Factors Affecting Interaction in a Distance Education via Video Conferencing[1]

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Abstract

The purpose of this study is to determine the factors affecting the interaction between instructor and students in a distance education process via video conferencing. In the study, case study, one of the qualitative research patterns, has been adopted and contrary case sampling, one of the purposive sampling methods, has been used. The data, which was collected through interviews and observations, have been analyzed with the method of content analysis method in the study. The findings are in the direction that the methods and techniques of the instructor with his supportive behaviors for interaction have a big impact on the interaction. In addition, the properties of students such as prior knowledge and self-confidence have been seen to affect the interaction. It has been concluded that other factors which affect the interaction were technical problems such as muting and disconnection, and communication difficulties such as the inability for eye contact and misfiring of gestures and mimics.

Keywords: video-conferencing, distance education, interaction

1. Introduction

Developments in the Internet-based technologies have put forward e-learning model, which has become an increasingly important power in distance education (Aşkar&Halıcı, 2004). That some of the universities, which are following the developments in e-learning, process the courses online, transport the distance education programs to the internet and open e-certificate programs shows that they have taken e-learning among their priorities (Ajadi, Salawu, &Adeoye, 2008; Mutlu, Özöğüt, Kayabaş, & Kip, 2007).

Universities aim to suppress the shortcomings of traditional education and provide a more effective learning environment for students via e-learning (Eastman & Swift, 2001; Gillies, 2008). However, it is known that there are students who have aborted programs because of problems such as lack of time, motivation and interaction for distance education programs in universities (Koppelman&Vranken, 2008). To overcome the related problems, video conferencing technologies are referenced. Video conferencing technologies is a communication system that provides synchronous and face-to-face interviews of person or groups who are away from each other using camera and microphone, and by telecommunication network (ISDN-IP) (Yiğit, Alev, Altun, Özmen, &Akyıldız, 2006).

In recent years, the use of video conferencing technologies pervades in e-learning applications in educational institutions in order to develop social relations and to achieve an environment close to the traditional classroom environment (Coventry, 2003; Stewart, Harlow, &DeBacco, 2011). Individuals can have the opportunity to communicate with peers and experts in different locations via video conferencing. With small working groups owing to this communication, the formation of a supportive and intimate environment for professional development is provided (Gillies, 2008). Video conferencing technologies deter the loneliness feeling of individuals who involve the course in different places providing their association during the course (Symth, 2005). In addition, it can supply to remedy the lack of interaction in crowded classrooms where there is less opportunity to ask questions to the instructor (Gillies, 2008; Göktaş&Kayri, 2005; Marsh, Mitchell, &Adamczyk, 2010). This situation indicates that video conferencing technologies are strong sides of the ease of interaction and access.

Despite the use of video conferencing technologies, with its synchronous visuality and auditory, increase seriously in schools and universities, it is seen that it cannot adequately meet the expectations of the students (Knipe& Lee, 2002; Motamedi, 2001; Yozwiak, Robiner, Victor, &Durmusoğlu, 2010). Being unable to have eye contact with instructor in activities such as brainstorming, question-answer and discussion; hinders the students to establish an intimate relationship with the instructor by not feeling that the instructor is beside them

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(Carville & Mitchell, 2000; Karal, Çebi, &Turgut, 2011). Therefore, courses held via video conferencing are seen as a television program for many away students (Bozkaya, 2006). In addition to these, link breaks make students disappointed. Even, this situation leads individuals to feel that they are not real students (Gillies, 2008; Koppelman&Vranken, 2008). When compared to other types of distance education, having problems, like these related to the interaction in addition to real-time communication, closeness, motivation and collaborative learning environments which are offered by video conferencing technologies, compromise the development of education through video conferencing. Because interaction between the instructor and students should be indispensably provided to create a successful strategy for distance education and to improve the quality of distance education (Gunawardena&Zittle, 1995). Even, in his communication and interaction theory, Holmberg (2003) emphasizes that the interaction between instructor and student forms the basis of learning. Depending upon all these, interaction, which is held between instructor and student, can be said to have an important place in distance education via video conferencing. Therefore, the interaction that occurs between the instructor and students is believed to be examined in depth.

In field literature, interviews or observations are seen to have been used as data collection tools while discussing the interaction, experienced in researches related to distance education via video conferencing, in terms of teaching staff or students (Doggett, 2008; Gillies, 2008; Koppelman&Vranken, 2008; Martin, 2005; Symth, 2005). A study, examining the interaction that took place especially in a distance education via video conferencing in the eyes of both instructor and students and using different data collection tools in depth, haven't been encountered. Therefore, it is thought that the study can provide more effective use of video conferencing technologies in learning and teaching process in terms of interaction and that it can shed light on practices in this field.

In this study, factors, affecting the interaction with perspectives of instructor and students who have experienced a distance education via video conferencing, are aimed to be uncovered. In this respect, while the main problem of the study represents "What are the factors affecting the interaction between the instructor and student in distance education process via video conferencing?" question, the sub-problems of the study are:

1. What are the factors affecting the interaction between instructor and student in terms of the student?
2. What are the factors affecting the interaction between instructor and student in terms of the instructor?

2. Method

This study is a qualitative research which focuses on the interaction that took place between an instructor from the Department of City and Regional Planning, University B and 2nd grade students from the Department of City and Regional Planning, University A, in Urban Sociology class via video conferencing. Woodside (2010) have stated that a case study offers the opportunity to review a phenomenon in depth. Therefore, the research has been carried out in the form of case study which is one of the qualitative research patterns.

2.1. Course environment and course description

Urban Sociology; is a course that aims students to associate social processes in urban areas with administrative processes and that is processed 2 hours per week. Instructor and students have processed courses with video conferencing technologies such as camera, microphone, smart board and document camera in distance education centers of universities and by connecting with their IP addresses which offer 330 KB bandwidth.

2.2. Selection of participants

In sample selection, contrary case sampling has been used from purposive sampling methods. Mentioned sampling method provides to obtain richer data compared to normal situations by including contrary cases in the universe of study to sampling group, and thus depth examination of the problem investigated (Patton, 1990). In this respect, researcher has included 8 students to participant group by taking instructor and participation (active/passive) into consideration.

Willingness has been taken into consideration in interviews and the interview has been explained for what purpose before interview. Names of the participants and universities have been concealed in frame of research ethics. In this context, participants have been coded as "P1, P2, P3, P4, P5, P6, P7, P8, and P9". Information about participants is presented in Table 1.

Table 1. Characteristics of participants

Code	Participation Type	Participation	University
P1	Student	Active	A
P2	Student	Active	A
P3	Student	Active	A
P4	Student	Active	A
P5	Student	Passive	A
P6	Student	Passive	A
P7	Student	Passive	A
P8	Student	Passive	A
P9	Instructor	-	B

P1: Participant 1

2.3. The role of the researcher

Researcher has introduced himself as a graduate student off the field. He has kept secret his primary aim saying that he has been taking the course by the compliance with the department. The researcher has assumed the role of student as participant observer. Because, it is an effective way to be a part of the group, activities and speeches in learning feelings and thoughts of the individuals by including class activities (Eisenhart, 2001). At the end of the semester, the researcher has explained the purpose of being in the environment to the students and he has progressed to the role of researcher from the role of student role by specifying that he has wanted to make interviews with some of the students.Araştırmacıkendisinialandışıbiryükseklisansöğrencisiolaraktanıtmıştır.

The study has been conducted with one instructor and one graduate student. The graduate student has taken Teleconferencing and Distance Education Applications, and Qualitative Research Methods courses to be enough in studied field.

2.4. Data collection tools and data collection process

Data has been collected with interview and observation techniques in this study which examines the factors affecting the interaction by perspectives of instructor and students. The researcher has refrained drafting questions that do not serve the purpose of study by considering research problems in the process of interview form development process. In addition, the researcher has added questions to the interview form in order to obtain information in depth for some situations which he has faced within observations. Interview form which was prepared in this manner has been presented to field experts and a person who is doing research in field. The final version has been given to the interview form by making necessary corrections in accordance with the feedback. Interviews have been realized with participants in designated place and time in order to avoid data loss and to save time by using digital voice recorders.

The researcher must see the world through the eyes of surveyed people in revealing the facts about the researched situation (Yıldırım&Şimşek, 2008). For this reason, the researcher has not used a standard observation instrument during his observations as he has attended courses taking on student role. In addition, organizing the interaction observation form developed by Oliver and McLoughlin (1997) regarding classroom interaction and considering the opinions of the field experts, the researcher has given it the final version in Appendix-A. Descriptions have also been made for the types of interaction in the interaction observation form in Appendix-B. Video recordings have been utilized for filling the interaction observation forms. While watching the video recordings, the researcher has made markings to the relevant field in interaction observation form by paying attention to whom starts the interaction between instructor and student/s, and what kind of interaction occurs. By digitizing the data obtained from markings within the interaction observation form, the researcher has made them suitable for descriptive analysis.

2.5. Data analysis

According to Elo and Kyngäs (2008), inductive content analysis; increases the intelligibility of the case investigated by the regulation of bringing together the data under coding and certain themes. In this context, data, which were obtained from interviews and unstructured observations, have been interpreted by analyzing with inductive content analysis and by creating appropriate tables and charts. The data, which were obtained from interaction observation table, have been descriptively analyzed according to the classification of Oliver and McLoughlin (1997).

2.6. Validity and reliability of the research

In qualitative researches, notions are used as plausibility for inner validity, transferability for external validity, consistency for inner reliability and verifiability for external reliability (Merriam, 1997). In this study:

- To ensure reliability, more than one data collection tools have been used such as interview and observation, long term interaction has been done with participants, expert opinion has been applied while developing observation form and analyzed data have been confirmed to participants.
- To ensure transferability, contrary situation sampling has been used from purposive sampling method and all stages of the research have been tried to explain in detail.
- To ensure consistency, findings have been presented by supporting with raw data, questions have been asked to participants at the same order in interviews, and router questions have been avoided.
- To ensure verifiability, raw data, and encodings in analysis phase, findings, comments and suggestions have been recorded and checked again and again.

3. Findings

Content analysis has been done with the data obtained from interviews with participants and observations. Outstanding themes as a result of analysis are; the roles of instructor, communication difficulties, technical problems and student characteristics. These themes are explanatory to both sub-problems of the research. For this reason, each of the themes has been presented in sub-titles. In addition, the findings of the descriptive analysis of the interaction observation forms have also been presented under the headings of relative themes.

3.1. The roles of instructor

One of the outstanding topics as a result of the analysis, the roles of the instructor's related encodings have been presented in Table 2. The encoding "being accustomed to the environment" has been obtained from only the analysis of the interview that was made with instructor.

Table 2. Findings for the roles of instructor

The roles of instructor		Using question-answer technique	Being expert in field	Using discussion technique	Inciting interaction	Using Case study technique	Making long expressions	Being funny	Being accustomed to the environment
Interview	P1	✓	✓		✓		✓		
	P2	✓	✓	✓	✓		✓	✓	
	P3	✓	✓	✓					
	P4	✓	✓	✓	✓	✓		✓	
	P5	✓	✓	✓	✓	✓	✓		
	P6	✓	✓	✓		✓		✓	
	P7	✓	✓	✓					
	P8	✓	✓	✓	✓	✓			
	P9	✓		✓	✓	✓			✓
Observation	O1				✓	✓		✓	
	O2	✓				✓		✓	
	O3	✓			✓		✓	✓	
	O4	✓		✓	✓			✓	
	O5	✓			✓		✓		
	O6	✓				✓	✓		
	O7	✓	✓		✓				
	O8	✓	✓			✓	✓	✓	
	O9	✓		✓		✓	✓		

P1: Participant 1; O1: Observation 1

Students have indicated that instructor's being expert in the field and using teaching techniques such as case study, question-answer and discussion in courses had a positive contribution on interaction. As a result of instructor's teaching techniques and supportive behaviors for interaction, it has been observed that different

students started to ask questions and participate in courses in recent weeks. However, it has been pointed out that instructor made students as passive listeners by making long lectures in some weeks. Findings on this issue are as follows:

> It was very important for me to listen to an expert, to answer him, to criticize his answers, to say that he was right or that I disagreed with him (P1).
> The instructor gave us witty answers and loved to make discussions. It was so good to be this way. Because there was no one concrete in front of us. His interaction with us in this way warmed us for the course (P2).
> The instructor tried to draw us to causerie while lecturing the topic. Rather than giving the information word for word, he processed the course by telling, instantiating and asking us questions (P4).

In Table 3, significant findings for the role of instructor have been presented where there was analysis results obtained from interaction observation forms filled via watching video recordings of the courses.

Table 3. The amount of interaction and the percentages by category

Type of interaction	INTERACTION OBSERVATION TABLE							
	I-C	I-S	Total	(%) Percent	S-I	S-S	Total	(%) Percent
Social	34	2	36	10.2	28	-	28	10
Procedural	49	10	59	16.8	42	-	42	15
Descriptive	98	45	143	40.7	186	1	187	67
Interpretative	4	33	37	10.7	4	-	4	1.3
Cognitive	21	55	76	21.6	16	3	19	6.7
TOTAL	206	145	351	100	276	4	280	100

According to Table 3, the instructor has been understood to make much more attempts in interaction between himself and student in course process. 631 interactions have been during course period consisting of nine video conferencing courses in all. The number of interactions that instructor initiated for the whole class or specific student/s is 351. In other words, 55% of the interaction took place, has been instructor-originated interaction. 62% of instructor-originated interaction consists of; descriptive interaction which means his lecturing via question-answer with students and cognitive interaction which means his adjoining students' answers to interaction by questioning.

3.2. Communication Difficulties

"Communication difficulties", which is often dealt with in interviews and observations, is one of the featuring headings as a result of analysis. The encodings related to the communication difficulties have been presented in Table 4.

Table 4. Findings for communication difficulties

Communication difficulties		Certain students' interacting	The lack of recognition face to face	Eye contact inability	The lack of a sense of intimacy	A sense of impenetrability in communication	A sense of impenetrability in communication	The lack of instructor-student interaction
Interview	**P1**	✓	✓				✓	✓
	P2	✓	✓		✓	✓	✓	
	P3	✓		✓				
	P4	✓	✓	✓				
	P5	✓		✓	✓	✓		✓
	P6	✓		✓	✓	✓		
	P7	✓	✓				✓	✓
	P8	✓	✓	✓				✓
	P9	✓		✓	✓		✓	
Observation	**O1**	✓						
	O2		✓		✓	✓		
	O3					✓		
	O5	✓					✓	
	O7	✓	✓					
	O8					✓		
	O9				✓			

P1: Participant 1; O1: Observation 1

The instructor and all of the students have expressed that specific students interacted with instructor in courses. Only specific students have been observed to interact with the instructor until last weeks as other students hesitated to interact. In addition, eye-contact inability and lack of recognition face to face are featuring difficulties related to interaction in the process of course. Findings on this issue are as follows:

> The instructor could misunderstand you as he could not see your mimics when you said something. He could maintain the course seriously when you made jokes or humors (P2).
> There was nobody to answer when the instructor asked a question. I also had the shyness. Does my voice mute? I had difficulty to speak as instructor was not in front of me (P3).
> 2 or 3 people usually answered when the instructor asked a question (P7).
> Does the instructor understand you when you interact with him? Doesn't he? Because it was not certain, we lived discontinuities and this affected our communication with instructor negatively (P5).
> That there is an eye-contact inability in smart classroom environment strengthens monologue (P9).
> Students are timid in this course in contrast to their talkativeness on other subjects. As a result, there is an environment that a few dominates and speaks in the class. It is therefore more monologues in lectures (P9).

3.3. Technical Problems

Encodings related to technical problems, another prominent topic as a result of the analysis, are presented in Table 5. The encoding "Camera focusing inability to faces" has only been obtained from analysis of the interview with instructor.

Table 5. Findings for technical problems

Technical problems		Muting	Disconnection	Obscurity of the image	Camera focusing inability to faces
Interview	**P1**		✓	✓	
	P2			✓	
	P3	✓	✓		
	P4	✓	✓	✓	
	P5	✓	✓	✓	
	P6	✓	✓		
	P7	✓	✓	✓	
	P8	✓		✓	
	P9	✓	✓	✓	✓
Observation	**O1**		✓		
	O2	✓		✓	
	O3	✓	✓	✓	
	O4	✓	✓		
	O5	✓		✓	
	O6	✓			
	O7	✓		✓	
	O8	✓	✓		
	O9	✓	✓		

P1: Participant 1; O1: Observation 1

The instructor and students have expressed that technical problems, during the courses, such as muting, disconnection and obscurity of the image had negative impact on the interaction. Due to technical problems experienced in courses, students have been observed to be afraid of interacting. In addition, the instructor has indicated that he could not instantly do a full assessment as he could not see the faces of students during the interaction. Findings on this issue are as follows:

> Stuttering voice and disconnection were big problems during the course. Becauseyou are not side by side by the instructor. As you are away, you cannot understand some of what the instructor says (P5).
> The ambient is quite good; there should not be technical problems. Therefore, we could not process course for 1-2 weeks (P6).
> There were distortions in the image and rustlings in the sound. For these reasons, we would be more active if we were face to face with the instructor (P7).
> As you cannot see the faces whom are by the other side in this education, being unable to measure their reactions and being unable to be in the position on how they are the parts of the course affect the interaction and socialization (P9).

3.4. Student characteristics

In the analysis of the consultation with the instructor, student characteristics have turned out to have effect on the interaction. The instructor's thought on this issue is as follows:

> There was an annoying silence in the class because of students' not being very knowledgeable about the subject, being foreign for the environment and having problem of trust (P9).

While the students had strangeness for the environment at the beginning of course process, it has been observed that students transcended it in oncoming weeks. Despite this, students have hesitated to interact until latest weeks. This can be seen on findings obtained by the results of analysis of interaction observation form. According to Table 3, the number of interactions which students have initiated for the instructor or other students is 280. In other words, 44,5 % of interaction is student-originated. 67% of the student-originated interaction consists of descriptive interaction in the shape of answering to questions from the instructor and asking questions relevant for subject. Students have beggarly used the interpretative and cognitive interaction, which allow discussion environment emergence such as interpreting what the instructor says and making inferences. In addition, that there is insufficient social interaction which includes developing an intimate relationship by talking to instructor on everyday matters, shows that students have not tried much to develop an intimate relationship with the instructor.

4. Discussion and Conclusions

Within the framework of the themes as a result of analysis of the data, the factors, which affect the interaction between the instructor and students in distance education via video conferencing, can be examined under four headings:

4.1. The roles of instructor

The research has concluded that teaching methods and techniques of the instructor occupy an important place in interaction during the course in terms of instructor and students. Gillies (2008) indicates in his study that instructor's using only the narration reduces the interaction to minimum in the courses. This study shows that instructor has increased the interaction owing to his appropriate choices about methods and techniques by being in the effort of adjoining students to the interaction. There are similar studies, which are parallel with these results, in the field literature (Bozkaya, 2006; Doggett, 2008; Martin, 2005; Whyte, 2011).

While students have been observed to hesitate to interact, instructor's being funny and behaviors to encourage students for the course have made students to interact with the instructor towards the end of term. In addition to this, instructor's being experienced with distance education environment has been concluded to be important in terms of interaction. Because an experienced instructor can use the environment in a way that he can increase the interaction by not having adaptation problem in the course process.Knipe& Lee (2002) and Bozkaya (2006), in their studies, highlight the importance that the instructor must have experience in distance education process.

4.2. Communication difficulties

Eye contact inability of the instructor with students has caused to stop each other's conversations in course process. Similar problems related to the inability for eye contact also are seen in the study of Gillies (2008). Besides, not recognizing mimics and gestures have created misfiring between instructor and students. In the study of Koppelman and Vranken (2008), a lack of visual clue such as misfiring of mimics and gestures has been seen to affect the interaction negatively. The lack of face-to-face recognition of the instructor and students is thought to inhibit the development of intimacy in the course process. In studies, an instructor, who has the lack of recognition of students, is perceived to be insincere and formal by his students (Bozkaya, 2006; Carville & Mitchell, 2000).

These problems make the interaction virtual by preventing the emergence of a sense of togetherness with the instructor and students. In studies, students have been reported to incline to isolate from interaction as they have perceived themselves not to be a part of the class because of that they have not felt the instructor beside them (Karalet all, 2011; Knipe& Lee, 2002; Symth, 2005). Similarly in this study, that the students have hesitated to interact owing to communication difficulties; has been concluded with that some specific students have participated to the interaction until latest weeks. Koeber and Wright (2008) have stated in their study that communication difficulties cause students to be less willing to interact with the instructor.

4.3. Technical problems

Technical problems such as muting, disconnection and obscurity of the image have been concluded to have negative effect on interaction during the course in terms of instructor and students. In this context, research results such as that instructor and students have difficulty to understand each other due to delays in sound (Bozkaya,2006), that technical problems annihilate the naturalness of speech and debates (Koppelman&Vranken, 2008), and that problems of sound and image constitute an obstacle for interaction (Koeber& Wright, 2008) are supportive for this study.

Cameras' not focusing on the faces of the students during the interaction is seen as a shortcoming in terms of instructor. This shortcoming deprives instructor from visual clues that are valuable on behalf of instantaneous assessment of students. MacLaughlin et all (2004), in their study, emphasize that a very efficient interaction takes place in the process of course in which cameras focusing on the speaker's face are used.

4.4. Student Characteristics

Student factor has also been found to have an important place away from the rigors of communication on students' hesitating from the interaction in terms of the instructor. Because, it has been concluded that students' lack of knowledge on subject, being foreign to environment and having self-confidence problem caused them to hesitate from interaction. In Whyte's study (2011), a high-level interaction has been seen between instructor and students as a result of that students were confident and comfortable about interacting.

Considering the results of the study, the factors affecting the interaction via video conferencing in distance education are summarized in Figure 1.
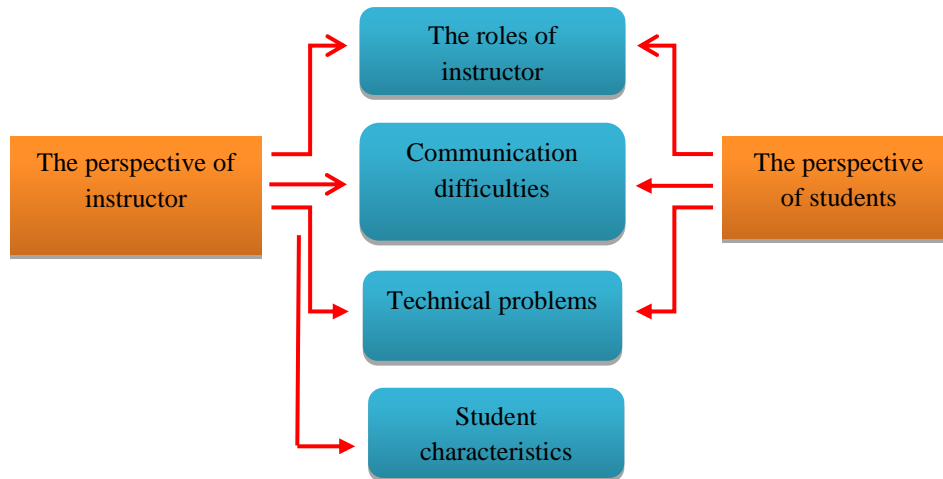
Figure 1. Factors affecting the interaction

That distance education via video conferencing is provided by communication systems which offers minimum 330 KB bandwidth and that data are obtained from interviews and observations made for nine weeks, can be seen as limitations of the study. In studies proceeding in this direction, a study, in a course environment which is prepared considering the problems in a study with higher resolution communication systems and with a longer-term participation, is believed to deliver useful results. A research, which researchers will make in a course environment supported with higher bandwidth with long term participation by considering problems in the study, is believed to deliver useful results for the field literature.

As a conclusion, this study is thought to be useful in terms of presenting the opportunity to investigate the factors affecting the interaction via video conferencing in distance education process in depth with the perspectives of the instructor and students and using different data collection tools. The research is thought to offer clues on interaction's being more effective in distance educations via video conferencing and to shed light on studies in this subject.

5. Suggestions

Considering the results of the study, the following suggestions are made for interaction in distance educations via video conferencing:

- The instructor should have an approach which is supportive for students to participate to the interaction and should choose teaching methods and techniques that serve this purpose.
- Precautions should be taken to minimize technical problems during the course as possible.
- It can be useful for students to make orientation study at the beginning of the education process and to perform one lesson at least face to face with the instructor.
- In distance education centers, using cameras that focuses on faces and high bandwidth, more advanced technologies can be used on behalf of providing visual clues and eye contact.
- By giving minor assignments on behalf of being active in the course, students can be asked to present them.

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Appendix

Appendix A. Interaction Observation Form

INTERACTION OBSERVATION FORM				DATE:
Type of Interaction	**I-C**	**I-S**	**S-I**	**S-S**
Social				
Procedural				
Expository				
Explanatory				
Cognitive				

The following explanations have been made in the study of Oliver and McLoughlin (1997) as for the types of interaction in the form of interaction observation form.

Appendix B. Interaction Observation Form

Type of Interaction	Description	Example
Social	Teacher-student talk establishing and developing rapport	T: HelloSally, how areyou? S: Verywellthankyou. T: Great tohearfromyou; whatareyougoingto do for us?
Procedural	Teacher-student dialogue involving information exchange on course requirements and procedures	S: Mr. Gray, can youtell me how manypagesyouwant us towrite? T: I'm lookingforabout 2 pages in total. S: Can weuse a topic of ourownchoice?
Expository	Student or teacher demonstrating knowledge or skill in response to a direct request from another	T: Can anyonetell me how we say, "Today it is warm"? S: Samuidesu? T: Not quite, it is…
Explanatory	Teacher using student responses to explain knowledge and develop content	T: This is how we ask thatquestion in Japanese… Sally, can younow ask yourquestion? S: Sallyasks her question… T: Great Sally, but didyourememberto… John, willyouplease ask yourquestion?
Cognitive	Teacher providing constructive feedback to a student to reflect and to consider an alternative perspective/reality	T: Can youtell me whatyouthinkwasthe main reasonfor his actions? S: He wasangryandwantedtogeteven. T: But wasthatall_ Whatabout his wishtoimprove his positionandstanding? S: I suppose he did but I thoughtthat he wouldhavedone it differently.