online, asynchronous courses at Bar-Ilan University, Israel.

- The e-learning context is conducive to the teacher providing satisfactory responses to his or her students' queries
- The manner in which the content is presented makes it convenient to review lessons previously learned
- The accessibility to, and availability of, the course's subject matter, as well as related materials which the student may explore at his own election, contribute to self-learning and the student's development of independent ideas, and are also useful in allowing the working student to utilize his newly-acquired knowledge in parallel to, and in conjunction with, his employment tasks.

The perceived benefits of e-learning which are listed above can roughly be categorized as follows:

1. Flexibility of the material and the time
2. Accessibility to the material
3. Visibility of the multimedia
4. Availability of the data

More than anything else (34.8% in our research), flexibility is what makes e-learning programs attractive to the learners (Schoech, 2000).

In distance-learning courses students can take courses from preferred locations that are convenient for their schedules. This advantage is appealing to most adult learners because it accommodates their work schedules and permits flexibility to manage their family life (Kember, Lai, & Murphy, 1994).

Students' Dissatisfaction With e-Learning

It is important to note that despite the perceived benefits of e-learning mentioned above, and notwithstanding the growth of the e-learning market in recent years, research indicates that a high rate of students who commence an e-learning course do not finish it (Dutton & Perry, 2002; Roblyer, 1999). This suggests that something is not working properly in the e-learning system. By considering the responses of students who participated in an e-learning course, we can better understand the reasons why students are often dissatisfied with the distance-learning "experience."

In the above-mentioned survey conducted by the authors of this article (Marcus, 2003), students were asked to identify the primary disadvantages associated with the online course in which they participated. They cited the following disadvantages:

- Lack of a firm framework—this tends to encourage laziness
- A high level of self-discipline is required
- Absence of a "learning atmosphere"
- The distance-learning format minimizes the level of contact, as well as the level of discussion, between the students
- The learning process is less efficient, when compared to a "face-to-face" learning format, and requires the students to dedicate more time to learning the subject matter
- Lack of interpersonal, direct (nonmediated) interaction
- In answering his or her students' questions, the teacher's ability to widen the scope of his or her answer is limited

The students' responses are consistent with the results of other studies that describe the disadvantages of e-learning (Carswell et al., 2000; Ingram & Sandelands, 2001; Little, 2001). Certain researchers have attempted to identify particular student characteristics or other factors that can be used to predict whether a student might drop out of, or otherwise fail to achieve satisfactory results in, a distance-learning course. Characteristics and other circumstances identified in these studies include clarity of design, interaction with instructors, and active discussion in the context of the course (Swan, 2001); the lack of self-motivation and the inability to structure one's own learning (Roblyer, 1999); an absence of previous experience with distance learning, homework completion, enrolled semester hours (students taking more hours were significantly more likely to complete the course; Dutton & Perry, 2002), and forced participation in distance learning (as opposed to an election of the student to use the distance-learning format; Roblyer, 1999).

As Kearsley (2000) asserts, although virtual classrooms can be as varied as traditional classrooms, the virtual classroom has a unique social, interaction context, which is very different from that of the traditional, physical classroom. It appears that learning to use the interaction-related tools that the e-learning classroom offers can positively influence the success and the satisfaction of the students who participate in online courses.

Interaction and Learning

The invention of the telephone gave people the opportunity to conduct "live" interaction from a distance. Undoubtedly, using the telephone was a strange form of communication for people who had never before used it. As it became more and more widespread, the telephone allowed people to recognize and become accustomed to this new type of interaction. Nowadays, talking on the telephone is an integral part of our "interactive" lives, and it is viewed by everyone as being a comfortable and accessible form of interaction among people.

Similarly, e-learning is a foreign concept to many of us. It presents a new type of interactive environment. Instinctively, when we think about distance learning for the first time, we may have a tendency to assume that it lacks an interaction aspect. We are inclined to think about classroom interaction as something that exists primarily face-to-face. For this reason, it may seem to some of us that e-learning is an inferior form of learning. However, as researchers dealing with distance education have identified, it entails more interaction options than any other form of learning.

As mentioned above, in his article, "Three Types of Interaction" (1989), Moore identifies three kinds of interaction that may affect learning in online courses: (a) Interaction with content, (b) interaction with the instructor, and (c) interaction with classmates. We will now examine Moore's three types, or dimensions, of interaction. Thereafter, we will introduce a fourth dimension—interaction with the system.

Interaction With Content

Moore's first type of interaction takes place between the student and the content, or the subject matter that is delivered to him or her. Interaction with content takes place when the learner, with the help of the teacher or the teaching institution, establishes new knowledge by encountering new information and combining it with the body of knowledge already retained by him or her. Moore (1989) notes, that without this type of interaction, there can be no education, because the educational process entails the learner's intellectual interaction with content, which results in changes in the learner's understanding, the learner's perspective, or the cognitive structure of the learner's mind.

Holmborg (in Amundsen, 1993) views the process which takes place within the learner as a form of communication with the written text. He refers to this process as "a guided didactic conversation," which means that the learner is actually involved and interacts with the text he is learning, as well as with the author of the text.

In the distant past, prior to the invention of printing technology, interaction with content was generally possible only in a direct, face-to-face teacher-pupil framework, which allowed for the transfer of knowledge from the teacher to his or her pupils. In the 19th century, improved print technology combined with mass production paper—manufacture techniques made interaction from a distance possible. Later on, radio and the television created a new kind of interaction—with broadcasted content. Presently, we are well acquainted with modern interaction tools that utilize different multimedia techniques, and which can be exploited in a manner that illustrates and clarifies the learning material.

Nevertheless, successful and proper exploitation of multimedia e-learning techniques, such as the ability to access material online, generally requires careful treatment and increased attention. Otherwise, the students may encounter significant difficulties, such as becoming overwhelmed and confused by the amount and breadth of the information to which they are exposed (Swan, 2001).

Also, in the modern era, when the daily schedule of the working student is, in most cases, "tight," and his election of the distance-learning format is often based on the will to use his or her time as efficiently as possible, it is crucial to ensure that the content delivered to the student is relevant to, and may be implemented and found useful in connection with, his or her immediate needs, whether at his workplace or elsewhere.

Choosing the proper form of interaction between the student and the subject matter of the course will make the learning experience more worthwhile and valuable for the learner.

Interaction With the Teacher

The connection between student-instructor interactions and learning outcomes in the traditional classroom environment is well documented. Educational researchers have

found that teachers' verbal (i.e., giving praise, soliciting viewpoints, humor, and self-disclosure) and nonverbal (i.e., physical proximity, touch, eye contact, facial expressions, and gestures) immediacy behaviors can lessen the psychological distance between them and their students, thereby leading to increased learning. Interactions with e-learning instructors would appear to be important at least to the same degree (Swan, 2001).

In his transactional distance theory, Moore (1980) posits that the physical distance that exists in e-learning courses between the teacher and the students may result in a psychological and communicational gap between them. Such a gap will often impede the ability of the teacher and his or her students to achieve the desired level of understanding among them. In light of this, teachers and students participating in distance-learning courses will generally require "special" behavioral patterns, which are designed to overcome the communication gaps resulting from the transactional distance.

The transactional distance theory posits that increasing the dialog between the students and the teacher is an important factor in bridging the gaps between them. Therefore, distance-learning instructors should strive to ensure that a maximum amount of dialog takes place in the courses that they offer.

Moore further explains that when positive interaction between the distance-learner and his or her teacher occurs, the learner comes under the influence of the instructor. This enables the student to draw on the experience of the instructor, which then permits the student to interact with the content in the manner which is most effective, taking into account his own personal needs and style. The instructor is especially valuable in responding to the learner's application of new knowledge (Moore, 1989).

Additionally, in distance learning, the fact that the student generally conducts his or her interaction with the materials independently lessens the degree of the lecturer's control over the learning process of the student. In light of this, the role and expertise of the lecturer in ensuring that the learning process is efficient become extremely important. A correct personal response of the lecturer to a student's actions should enable the student to create new knowledge and implement it in other areas. Often, it is advisable for the lecturer to recommend specific articles which are not known to the student, and which may assist the student in enhancing and widening his knowledge (Moore, 1989).

Coppola, Hiltz, and Rotten (2001) claim that in any environment, teachers have three types of roles: cognitive, effective, and managerial (or, as some researchers refer to it—"teaching presence"). They found that, in the online environment, the cognitive role shifts to one of deeper complexity, which requires finding new tools.

In the e-learning context, the managerial role requires greater attention to detail, more structure, and additional student monitoring (Coppola et al., 2001). By using the special tools that online technology offers, for example, to monitor the students' participation in the course, the instructor can

interact with the students in a manner which prevents them from “getting lost.”

Moore (1989) claims that especially in distance education, when the instructor has to deal with each student individually, and each student’s response to a certain presentation differently, the instructor has a real opportunity to enter into a dialog with each student.

By being aware of the importance of the interaction between them, the lecturer and the students should try to cope with the difficulty that is created in a “faceless” distance-learning situation, and should find ways to supplement and replace the feeling of closeness that exists in a situation of physical proximity.

The lecturer’s expertise in interacting with the students, and the manner in which the interaction is carried out, is a vital ingredient which allows for the creation of the third type of interaction: learner–learner interaction.

Interaction With Classmates

Moore’s third type of interaction is interaction among the students themselves (Moore, 1989). Recent studies have shown that a basic element in traditional classroom learning is communication among the students: the ability to ask questions, to share ideas with others, or to disagree with others is a basic need in the learning process. The fact that gaps in one’s knowledge may be compensated for, and are complemented by virtue of, the knowledge of such person’s classmates, constitutes an important advantage of learning in a group (Picciano, 2002). Moreover, people who work together provide social and emotional support to each other (Haythornthwaite, 2001).

Certain researchers have suggested that asynchronous forms of media which support fewer effective communication channels are less capable of representing the “social presence” of participants in courses which are based on such forms (Short, Williams, & Christie 1976 as cited in Swan, 2001). However, more recent researchers contest this view, arguing that computer-mediated communication can offer “social presence” (Walther, 1994 as cited in Swan, 2001). Distance education courses offer interaction among peers by using tools such as e-mail, online conferences, and chat rooms. In the new model of asynchronous distance learning courses, interactions among students through discussion groups seem to be one of the most influential features. Participants’ interaction with one another within a learning community can allow them to overcome their isolation and strengthen their relationship with the group (Trentin, 1998). Different research studies (Lai, 1997; Klemm & Snell, 1996; Jonassen & Kwon, 2001) assert also that subjects that involve discussion, brainstorming, and reflection are best suited to the online format—despite the fact that online discussions are significantly different from face-to-face discussions. To begin with, all students have a voice, and no student dominates the conversation. The asynchronous nature of the discussion makes it impossible for even the instructor to control it. Accordingly, many

researchers note that students perceive e-learning group discussions as more equitable and more democratic than traditional classroom discussions (Swan, 2001). Because it is asynchronous, online discussion affords participants the opportunity to reflect on their classmates’ contributions while creating their own, and on their own writing before posting them (Jonassen & Kwon, 2001; Trentin, 1998; Vandergrift, 2002). This tends to encourage mindfulness among students, as well as a culture of reflection. The interaction that is established by computer-mediated communication encourages experimentation, sharing of ideas, increased and more distributed participation, and collaborative thinking (Trentin, 1998; Jonassen & Kwon, 2001). Various scholars tie the success of online courses to the level of the discussions that took place during the course. Picciano (2001), for example, found that students’ perceived learning from an online course was related to the amount of discussion which actually took place in the course. Brown (2001) found that the degree of community which was experienced by the students was closely linked to the levels of their engagement in the class and dialogue. Swan’s (2001) research results showed that the greater the percentage of the course grade that was based on discussion, the more satisfied the students were, the more they thought they learned from the course, and the more interaction they thought they had with the instructor and their peers. Such findings indicate that interaction among students is an important factor in the success of online courses.

On the other hand, other researchers who investigated collaborative learning online, found it to be unsuccessful. They suggest that asynchronous formats might not be appropriate for the negotiation of difficult issues which require rapid turn taking in conversation and shared access to objects that cannot be easily referenced in electronic spaces (Swan, 2001). Harasim (1986) and Bonk (2001) both assert that the lack of nonverbal cues, the delays in receiving a reply, and the lack of spontaneity as compared to a face-to-face group that is gathered around a table, may have both advantages and disadvantages for the participants. In any case, it is clear that online interaction differs in some important ways from the face-to-face discussion.

In the distance-learning framework, the three types of interaction discussed above—interaction with content, interaction between the students and the lecturer, and interaction among the students—do not take place in “open space.” In the virtual environment, more than any other environment, the system in which the different types of interaction take place, plays a major role.

Interaction With the System

Learning activities entail complex procedures of interactions, and the benefits of the technological system can easily be lost if that complexity is not appreciated, understood, and dealt with in a satisfactory manner. It is clear that even when the technology’s potential is utilized to its fullest, there is no guarantee with respect to the quality of the added learning

that the technology-based interaction will bring to the learning process.

In parallel to the efforts to exploit modern technology for implementing distance learning, there is a need to make sure that the technology itself will remain transparent and will not create a psychological or functional barrier. It can be expected that many of the e-learners will have difficulty in carrying out the psychological change that is required to proceed from studying face-to-face to studying online. It can also be predicted that many e-students will require guidance in the use of the new system. A study conducted by Kedar, Baruch, and Gruvigald (2003) indicates that if the technological and technical problems that the students encounter while using the system are not solved immediately, this will reflect negatively on the student's level of satisfaction from the e-learning system. Carswell and Venkatesh (2002) found some support for their hypothesis that students' perceptions of the technology are positively related to learning outcomes and an intention to further use the technology.

In light of the above, the necessity of building a support system, with maximum accessibility, is apparent. In building such a system, theories of innovation diffusion should be employed.

The system itself may be viewed as a special environment which can establish new and different types of interaction among the students. In a study conducted by Lawrence and colleagues (2001), researching the aspect of human-computer interaction on a group of students at Cornell University, they hypothesized that, as compared with a more traditional approach to classroom teaching, a collaborative learning environment would encourage the use of more social computing among students and group members. *Social computing* was defined there as the use of social communicative tools such as e-mail, instant messaging, and chat. Their conclusion was that mobile computing allows students to engage in learning-related activities in diverse physical locations, to work on projects supported by multimedia resources, to communicate with distant collaborators, and to access information networks anywhere and anytime. Similarly, wireless computing technologies can potentially enhance social learning. Such research has an impact on the understanding of the place of the computer as a tool—a system—and its implication on patterns of learning. The computer, which is generally the medium for the delivered content and delivered interaction in modern distance learning courses, can establish a new type of interaction that is not available in the traditional environment. For example:

- The availability of online data and multimedia is a new tool, which should result in new thinking about how to design the students' assignments to maximize their benefits.
- The accessibility of self and group data, both for the students and for the instructor, when using an e-learning system, offers the students and the instructor a new instrument for interacting. This new implement can assist the teacher in monitoring the students and their respective progress. It can also play a positive role in allowing the students to experi-

ence the feeling of being part of a group. In addition, by allowing each student to evaluate his or her achievements in comparison to the classmates, it can encourage healthy ambitiousness among the students, thereby addressing one of the main problems associated with distance learning—the necessity for a high level of self-discipline.

- In most systems, the discussion that is conducted in the framework of the course is available for review by the students at all times; the students can “go back in time” and read any of the discussions which took place in the past.
- The use of e-mail can make it easier for the students to contact the teacher or their classmates privately. This form of interaction can be used when a student feels the need to request more information, but prefers to do so on a one-on-one basis, without disclosing his or her request to the other participants in the course and without the need accommodate the schedule of the instructor's office hours.

The above examples demonstrate how the unique features of the computer-based, distance-learning “system” can be exploited to enhance learning. Those are only four of many examples which can be cited in this regard.

Based on his experience as an online course designer, Guglielmo Trentin (1998) noted “The more easily environments can be structured to meet communication needs, the more enjoyable and trouble-free participation in the course will be.” (p. 36) Trentin listed the characteristics that a computer conferencing system should possess to be suitable for online education. His list includes issues relating to good management and clear structure of the messages in the discussion that is held (for example, management of links between messages that belong to the same conference and offering quick access to new messages), and other functions that the system should offer, such as storage of material and logs and statistics of user operations.

Educators must pay attention to what the system itself has to offer, and to use it to influence, in a positive and constructive manner, the three types of interaction identified by Moore—interaction between the student and the content, interaction between the student and the lecturer, and interaction among the students—so that the apparent weaknesses of the e-learning system will become its strengths.

Proposed Model

None of the four types of interaction functions independently. To the contrary—they are closely interrelated. Interaction among students, for example, is supported by instructor facilitation and support, and because it centers on, and is intertwined with the content of the course, can be considered a series of content interactions. This is especially true in the e-learning environment, where the different types of interaction take place on the same medium, as is the case in electronic chats and discussion groups involving the teacher and his or her students.

In light of the close relationship among them, the various categories of interaction should be considered together.

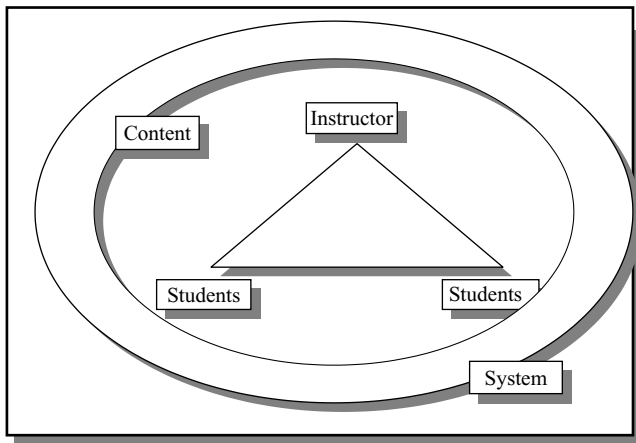


FIG. 1. The model illustrates the connection between the four dimensions of interaction that take place in distance-learning courses.

They may be seen as *interconnected roads on the e-learning map*.

The model depicted in Figure 1 emphasizes the connection between the four dimensions of interaction which take place in distance-learning courses. In our model, the lecturer is at the top of the learning pyramid, but in parallel to his or her communication with the students, communication among the students themselves is carried out. The lecturer also participates in the interaction between the students. Both of these types of interaction—teacher–student and student–student—take place in, and are affected by, the “environment” of the course, which is determined by its content and system.

Conclusion

In this article, we have examined the perceived benefits and disadvantages of e-learning courses. The results of our examination indicate that the key factor, which can make an online course succeed or fail, is the element of interaction. When interaction takes place successfully in an e-learning course, the students benefit from the learning process, and positive results are achieved. When the interaction aspect “fails,” the students are dissatisfied with the distance-learning course.

To be successful, e-learning instructors must overcome psychological and communication gaps that may result from the transactional distance associated with e-learning. Unlike face-to-face courses, which are naturally associated with a feeling of closeness, thereby encouraging interaction, distance-learning courses need to be carefully structured to achieve a feeling of closeness. Ultimately, closeness is not determined by geography, but rather by the relationship between the participants, the dialog they conduct, and the feelings they have towards each other and the educational system in which they participate.

The interactive aspects of e-learning should be tailored to meet the specific needs of the participants in the course being considered. In structuring their distance-learning

courses, instructors need to consider the three types of interaction identified by Moore: (a) Interaction with content, (b) interaction with the instructor; and (3) interaction among the classmates. Instructors should also consider the fourth dimension of interaction identified in this article: interaction with the system. By taking into account the four types of interaction (as well as the connection between them) when designing their e-learning courses, instructors can expect to achieve better results. Optimally, those features of the e-learning environment that are sometimes identified by students as being negative factors can be transformed into the unique benefits offered by the distance-learning format.

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