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Effects of Computer and Multimedia Software on Iranian high School Students' Learning and Perceptions of Chemistry Classroom Environments

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Both process- and product-oriented, this study estimates the effects of using computer and multimedia software on students' learning and their perceptions of chemistry classroom environment. 44 Iranian first-grade high school students were divided into control and treatment group. They were taught parts of the second grade high school chemistry textbook during 15 sessions. The control group was taught using just the textbook and the ordinary equipment while the treatment group was taught using computer, educational software, PowerPoint files and LCD monitor beside the textbook and the ordinary equipment. After 12 sessions, the WIHIC (What Is Happening In This Classroom) questionnaire was administered among the participants and at the end, a final test was also given to both groups to assess the participants' learning. The results revealed that the participants in the treatment group perceived their chemistry classroom environment more positively and gained better scores.

Keywords: chemistry classroom environment; WIHIC; computer and multimedia software; high school students; process- and product-oriented study

INTRODUCTION

The recent developments in science and technology have affected the structure and educational system of the society. In the light of these developments, Information

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Communication Technology (ICT) has started to be widely used in various fields of education including chemistry (Sanger & Badger, 2001; Sanger, Phelps & Fienhold, 2000; Kurtz & Holden, 2001). There have been various studies on the use of ICT in learning chemistry and sometimes conflicting results have been reported. Some studies show that the use of ICT can increase student achievements and overcoming misconceptions (Ertepınar, 1995; Sanger, 2000; Huppert, 2002) while some others mention no difference between traditional and technology-mediated learning (Burnston, 2003). Burnston (2003) believes that most of these studies are outcome-based and do not take into account the cognitive processes underlying the performance. Doughty (1987) also states that the product-oriented approach to evaluating the use of ICT in chemistry education has proven unsatisfactory primarily due to inattention to the central role of the learning process and the corresponding influence of learner characteristics. To clarify the effectiveness of the ICT, it is necessary to evaluate classroom environments with multiple environmental elements. Jung (2003) proposes Moos' (1979) framework as quite comprehensive to explore technology-mediated classroom environments. Moos (1974) presents three widely used categories for describing the social climate of a classroom: (1) personal development, involving personal growth and enhancement; (2) relationship, which identifies interaction and support among participants in the environment, and (3) system maintenance, which involves environmental order, control and change.

This study applies the WIHIC (What Is Happening In This Class) questionnaire, one of the most widely used instruments in the field of learning environments research, to assess the effectiveness of a technology-enhanced learning environment in a chemistry classroom. The WIHIC questionnaire has been developed based on Moos' ideas and explores a learning environment from seven dimensions (i.e., Student cohesiveness, Teacher support, Involvement, Investigation, Task orientation, Cooperation, and Equity). This study aims to investigate the effects of using computer and multimedia software on some Iranian high school students' learning and their perceptions of their chemistry classroom environments. It also provides one of few classroom environment studies we are aware of conducted in Iran.

LITERATURE REVIEW

TECHNOLOGY IN CHEMISTRY EDUCATION

Teaching chemistry does present some significant challenges. Much of chemistry is the study of intangible concepts that require models to assist with conceptualization. Technology can play a significant role here. Through technology interactive models can be designed to concisely and appropriately explain the nature of matter. The effects of using technology on chemistry education are not limited here and other influences have been cited in the literature. For example, computers can be used at different times and places according to the characteristics of the subject matter, the students, and the available software and hardware. Computer programs can be used for practice, revision, one-to-one instruction, problem solving, or simulations during the applications (Demirel, 1996).

With Computer Assisted Instruction (CAI), there is a form of one-to-one instruction (or two students together at each computer), plus the opportunity for the students to proceed at their own pace, repeating parts of the exercise as they wish. None of these features are easily available in a didactic classroom situation. In addition, there is added variety and, perhaps, novelty in CAI, along with the potential to use vivid and animated graphics, enabling three-dimensional aspects, and other features to be viewed more realistically. Of course, not all computer programs have these features, but the potential is certainly there.

Computer presents wonderful opportunities for learning and teaching processes. Using to teach, manage, show and communicate made the computer unique compared the other learning devices. In computer assisted instruction method, the teacher could use the computer in different times and places according to the specifications of the hardware and software, the subject and the students. These ways of usage could be repetition, evaluation, exercise and presentation.

Computer-based learning (CBL) is a method, which use computer in learning media, strengthening students' motivation and education process. It gives opportunities to both students and teachers to learn by their speed and combine active learning with computer technology. Collette and Collette (1989) explained that using computer increase motivation and desire to lectures and laboratory in the process of learning.

There are a lot of important reasons for using computer and World Wide Web in chemistry education. Educator not only can gather many materials from various centers. But also they can get text, graph, audio, video, picture, animation and simulation in the same media to students. Many studies also supported the idea that CBL has positive effect on students' achievements and attitudes (Aiello & Wolfe, 1980; Burns & Bozeman, 1981; Chang, 2002; Russell et al., 1997; Sanger & Greenbowe, 2000).

In a study on chemistry education related to the acquisition of knowledge and retention; the traditional teaching media and hypermedia learning environments of the chosen subject in the pre and post test of the treatment-control group design were compared (Yıldırım, Özden & Aksu, 2001). Another similar study on general chemistry applications showed that the student achievement increased with the computer assisted instruction (Jackman & Mollenberg, 1990). Again, in a study on the understanding of nitrogen cycle in a secondary chemistry class, students were observed to be more successful due to computer assisted instruction which made them actively involved than the students in the teacher centered traditional class (Lord, 1988). The results of a study, which compared the traditional method to the learning cycle computer assisted method, showed that the post test results of the treatment group were higher than the traditional group (Jackman & Mollenberg, 1997).

LEARNING ENVIRONMENTS RESEARCH

The pioneering works of two American scholars, Rudolf Moos and Herbert Walberg paved the way for the field of learning environments research. Walberg and Anderson (1968) developed the Learning Environment Inventory (LEI). Moos (Moos, 1968; Moos & Houts, 1968) developed a number of social climate scales.

The concept of learning environment involves three types of dimensions (Moos, 1974) which lead to its comprehensiveness. Moos's three basic types of dimensions for classifying human environments are Relationship Dimensions (which identify the nature and intensity of personal relationships within the environment and assess the extent to which people are involved in the environment and support and help each other), Personal Development Dimensions (which assess basic directions along which personal growth and self-enhancement tend to occur) and System Maintenance and System Change Dimensions (which involve the extent to which the environment is orderly, clear in expectations, maintains control and is responsive to change).

A large number of researchers and educators believe that the field of learning environments is of interest and value. Numerous research studies have revealed that student perceptions of the classroom environment account for appreciable amount of variance in learning outcomes, often beyond that attributable to background student characteristics (Dorman, 2001). Fraser (1998) states that the quality of the classroom environment is a significant determinant of student learning and students' positive perceptions of learning environments will pave the way for meaningful learning.

Decades of research in the field of learning environments have led to the development of a variety of economical, valid and widely-applicable questionnaires for assessing students' perceptions of classroom environments. There are now hundreds of research studies which explore learning environments at various grade levels (primary, secondary, tertiary) and in a variety of classrooms such as science and mathematics, chemistry, computer, biology, geography, physics and language.

Studies on science and mathematics classroom environments have a long tradition in the field and studies such as Yang, Huang and Aldridge (2002), Wolf and Fraser (2008) and Fraser, Aldridge and Adolphe (2010) focused on science and mathematics learning environments with the aim of promoting these environments. Studies such as Soerjaningsih, Fraser, and Aldridge (2001), and Maor and Fraser (1996) provide insightful ideas about the nature and promotion of computer classrooms environments. Among the rest, Moss and Fraser (2001), and Fisher, Fraser, and Basset (1995) focused on biology classroom environments. Geography is another subject area which has been explored in a number of learning environment studies (e.g., Fraser & Chionh, 2000). Psychosocial environments of physics classrooms have also been the subject of studies such as McRobbie, Roth, and Lucus (1997) and Terwel, Brekelmans, Wubbels, and van den Eeden (1994). Chemistry classroom environments have also been the target of exploration in different studies (e.g. Hofstein, Cohen, & Lazarowitz, 1996; Hofstein, Gluzman, Ben-Zvi & Samuel, 1979; McRobbie & Fraser, 1993; Wong, Young & Fraser, 1997; Riah & Fraser, 1998). In addition, further studies tried to explore the relationship between learning environments and other educational concepts and in this way they expanded the scope of learning environment research. For example, Trigwell and Prosser (1991), for the first time, focused on the relationship between qualitative differences in learning outcomes, perceptions of the learning environment and approaches to study.

McRobbie and Thomas (2001) report an attempt to change the learning environment in a year 12 chemistry classroom and document changes in participants' perceptions of their learning environments and the corresponding changes in a teacher's and her students' perceptions of their reasoning and understanding that such changes facilitated. A community of learners in which students and teachers began to understand the processes and the value of reasoning in terms of theories and evidence was developed as a result of the involvement of the researchers with the teacher and her class of students.

Quek, Wong, and Fraser (1998) cross-validated the Questionnaire on Teacher Interaction (QTI) among 497 tenth grade chemistry students, reported some gender and stream (gifted versus non-gifted) differences in perceptions of teacher-student interaction, and established associations between QTI scales and student enjoyment of chemistry lessons. Riah and Fraser (1998) investigated how the introduction of new curricula has influenced learning environments in high school chemistry classes in Brunei.

Riah and Fraser (1997) used a modified version of the What Is Happening In This Class (WIHIC) questionnaire in Brunei, and reported associations between perceptions of learning environment and attitudinal outcomes. Simple and multiple correlations showed that there was a significant relationship between the set of environment scales and students' attitudes towards chemistry theory classes. The Student Cohesiveness, Teacher Support, Involvement and Task Orientation scales were positively associated with students' attitudes.

In another study, Hofstein and Lazarowitz (1986) compared the actual and preferred classroom learning environment in biology and chemistry as perceived by high school students. With the premise that "the greater the degree of concordance between one's ideal classroom and the actual classroom within which one finds oneself, the greater the degree of satisfaction there is likely to be" (Williams & L. Burden, 1998), they found that there was a significant difference between students' scores on actual and preferred form.

The growth of learning environment studies can also be viewed from another perspective. Interest in learning environments spread from the USA to the Netherlands where it was picked up by Theo Wubbels and colleagues (e.g., Wubbels & Brekelmans, 2006), and to Britain, where it was carried forward by Ramsden and Entwistle (1981) and led to the development of the Course Perceptions Questionnaire to obtain self-reports on eight aspects of the academic context. In Australia, Barry Fraser appeared to be the prominent figure of the field (Fraser, 1998, 2007). Learning environment research has since spread further afield to Asia (Fraser, 2002) and South Africa (Aldridge, Laugksch, & Fraser, 2006).

In Australia, Fraser and colleagues initially elaborated the College and University Classroom Environment Inventory (CUCEI) (Fraser & Treagust, 1986), but this was followed by other widely used instruments such as the Individualized Classroom Environment Questionnaire (ICEQ), the Science Laboratory Environment Inventory (SLEI), the Constructivist Learning Environment Survey (CLES) and the What Is Happening In This Class (WIHIC) questioner (Fraser, 1998).

In Asia, the study of learning environments has been undertaken in Brunei (Scott and Fisher 2004), Indonesia (Margianti, Aldridge, & Fraser, 2004; Soerjaningsih et al., 2001), Taiwan (Aldridge, Fraser, & Huang, 1999), Singapore (Khoo & Fraser, 2008), Japan (Hirata & Sako, 1998), India (Koul & Fisher, 2005), Korea (Lee, Fraser, & Fisher, 2003). It should be noted that this study is one of the few learning environment studies concerning chemistry classroom settings in Iran.

Learning environment research is a comprehensive and well-established field and can thus present a holistic picture of the effects of democratic education in action and is able to show us how to move towards more democratic practices.

REESARCH QUESTIONS

This study tries to answer the following questions:

1. Is there a significant difference ($p \leq 0.05$) between Iranian high school students' perceptions of their chemistry classroom environment when they are taught in a technology enhanced learning environment and when they are taught using just the textbook and the ordinary equipment?
2. Is there a significant difference ($p \leq 0.05$) between Iranian high school students' learning in chemistry when they are taught in a technology enhanced learning environment and when they are taught using just the textbook and the ordinary equipment?

METHODOLOGY

PARTICIPANTS

In April, 2012, all the male first graders in high schools in Arsanjan, Iran, were invited to participate in this study. 44 students volunteered to participate in this study and after the final exams, they gathered in Parto Institute, Arsanjan, to be told about the details of the study. In the first session, they were assigned to two groups (experimental and control) through simple random sampling and they were told that they were going to be taught some parts of their following year chemistry textbook during 15 sessions. The researchers answered all the questions the students asked about the project. At the end of the session, the participants were given consent forms to be filled and signed by their parents. Parents' agreement was announced as a prerequisite to participate in the study.

MATERIALS AND INSTRUMENTS

The following materials and instruments were used in this study:

1. Second grade high school textbook: the chapters related to atom structures and different types of chemical bonds were selected from this textbook and were taught to the participants.
2. 15 PowerPoint files: these files were prepared for each session by the researchers. These files included the main points, details and some related images and were given to the participants in the treatment group in a CD. Odyssey Wave Function software was used to simulate some of the chemical bonds included in these files.
3. Kimiagar Multimedia Software: this software included comprehensive educational films and other topics for first, second and third grade high school students. Although this software was used in the class, some of the participants in the treatment group bought it to use at home.
4. An exam: this exam was prepared by the researchers and aimed to test the participants' learning of the taught materials. This exam included 25 open-ended questions.

Table 1. Scale descriptions of the WIHIC

WIHIC scale	**The extent to which…**	**Moos (1974) dimension**
Student cohesiveness	…students are friendly and supportive of each other.	Relationship
Teacher support	… the teacher helps, befriends and is interested in students.	Relationship
Involvement	… students have attentive interest, participate in class and are involved with other students in assessing the viability of new ideas.	Relationship
Investigation	…there is emphasis on the skills and of inquiry and their use in problem-solving and investigation.	Personal growth
Task orientation	… it is important to complete planned activities and stay on the subject matter.	Personal growth
Cooperation	… students cooperate with each other during activities.	Personal growth
Equity	… the teacher treats students equally, including distributing praise, question distribution and opportunities to be included in discussions.	System maintenance and change

In addition, The What Is Happening In This Class (WIHIC) questionnaire was the main instrument that was used in this study. The WIHIC brings parsimony to the field of classroom environment research. It combines modified versions of the most salient scales from a wide range of existing questionnaires with additional scales that accommodate contemporary educational concerns such as equity and constructivism (Fraser 1998). The original 90-item nine-scale version was refined by both statistical analysis of data from 355 junior high school science students and extensive interviewing of students about their views of their classroom environments in general (Fraser et al., 1996, cited in Fraser, 1998). The final form of the WIHIC (Appendix A) contains seven eight-item scales including Student cohesiveness, Teacher support, Involvement, Investigation, Task orientation, Cooperation, and Equity (Chionh & Fraser 1998). Full descriptions of these scales have been provided in Table 1. Each item can be responded on a five-point Likert scale ranging from Almost Never to Almost Always. A typical item in the Student cohesiveness scale is “I know other students in this class”. In the Teacher support scale items such as “The teacher helps me when I have trouble with the work” can be found. Items like “I give my opinions during class discussions” form the Involvement scale. In the Investigation scale, there are items such as “I explain the meaning of statements, diagrams and graphs”. Task orientation scale contains items like “I know the goals for this class”. Items such as “I work with other students in this class” form the Cooperation scale and the Equity scale involves items like “I am treated the same as other students in this class”. This range of scales and items can present a better picture of the two learning processes (i.e., technology-mediated and traditional) under exploration in this study. The WIHIC has been used in a variety of studies (e.g. Aldridge & Fraser, 2000; Ebrahimi et al., 2013; Huang et al., 1998; Wallace et al., 2002).

PROCEDURES

Two different teaching approaches were adopted to teach the participants in treatment and control groups. In the control group class, the teacher just taught the materials based on textbook and used ordinary equipment such as marker and whiteboard. In the treatment group class, beside the textbook, the PowerPoint files and Kimiagar Software were also used and there were additional equipment such as a computer and a 42-inch LCD monitor. The teacher in this class presented the new materials mostly based on the PowerPoint files and at the end of each session the related film was shown to the participants. After 12 sessions, the WIHIC questionnaire was given to the participants in both classes and they were asked to select the items that best described their classes. The final test which covered all the taught materials was administered among all the participants in control and treatment groups after 15 sessions.

DATA ANALYSIS

For answering the first question of the study, paired-sample t-tests were conducted to see whether there is a significant difference between the treatment and control group participants’ perceptions of each aspect of their chemistry classroom environments. For the second question, a t-test was conducted to see whether there is a significant difference between the participants’ scores in control and treatment group.

RESULTS AND DISCUSSION

Regarding the questionnaire, the students’ responses to the Likert scale including Almost Never, Seldom, Sometimes, Often, and Almost Always alternatives were scored 1, 2, 3, 4, and 5 respectively. Seven groups of scores reflecting scales of the questionnaire were provided for all participants. In other words, scores on Student cohesiveness, Teacher support, Involvement, Investigation, Task orientation, Cooperation, and Equity scales for all students in both groups were provided. The score for each scale was the sum of the each participant's score on the items of that scale.

The data were analyzed using SPSS and different t-tests were conducted to see whether there is a significant difference between the treatment and control group participants' perceptions of each aspect of their chemistry classroom environments. The results of these *t*-tests have been provided in Table 2. As it is clear, there are significant differences ($p<0.05$) between scores on Student cohesiveness, Teacher support, Involvement, Task orientation, Cooperation, and Equity scales perceived by participants in control and treatment group.

Table 2. The results of different paired-sample t-tests between the scores of the same scales collected after and before introducing technology-enhanced language learning approach

		Mean	**SD**	**t**	**df**	**Sig.**
Pair 1	SC1-SC2	0.23	0.97	2.56	21	**.001**
Pair 2	TS1-TS2	0.67	1.34	1.90	21	**.001**
Pair 3	IV1-IV2	0.77	0.78	1.99	21	**.001**
Pair 4	TO1-TO2	0.65	1.20	3.06	21	**.001**
Pair 5	CP1-CP2	0.21	0.95	2.59	21	**.001**
Pair 6	EQ1-EQ2	0.34	0.87	3.05	21	**.001**

Note: SC stands for Student cohesiveness, TS for Teacher support, IV for Involvement, TO for Task orientation, CP for Cooperation, and EQ for Equity. Also, 1 signifies treatment group and 2 signifies control group

Regarding the final exams, two high school chemistry teachers scored the exams and the final score for each participant was the mean of the scores provided by these two raters. Finally, a t-test was conducted to see whether there is a significant difference between the participants' scores in control and treatment group. The results of this t-test have been presented in Table 3. As it can be seen, there is a significant difference between participants' exam scores in control and treatment group.

Table 3. The results of the paired-sample t-test between total scores of participants in the treatment group and total scores of participants in the control group

		Mean	SD	SEM	t	df	Sig.
Pair 1	treatment - control	3.40	2.82	0.60	5.66	21	**.001**

Overall, the results reported here clearly reveal that there are significant differences between control-group and treatment-group students' perceptions of all target dimensions (i.e., Student cohesiveness, Teacher support, Involvement, Task orientation, Cooperation, and Equity) of their chemistry classroom environments. It means that the students in the treatment group perceived their technology-enhanced chemistry classroom environment more positively than the students in the traditional chemistry classroom. The technology-enhanced chemistry classroom helped the students in the treatment group to be more friendly and supportive of each other (i.e., Student cohesiveness) and caused them to perceive the teacher as more helpful and more interested in them (i.e., Teacher support). The technology-enhanced chemistry classroom was perceived by students to increase the extent to which they had attentive interest, participated in class and were involved with other students in assessing the viability of new ideas (i.e., Involvement). The technology-enhanced chemistry classroom helped students to perceive that they are more serious to complete planned activities and stay longer on the subject matter (i.e., Task orientation). They perceived that in technology-enhanced chemistry classroom they cooperate extensively with each other during activities (i.e., Cooperation). They also perceived that the teacher in technology-enhanced chemistry classroom treats students more equally, including distributing praise, question distribution and opportunities to be included in discussions (i.e., Equity).

The results of the t-test conducted on the participants' exam scores in control and treatment group also reveal that students in the treatment group exceeded those in control group in their learning. In other words, the students in the technology-enhanced chemistry classroom learned more and received higher score on their exams than the students in the traditional chemistry classroom.

The results show that implementing a technology-enhanced chemistry classroom was able to help the Iranian high school students participating as the treatment group in this study to find their classrooms as a better and more efficient place for learning.

CONCLUSION

The present study aimed to explore the effects of using ICT on Iranian high school students' learning and their perceptions of their chemistry classroom environment. Both process-oriented and product-oriented, this study tried to present a more comprehensive picture of the effects of ICT. It is one of the rare studies that use the concept of "learning environment" to investigate the effectiveness of technology-enhanced chemistry classrooms. The field of learning environments research is known to be able to present a larger picture of a learning process and the details involved. In the present study, learning environment of a technology-enhanced chemistry classroom was assessed from eight different dimensions, an approach that reveals the effects of ICT on chemistry learning more thoroughly and clearly.

The results of this study show that the use of ICT devices such as computer and educational and multimedia software can lead to better learning and better scores in chemistry among students. In addition, the positive effects of ICT are not limited to students' scores. The students perceive their chemistry classroom more positively when their classroom is enhanced with technology. The positive perceptions the students showed towards the technology-enhanced chemistry classroom environment may explain the higher scores they got in the exam and such perceptions can keep them highly motivated and satisfied.

The results of this study can be of significance for chemistry educators and researchers. To explore the effects and efficiency of CAI in chemistry classrooms and to be able to present a more comprehensive picture of the issues involved, the researchers should focus on both product and the underlying processes. The field of learning environment is of great help here since it is able to delve through the underlying processes involved in ICT implementation in chemistry classrooms. The results are also inspiring for chemistry educators, especially those in Iran. With the recent changes in Iranian educational system and the advent of smart schools and availability of computers and other ICT devices in Iranian schools, it is a great opportunity for Iranian chemistry educators to use ICT in their classes to improve their practice and to create more efficient chemistry learning environments.

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APPENDIX A

What Is Happening In this Class? (WIHIC) Questionnaire (the actual form)

STUDENT COHESIVENESS		Almost Never	Seldom	Some times	Often	Almost Always
1	I make friendships easily among students in this class.					
2	I know other students in this class.					
3	I am friendly to members of this class.					
4	Members of the class are my friends.					
5	I work well with other class members.					
6	I help other class members who are having trouble with their work.					
7	Students in this class like me.					
8	In this class, I get help from other students.					
TEACHER SUPPORT		Almost Never	Seldom	Some times	Often	Almost Always
9	The teacher takes a personal interest in me.					
10	The teacher goes out of his/her way to help me.					
11	The teacher considers my feelings.					
12	The teacher helps me when I have trouble with the work.					
13	The teacher talks with me.					
14	The teacher is interested in my problems.					
15	The teacher moves about the class to talk with me.					
16	The teacher's questions help me to understand.					
INVOLVEMENT		Almost Never	Seldom	Some times	Often	Almost Always
17	I discuss ideas in class.					
18	I give my opinions during class discussions.					
19	The teacher asks me questions.					
20	My ideas and suggestions are used during classroom discussions.					
21	I ask the teacher questions.					
22	I explain my ideas to other students.					
23	Students discuss with me how to go about solving problems					
24	I am asked to explain how I solve problems.					
INVESTIGATION		Almost Never	Seldom	Some times	Often	Almost Always
25	I carry out labs in class to test my ideas.					
26	I am asked to think about the evidence for statements.					
27	I carry out labs in class to answer questions coming from discussions.					
28	I explain the meaning of statements, diagrams and graphs.					

29	I carry out labs in class to answer questions, which puzzle me.					
30	I carry out labs in class to answer the teacher's questions.					
31	I find out answers to questions by doing labs in class.					
32	I solve problems by using information obtained from my own labs in class.					
TASK ORIENTATION		Almost Never	Seldom	Some times	Often	Almost Always
33	Getting a certain amount of work done is important to me.					
34	I do as much as I set out to.					
35	I know the goals for this class.					
36	I am ready to start this class on time.					
37	I know what I am trying to accomplish in this class.					
38	I pay attention during this class.					
39	I try to understand the work in this class.					
40	I know how much work I have to do.					
COOPERATION		Almost Never	Seldom	Some times	Often	Almost Always
41	I cooperate with other students when doing assignment work.					
42	I share my books and resources with other students when doing assignments.					
43	When I work in groups in this class, there is teamwork.					
44	I work with other students on projects in this class.					
45	I learn from other students in this class.					
46	I work with other students in this class.					
47	I cooperate with other students on class activities.					
48	Students work with me to achieve class goals.					
EQUITY		Almost Never	Seldom	Some times	Often	Almost Always
49	The teacher gives as much attention to my questions as to other students' questions.					
50	I get the same amount of help from the teacher, as do other students.					
51	I have the same amount of say in this class as other students.					
52	I am treated the same as other students in this class.					
53	I receive the same encouragement from the teacher as other students do.					
54	I get the same opportunity to contribute to class discussions as other students.					
55	My work receives as much praise as other students' work.					
56	I get the same opportunity to answer questions as other students.					

TASK ORIENTATION		Almost Never	Seldom	Some times	Often	Almost Always
33	Getting a certain amount of work done is important to me.					
34	I do as much as I set out to.					
35	I know the goals for this class.					
36	I am ready to start this class on time.					
37	I know what I am trying to accomplish in this class.					
38	I pay attention during this class.					
39	I try to understand the work in this class.					
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