

Computing laboratory classes as language learning environments

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Abstract Whereas most research on computer-assisted language learning (CALL) tends to rely heavily on the assessment of academic achievement and language learning outcomes, this study involved an evaluation of the psychosocial learning environment in computing laboratories. The What Is Happening In this Class? (WIHIC) and Attitude to Computers and Computing Courses (ACCC) questionnaires were administered to 152 university students undertaking 1-year compulsory education courses in English at the Centre for Foreign Languages (YADIM) at Çukurova University in Turkey. Analysis of data illuminated students' perceptions of the computer laboratory class as a language learning environment and paved the way for further learning environment studies involving both students and teachers.

Keywords Attitudes · Computer-assisted learning · Educational technology · Evaluation · Language learning · Learning environment

Introduction

That new information and communications technologies hold great potential for improving the way in which people learn is not in doubt. Through the use of Internet applications (electronic mail, electronic journals, the World Wide Web), for example, realistic and meaningful activities can be brought into the classroom. When they are combined with text, sound, graphics and animation, computer technology can enrich and extend the instructional activities of the class. Thus, educators, as well as parents, rush out to invest large sums of money in computer laboratories on the assumption that computer technology will somehow transform the educational experience.

This information technology pull has forced educators to consider more closely how the presence of computers could change the physical and psychosocial nature of classroom environments in either negative or positive ways (Zandvliet and Fraser 2005). Little

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research, however, has taken place to support this discussion. As Teh and Fraser (1995) state, “Innovations in computer-assisted learning rarely have been evaluated in terms of their impact on the nature of the classroom learning environment as perceived by students” (p. 178). Especially in the context of computer-assisted language learning, for which technology-induced pedagogy is seen as a panacea to teaching problems, such as lack of opportunities for real-life communication, motivation, and provision of authentic input, can the impact of technology be fully understood with reference to students’ perceptions on overall learning environment?

The significance of this study is that it is one of the first to investigate the effectiveness of computer laboratory classes in a university setting as a language learning environment. The aim is to describe the psychosocial environments of laboratory classes where computer technology is used to supplement regular classes. We investigated what is happening in these laboratories more closely in an effort to maximise the possibilities offered for student learning and for the creation of viable learning environments.

Learning environment research

In the past four decades, learning environment research has firmly been established as a thriving field of study. The pioneering work of Kurt Lewin, who proposed that the interaction between the environment and the personal characteristics of the individual determines human behaviour, has contributed to the soaring interest in studying the learning environment. The term ‘learning environment’ is most often associated with the physical aspects, the psychological or emotional conditions, and the social and cultural influences present in the classroom. It typically covers issues such as the effect of a classroom environment on student learning and attitudes, the effect of a school’s environment on teacher job satisfaction and effectiveness, and the effect of technology on classroom environment (Fraser 1994).

Much attention has been given to the development and use of instruments to assess the qualities of the classroom learning environment from the perspective of the student (Fraser 1986, 1994; Fraser and Walberg 1991), and the association between learning environment variables and student outcomes has provided a particular rationale and focus for the use of learning environment instruments. A great number of instruments to measure various aspects of the learning environment have been developed, such as Learning Environment Inventory (LEI), What Is Happening In this Class? (WIHIC), Science Laboratory Environment Inventory (SLEI), Computer Classroom Environment Inventory (CCEI) and the Constructivist Learning Environment Survey (CLES). The two common formats of these instruments are the actual form, which assesses the learning environment experienced by the students, and the preferred form, which focuses on the environment ideally preferred by the students.

Studies built on Lewin’s (1936) influential field theory and Walberg’s (1981) theory of educational productivity found that students’ perceptions of the classroom psychosocial environment are associated with, and actually could predict, their affective, behavioural and cognitive learning outcomes (Fraser 1986, 1994, 1998; Fraser and Fisher 1982; Haertel et al. 1981). A review of recent publications indicates three general themes for contemporary classroom environment research: constructivist classroom environments (Taylor et al. 1995), teacher interpersonal behaviour in the classroom (Kent and Fisher 1997; Wubbels et al. 1993), and computer-assisted instruction classrooms (Teh and Fraser 1995).

The increased use of computers in classrooms has led to studies in evaluating the effectiveness of computer-assisted learning (Fisher and Stolarchuk 1997; Teh and Fraser 1995; Zandvliet and Fraser 2005) and investigating the association between gender, computer experience and perceived environment (Levine and Donitsa-Schmidt 1995). In the context of computer-assisted language learning (CALL), Egbert and Jessup (1996) have focused on learner perceptions of a ‘package’ of salient dimensions of an ideal computer-supported language learning environment. Their analytic and systemic analyses of learner perceptions indicate that learners perceive their learning environments in unexpected ways and that technology has an impact on these perceptions in that it allows the classroom to be ‘individualised’ in ways that are not possible without technology. Egbert and Jessup also discuss implications for task construction and grouping and the importance of learner perceptions to acquire an understanding of computer-supported language learning environments.

This study raised similar issues and aimed to contribute to an understanding of what is happening in computer-supported language learning environments and of how students perceive their learning environments.

Research methods

This study aimed to find answers to the following questions:

1. What are the characteristics of language learning environment in the computing laboratory and how do university students perceive their learning environments?
2. How do learners perceive the contribution and effect of computer technology in the learning environment?
3. Are the What Is Happening In this Class? (WIHIC) and Attitude to Computers and Computing Courses (ACCC) questionnaires valid measures of Turkish students’ attitudes toward computer technology and their perceptions of the computing laboratory as a classroom environment?

The setting

The CALL applications at the Centre for Foreign Languages (YADIM) were carried out in computer laboratories housing 25 networked computers. The operating system was Windows XP. The software programs that were utilised are mainly for English language study. There is a range of software, from text-based grammar-practice programs to full multimedia (video/audio) based titles that enable learners to record their own voice and play it back.

The activities carried out at the CALL laboratory included visiting websites to work with supplementary materials on the topics covered in the face-to-face teaching environment, such as grammar, reading, writing and listening skills. CALL activities used at YADIM did not include using electronic chat rooms formally, but cross-cultural e-mail exchange was included after the students gained some competence in producing written work in English, which usually happens during the second term of the year.

The students at YADIM utilise the computer suites on a regular basis of 1 or 2 h per week per class as a complement to face-to-face teaching in traditional classrooms. These classes run for 18-week semesters and are full-time courses (24 contact hours per week).

The students also have a chance to use the computers at the Self-Access Centre for their free studies.

Participants

The questionnaires were administered to 152 students undertaking English courses involving a computing laboratory component within the Centre for Foreign Languages at Çukurova University in Turkey. The ages of the students differed from 18 to 25 years, with the average age being 20.3 years. The number of male participants was 101 while the number of female participants was 51.

Instruments

The first set of data was collected utilising the questionnaire WIHIC (Fraser et al. 1996). The same questionnaire was used to assess students' perceptions of the computer laboratory environment. The version of the WIHIC used in this study consisted of 7 scales and 42 items. These scales are Student Cohesiveness, Teacher Support, Involvement, Investigation, Task Orientation, Cooperation and Equity. The WIHIC has been extensively cross-validated in studies in Taiwan and Australia (Aldridge et al. 1999), the UK, Canada and Australia (Dorman 2003), Canada and Australia (Zandvliet and Fraser 2005), Korea (Kim et al. 2000) and the USA (Allen and Fraser 2007; Ogbuehi and Fraser 2007; Wolf and Fraser, in press). Table 1 provides a scale description and a sample item from each WIHIC scale.

This study also involved the use of the Attitude to Computers and Computing Courses (ACCC) questionnaire to measure students' attitudes towards computers and computer courses (Newby and Fisher 1997a, b). All the scales have seven items. A scale description and a sample item from each ACCC scale is provided in Table 2.

Table 1 Description of WIHIC scales

Scale	Description	Sample item
Student Cohesiveness	Extent to which students know, help and are supportive of one another	I know other students in this class. (+)
Teacher Support	Extent to which the teacher helps, befriends, trusts and is interested in students	The teacher takes a personal interest in me. (+)
Involvement	Extent to which students have attentive interest, participate in discussions, do additional work and enjoy the class	I explain my ideas to other students. (+)
Investigation	Extent to which skills and processes of inquiry and their use in problem solving and investigation are emphasised	I carry out investigations to test my ideas. (+)
Task Orientation	Extent to which it is important to complete activities planned and to stay on the subject matter	I pay attention in this class. (+)
Cooperation	Extent to which students cooperate rather than compete with one another on learning tasks	I work with other students in this class. (+)
Equity	Extent to which students are treated equally by the teacher	I am treated the same as other students in this class. (+)

Table 2 Description of ACCC scales

Scale	Description	Sample item
Anxiety	Extent to which the student feels comfortable using a computer	Working with a computer makes me very nervous. (+)
Enjoyment	Extent to which the student enjoys using a computer	I enjoy learning on a computer. (+)
Usefulness of Computers	Extent to which the students believes computers are useful	My future career will require a knowledge of computers. (+)
Usefulness of Course	Extent to which the student finds the course useful	I do not think I will use what I learned in this class. (–)

Translation into Turkish and back translation

Initially, the two questionnaires were translated into Turkish by the researcher. The next step involved an independent translation of the Turkish version into English by an academic who was not involved in the original translation. Then, the researcher checked the back translations, and subsequently some items were modified in the Turkish translation.

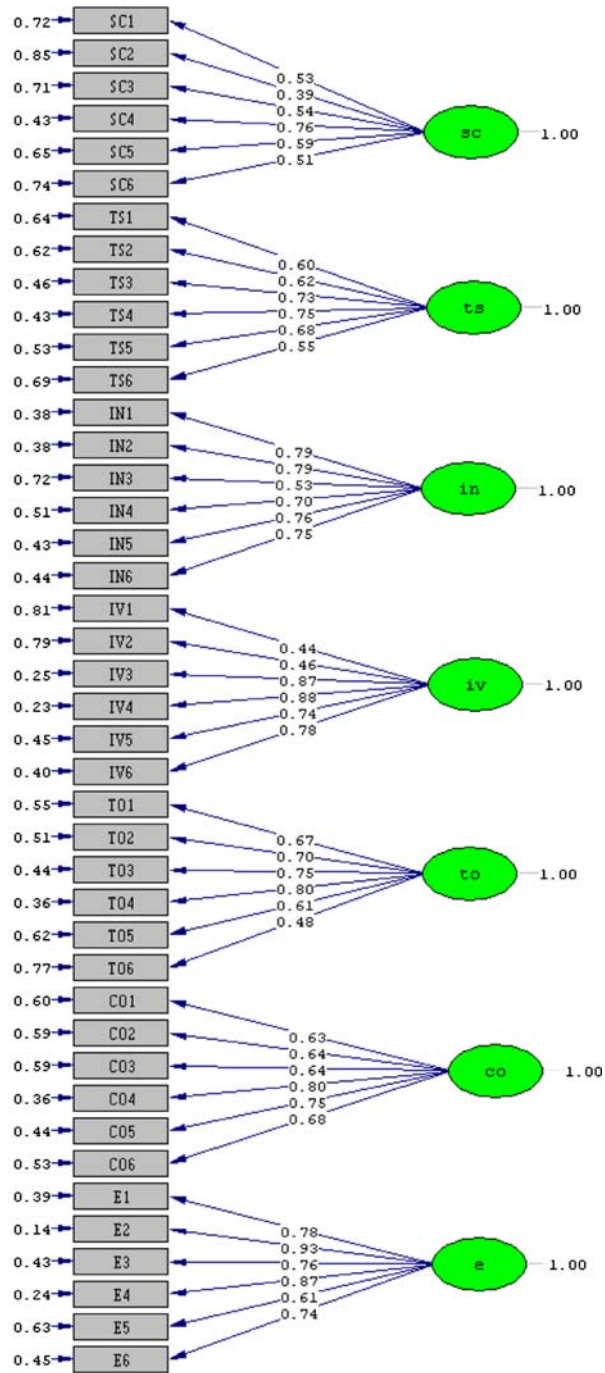
Results and discussion

Validation of WIHIC and ACCC

For the purpose of validating both WIHIC and ACCC, confirmatory factor analyses were conducted on the data. These analyses were done using the LISREL 8.3 computer package. Interpretation of the values was based on Browne and Cudeck (1993). In accordance with their suggestions, Root Mean Square Error of Approximation (RMSEA) values should be as small as possible with perfect fit indicated by an index of zero. Values less than 0.05 indicate good fit. Goodness of Fit Index (GFI) values range from 0 to 1, with values above 0.95 indicating good model fit. For Parsimony Goodness of Fit Index (PGFI) and Parsimony Normed Fit Index (PNFI), values again range from 0 to 1 while values close to 1, which indicates perfect fit, are not expected.

Confirmatory analysis for the measurement model produced the following results for the WIHIC, comprising 42 items with 6 items in each of 7 scales. While the RMSEA value was 0.07, GFI, PGFI, PNFI values were 0.68, 0.60 and 0.77, respectively. These results, on the basis of the standards given above, indicate a reasonable, but not perfect, model fit for the WIHIC (perhaps partly because of the small sample size). Figure 1 below also shows that regression coefficients for this model ranged from 0.14 to 0.85, while measurement errors ranged from 0.39 (SC2) to 0.93 (E2). In Fig. 1 the seven classroom environment dimensions are shown in ellipses, while scale items are shown in rectangles.

Table 3 includes more validation information for the WIHIC, based on its use in Turkey. The α reliability coefficient has been used as the index of scale internal consistency and ranges from 0.72 to 0.89, suggesting that the Turkish version of the WIHIC possess satisfactory internal consistency.



Chi-Square=1447.89, df=798, P-value=0.00000, RMSEA=0.073

Fig. 1 Measurement model for the WIHIC

Table 3 Internal consistencies, means and standard deviations for WIHIC scales

Scale	α reliability	<i>M</i>	<i>SD</i>
Student Cohesiveness	0.72	20.14	3.51
Teacher Support	0.81	16.88	4.92
Involvement	0.86	20.62	4.78
Investigation	0.85	17.78	4.94
Task Orientation	0.81	23.17	4.39
Cooperation	0.84	19.11	5.11
Equity	0.89	25.23	4.66

The high mean scores on each scale of the WIHIC shown in Table 3 suggest a positive classroom environment, with the mean scores ranging between 25.23 and 16.88. The students perceived Equity, Task Orientation, Involvement, and Student Cohesiveness more positively. The scores for these four scales were 25.23 for Equity, 23.17 for Task Orientation, 20.62 for Involvement, and 20.14 for Student Cohesiveness. However, students rated the amount of Teacher Support and Investigation as lower.

The interscale correlations for the WIHIC are presented in Table 4 below. The scale of Student Cohesiveness is correlated closely and positively with Cooperation (0.59) and Involvement (0.41). However, this correlation decreases with the other scales.

Confirmatory factor analysis of the ACCC data revealed an RMSEA value of 0.07, while GFI, PGFI, PNFI values were 0.81, 0.66 and 0.75, respectively. Figure 2 also shows that regression coefficients for this model ranged from 0.31 to 0.96. Measurement errors ranged from 0.20 (Item USECO1) to 0.83 (Item USECO3).

When confirmatory factor analysis also was conducted for the ACCC data, nearly all items loaded on their a priori scales, with the following exceptions:

1. Item 1 in the Anxiety scale was omitted because its *T*-value is negative (0.68).
2. Item 2 in the Anxiety scale loaded on the Usefulness of the Course and Enjoyment scales (30.6 and 35.2, respectively).
3. Item 1 in the Usefulness of the Computers loaded on the Anxiety and Enjoyment scales (30.5 and 34.6, respectively).

Table 4 Interscale correlations for the WIHIC

Scale	Correlation						
	Student cohesiveness	Teacher support	Involvement	Investigation	Task orientation	Cooperation	Equity
Student Cohesiveness	1.00	0.38**	0.42**	0.33**	0.29**	0.59**	0.22**
Teacher Support		1.00	0.50**	0.35**	0.13	0.32**	0.37**
Involvement			1.00	0.41**	0.23**	0.31**	0.31**
Investigation				1.00	0.36**	0.29**	0.03
Task Orientation					1.00	0.35**	0.27**
Cooperation						1.00	0.32**
Equity							1.00

***p* < 0.01

These items were removed to refine the model which is shown in Fig. 2.

Table 5 provides some cross-validation information for the ACCC when used specifically in the present sample of Turkish students. It is seen that the α reliability figures for different ACCC scales range from 0.72 to 0.79.

Higher mean scores occurred on the scales of Enjoyment and Usefulness of Computers, whereas lower scores occurred on Usefulness of the Course and Anxiety. It seems that students at preparatory school found the language learning environment enjoyable and also were aware of the usefulness of the computer. On the other hand, their level of anxiety was quite low and students did not perceive learning English through computers to be particularly useful.

The interscale correlations for the ACCC are presented in Table 6. The scales of Usefulness of the Course and Usefulness of Computers are correlated closely and positively with Enjoyment (0.51 and 0.55, respectively), but negatively with Anxiety (0.26).

Associations between computer laboratory environment and attitudinal outcomes

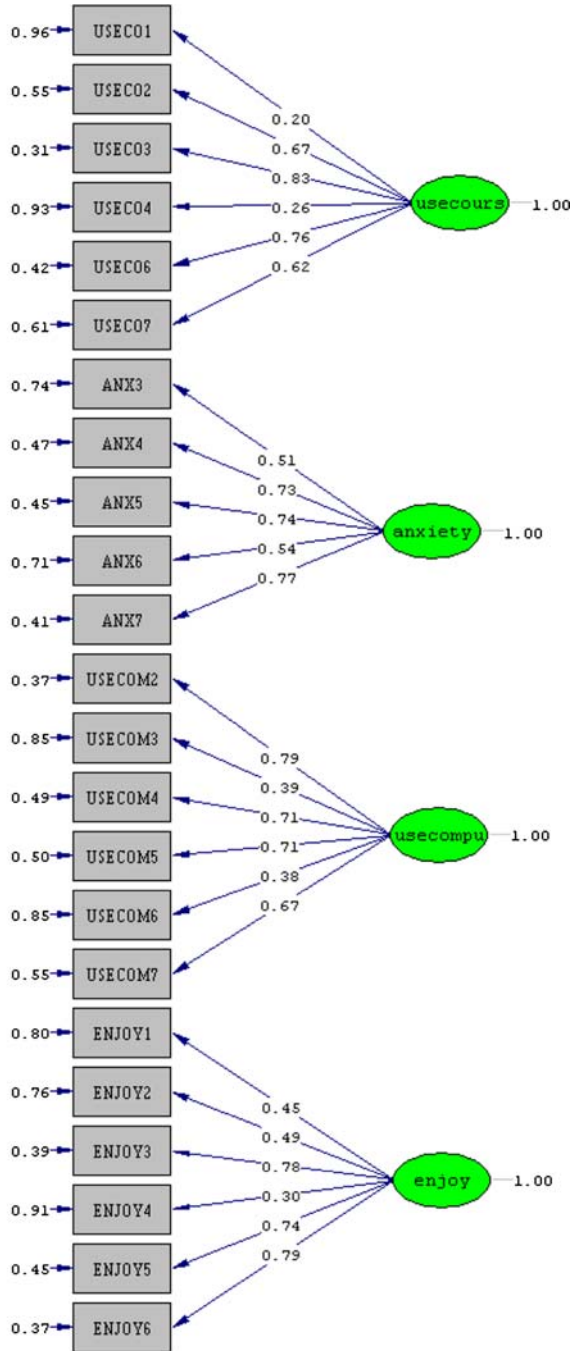
Table 7 presents results of analyses for associations between students' perceptions of their computer laboratory environment (WIHIC) and their attitudes towards computers (ACCC). An examination of the simple correlation coefficients in Table 7 shows that only two relationships were statistically significant ($p < 0.05$). Teacher Support was positively and significantly related to students' anxiety, and Investigation correlated negatively and significantly with the Usefulness of Computers scale.

Characteristics of the learning environment

Table 8 below lists the items in the WIHIC scale Student Cohesiveness together with the percentage frequency of each response alternative (Never, Rarely, Sometimes, Often and Always). A large majority of the students stated that they know other students in the class and that they make friendships easily among students. About half of the students 'often' or 'sometimes' get help from the other students and work well with them.

Table 9 reports students' perceptions as to the frequency of Teacher Support provided to them. A majority of the students perceived that the teacher 'never' or 'rarely' goes out of his/her way to help them. They stated that the teacher 'rarely' or 'sometimes' takes a personal interest in them or considers their feelings. These relatively low scores on Teacher Support must be interpreted with the Turkish educational context in mind. In Turkey, teachers generally have limited time to pay personal attention to their students because of large class sizes. Besides, in general, the students consider the teacher as knower and depend on him/her in terms of what they need to learn and how best to learn it. This respect for the teacher's knowledge might mean that students would rarely question teaching methods or the lesson content. In some cases, the students' respect for the teacher means that, even if they have difficulty understanding the content, they still wouldn't ask questions but would wait for the teacher to take the lead. That is probably why almost 60% of the students felt that teacher's questions help them to understand what is going on in the laboratory.

Table 10 includes items referring to the WIHIC's Involvement scale (the involvement of the students in the laboratory practices). Most of the students believed that they can 'sometimes' contribute to classroom discussions by asking questions or answering the



Chi-Square=391.73, df=224, P-value=0.00000, RMSEA=0.070

Fig. 2 Measurement model for the ACCC

Table 5 Internal consistencies, scale means and standard deviations for the ACCC scales

Scale	α reliability	<i>M</i>	<i>SD</i>
Anxiety	0.79	9.4	4.08
Enjoyment	0.74	23.0	4.73
Usefulness of Computers	0.75	24.1	4.96
Usefulness of Course	0.72	18.4	4.74

Table 6 Interscale correlations for the ACCC

Scale	Correlation			
	Usefulness of course	Anxiety	Usefulness of computers	Enjoy
Usefulness of Course	1.00	-0.27**	0.23**	0.51**
Anxiety		1.00	-0.40**	-0.54**
Usefulness of Computers			1.00	0.55**
Enjoy				1.00

** $p < 0.01$

questions directed to them by the teacher. It can be argued that the relatively low rating for Involvement is not very surprising given that the main concern of many Turkish teachers is to cover the curriculum on time. Besides, the selection of material is predetermined by the teacher and lessons are sequentially ordered and proceed at a relatively fixed pace. Therefore, computer technology is used to a lesser extent than it is desired for enabling students to be involved in the lesson or to take more control over their own learning.

Regarding the scale Investigation, Table 11 shows that more than half of the students felt that, in the computing laboratory, they 'rarely' or 'sometimes' are given the opportunity to explain the meanings of the statements or to undertake investigations to answer the questions coming from discussions or from the teacher herself/himself. A majority of the students, however, stated that they investigate to answer questions which puzzle them. This might mean that the teacher's limited time for students on an individual basis might stimulate the development of students' investigation skills.

Table 7 Simple correlations for associations between WIHIC and ACCC scales

Scale	Simple correlation			
	Usefulness of course	Anxiety	Usefulness of computers	Enjoyment
Student Cohesiveness	-0.02	0.07	-0.08	-0.01
Teacher Support	-0.16	0.18*	-0.14	-0.14
Involvement	-0.07	0.08	-0.14	-0.05
Investigation	-0.07	-0.02	-0.19*	-0.13
Task Orientation	-0.13	-0.06	-0.05	-0.01
Cooperation	0.05	-0.07	0.06	0.07
Equity	-0.05	0.08	-0.06	-0.05

* $p < 0.05$

Table 8 Percentage frequency of responses to Student Cohesiveness items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
I make friendships easily among students in this class.	0.0	3.9	12.4	35.3	48.0
I know other students in this class.	1.3	2.6	7.8	33.3	54.2
Members of the class are my friends.	2.0	7.8	20.3	31.4	37.9
I work well with other class members.	6.5	17.6	32.7	26.8	15.7
I help other class members who are having trouble with their work.	3.3	11.8	26.1	25.5	32.7
In this class, I get help from other students.	5.9	20.3	37.9	21.6	13.7
Total	3.8	10.6	22.9	29.0	33.7

Table 12 lists the items in the Task Orientation scale. The responses indicated that a majority of the students know the goals of the laboratory sessions and pay attention during the class. Almost 75% of students stated that they try to understand the work in the class and feel that accomplishing something is important to them. The high scores on Task Orientation is not very surprising because students at YADIM are under great pressure to pass the proficiency examination given at the end of the preparatory year before they are allowed to follow their courses at their faculties. Therefore, they tend to persist with tasks that they find useful, especially when the tasks are linked to what is needed for examinations and assessments. Their comments—unfortunately, very few in number—also indicated that the expectations of parents and teachers and the competitive nature of the university entrance examinations and placement system in Turkey, where only about one fifth of students can be placed in higher education programs, provided incentives for them to stay on task in class and to learn.

The frequencies of responses to items in the WIHIC Cooperation scale are shown in Table 13. When asked if they are able to cooperate with other students in the laboratory, most of the students chose ‘rarely’ or ‘sometimes’. The reason might lie in the fact that, when students are using computers, they usually work alone. If they work together, it is in pairs, whereas working in small groups is much less common. Therefore, we do not see the use of computers supporting cooperative learning very frequently in the laboratory. Yet, more than half of the students seem to share their resources with others or learn from others.

Table 9 Percentage frequency of responses to Teacher Support items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
The teacher takes a personal interest in me.	9.8	34.0	38.6	9.8	7.2
The teacher goes out of his/her way to help me.	35.3	34.6	20.3	4.6	4.6
The teacher considers my feelings.	19.0	29.4	25.5	14.4	11.1
The teacher is interested in my problems.	8.5	30.7	26.8	19.6	13.7
The teacher moves about the class to talk with me.	13.7	28.8	30.7	15.0	11.1
The teacher’s questions help me to understand.	2.0	14.4	26.8	34.0	22.2
Total	2.5	28.7	28.1	16.2	11.7

Table 10 Percentage frequency of responses to Involvement items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
I discuss ideas in class.	2.0	11.8	22.9	28.1	34.6
I give my opinions during class discussions.	3.9	14.4	30.1	22.9	28.1
The teacher asks me questions.	1.3	14.4	49.7	24.8	9.2
I ask the teacher questions.	3.3	22.2	37.3	22.9	13.7
I explain my ideas to other students.	3.3	13.1	36.6	28.1	18.3
My ideas and suggestions are used during classroom discussions.	2.0	16.3	44.4	23.5	13.1
Total	2.6	15.4	36.8	25.0	19.5

Table 14 lists the items in the Equity scale. It seems that an overwhelming majority of students were pleased with the frequency of help and attention provided in the laboratory. They believed that they are given equal opportunities during class discussions and receive the same amount of encouragement from the teacher as other students do.

Overall students' perceptions of the learning environment in this study suggest that, on average, Turkish students perceived their classes as highly task oriented, moderately cohesive, cooperative and equitable, but less teacher supportive, and associated with involvement or stimulating investigation. The results suggest that students should receive more teacher support and involvement in the teaching/learning process and should cooperate with other students more than at present. Also, the teacher's behaviour should be changed to be more helping/friendly and understanding so that the teacher can cater for the students' interests.

Student attitudes to computers and computing courses

Table 15 presents each item in the ACCC Anxiety scale, together with the percentage frequency of each response alternative. A majority of the students felt that computers do

Table 11 Percentage frequency of responses to Investigation items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
I explain the meaning of statements.	2.6	27.5	38.6	21.6	9.2
I am asked to think about the evidence for statements.	10.5	38.6	28.8	17.0	4.6
I investigate to answer questions coming from discussions.	11.1	30.1	33.3	16.3	8.5
I find out answers to questions by doing investigation.	10.5	22.9	34.6	22.9	8.5
I carry out investigation in class to answer questions which puzzle me.	7.2	17.6	28.1	30.7	15.7
I carry out investigation in class to answer the teacher's questions.	9.2	26.8	30.7	22.9	9.8
Total	8.5	27.3	32.4	22.0	9.4

Table 12 Percentage frequency of responses to Task Orientation items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
I know the goals for this class.	2.0	9.2	20.9	37.9	29.4
I am ready to start this class on time.	5.9	13.1	24.8	33.3	22.2
I pay attention during this class.	2.0	6.5	25.5	45.8	19.6
I try to understand the work in this class.	0.0	4.6	19.6	39.2	35.9
Getting a certain amount of work done is important to me.	0.0	7.2	17.6	22.2	52.3
I know how much work I have to do.	3.3	9.8	25.5	28.1	32.7
Total	3.3	8.4	22.3	34.4	32.0

Table 13 Percentage frequency of responses to Cooperation items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
I cooperate with other students when doing assignment work.	17.6	27.5	34.6	10.5	9.2
I share my books and resources with other students when doing assignments.	5.2	17.6	24.2	30.1	22.2
I learn from other students in this class.	5.9	22.2	41.8	17.6	11.8
I cooperate with other students in this class.	5.2	18.3	32.0	27.5	16.3
When I work in groups in this class, there is teamwork.	6.5	16.3	23.3	35.3	17.6
I work with other students on projects in this class.	8.5	17.6	35.3	22.9	15.0
Total	8.2	20.0	31.9	24.0	15.7

Table 14 Percentage frequency of responses to Equity items

Item wording	% frequency				
	Never	Rarely	Sometimes	Often	Always
The teacher gives as much attention to my questions as to other students' questions.	2.0	7.8	13.7	28.8	47.1
I get the same amount of help from the teacher as do other students.	0.0	3.9	15.7	30.1	49.7
I am treated the same as other students in this class.	1.3	2.6	9.2	34.6	51.6
I receive the same encouragement from the teacher as other students do.	0.7	2.0	15.7	29.4	51.6
My work receives as much praise as other students' work.	3.3	11.8	15.7	24.2	44.4
I get the same opportunity to answer questions as other students.	0.7	3.9	16.3	26.8	51.6
Total	1.6	5.3	11.8	29.0	49.3

not make them nervous (42% and 19%) and that they do not have a sinking feeling when they think about trying to use a computer. The item "I feel aggressive and hostile towards computers", in particular, received the Never response from 62.7% of the students.

Table 15 Percentage frequency of responses to Anxiety items

Item words	% frequency				
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Working with a computer makes me very nervous.	45.8	27.5	15.7	5.2	5.2
I get a sinking feeling when I think about trying to use a computer.	54.9	19.6	16.3	5.2	3.3
Computers make me feel uncomfortable.	56.9	22.2	13.1	4.6	2.6
Computers make me feel uneasy and confused.	34.0	33.3	19.0	7.8	5.2
I feel aggressive and hostile towards computers.	62.7	13.7	13.7	5.2	3.9
Total	42.4	19.4	13.0	4.7	3.4

Regarding the ACCC scale of Enjoyment, the percentages shown in Table 16 suggest that a clear majority of the students enjoyed using computers in the laboratory. Almost 70% of students found working with computers often or always enjoyable and stimulating.

The scale Usefulness of Computers includes items such as “My future career will require knowledge of computers” and “The use of computers will increase in the future” (see Table 17). The responses indicate that most of the students recognised the importance of the computers in their future life and believed that knowledge of the use of the computers will help them get a job (57%) (see Table 17).

Table 18 presents results for the scale Usefulness of the Course. More than 60% of the students felt that they will never use what they learned in this class. The percentage of students who stated that the course provides them with skills that they expect to use in the future is quite low, with almost half of the students strongly disagreeing with the statement. The findings also indicated that lessons conducted in the CALL laboratory don’t contribute a great deal to their technical skills. This is not very surprising because, on the basis of the feedback obtained from the teachers, most of the students already had a high level of competence in the workings of the computers. That is probably why they found using CD-ROMs or navigating in the Internet not very demanding on their technical skills. What is interesting here is the high percentage of Not Sure responses given to all items in this scale. A possible explanation might be that being preparatory students, they were not fully aware

Table 16 Percentage frequency of responses to Enjoyment items

Item words	% frequency				
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
It is fun to find out how computer systems work.	5.2	15.7	24.2	22.9	31.4
I enjoy using a computer.	7.8	5.9	14.4	17.0	54.2
I think working with computers would be enjoyable and stimulating.	2.0	13.1	20.3	28.1	35.9
The challenge of solving problems using a computer does not appeal to me.	31.4	28.1	26.1	5.9	7.8
I would like to work with computers.	3.3	9.8	17.0	21.6	47.7
I enjoy learning on a computer.	3.9	9.8	19.6	26.1	39.9
Total	8.1	13.7	20.3	20.3	36.2

Table 17 Percentage frequency of responses to Usefulness of Computers items

Item words	% frequency				
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
My future career will require knowledge of computers.	3.3	6.5	12.4	22.9	54.2
I cannot imagine getting a job that does not involve using computers.	13.1	13.7	15.0	15.7	41.8
Computers are an important factor in the success of a business.	4.6	3.9	9.8	19.6	61.4
The use of computers will increase in the future.	5.9	7.2	8.5	13.7	64.1
All tertiary students need a course about using computers.	6.5	15.7	19.0	23.5	34.6
Knowledge of the use of computers will help me get a job.	3.3	11.1	10.5	17.6	56.8
Total	6.1	9.7	12.5	18.8	52.2

Table 18 Percentage frequency of responses to Usefulness of Course items

Item words	% frequency				
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
I do not think I will ever use what I learned in this class.	6.5	5.9	23.5	37.9	25.5
This class provided me with skills I expect to use in the future.	22.9	24.8	24.8	19.0	7.8
This class has increased my technical skills.	14.4	34.6	20.9	17.6	11.8
I gained few useful skills from this class.	8.5	8.5	20.3	43.8	18.3
This class helped develop my problem-solving skills.	18.3	28.8	28.8	11.8	11.8
As a result of this class, I feel confident about tackling unfamiliar problems involving computers.	12.4	24.8	22.2	22.2	17.6
Total	13.8	21.2	23.4	25.4	15.5

of how they would make use of the language skills that they gain once they start their academic courses at their faculties. Students' perceptions of usefulness of the course might also have been influenced by the fact that not all aspects of language learning are equally emphasised in the CALL laboratory. Of the four skills of speaking, listening, reading and writing, the receptive skills of listening and reading are more commonly addressed by the programs in the laboratory than the productive skills of speaking and writing. This asymmetry might have caused a feeling of discontent among students.

Summary and implications

The findings for the present study came from data collected from two different questionnaires, namely, the What Is Happening In this Class? (WIHIC) and the Attitude to Computers and Computing Courses (ACCC) questionnaires. The data support the

cross-cultural validity of the classroom environment scales after they had been translated into the Turkish language and used for the first time in Turkey. Each scale in the WIHIC was found to display satisfactory internal consistency. Confirmatory factor analysis of the WIHIC and ACCC confirmed their a priori factor structure with a few minor exceptions. However, as Dorman (2003) suggested, it is generally problematic to obtain satisfactory fit for a model with seven latent variables and 42 observed variables. The variables in the ACCC also pose similar problems as the model fit indices indicated. Therefore, it is recommended that some items be modified to improve their discrimination among respondents.

An examination of mean scores on WIHIC suggests that Teacher Support, Investigation and Cooperation receive lower scores relative to other scales. Seemingly, students did not receive enough teacher support, couldn't stay on task long enough to feel involved in the teaching/learning process, and were less cooperative when computers are used. These findings are supported by Schofield's (1995) study which revealed that, although peer interaction increases when computers are used, in some cases, interaction becomes competitive rather than cooperative. Kim et al. (2000) also report higher mean scores for the scales of Student Cohesiveness, Task Orientation and Cooperation in the WIHIC, and lower mean scores for Teacher Support, Involvement and Investigation. These scores and patterns are almost the same as those in past research conducted in Australia and Taiwan (Aldridge et al. 1999). In contrast, the scores of Australian students in the study by Rawnsley and Fisher (1997) were higher for the scales of Teacher Support, Involvement and Equity than those of the Korean students.

The reason could be that teachers are required to prepare a lesson plan to supplement a given curriculum on a specific timeline and incorporate the most beneficial Websites and CD-ROMs in the instruction. They are also faced with the problem of managing the class in a laboratory that has 25 computers. In addition, teachers have to allocate time for discussion and other hands-on activities important for language learning. Apparently, teachers need training or inservice education on how to incorporate technology in their instruction in order to create a positive language learning environment.

Regarding the ACCC, all scales except Anxiety had high mean scores. Apparently, students enjoyed their CALL classes, believed in the use of these courses and the use of computers for their studies, but did not feel any fear or worry when computers were used. This might be attributed either to the limited availability of the CALL classes, which are given only 2 h a week, or to the classes being highly controlled by the teachers and most activities being structured by the teachers (Mucherah 2003). However, we need to be cautious when interpreting these results because the study involved no classroom observation component that could provide a more complete picture of the learning environment in the computing laboratory.

The present study had some limitations. First, although the instruments used in the study have proved to be useful in the overall analysis of the classroom environments researched in the study, they could have been combined with lesson observation and student interview data. Second, considering teacher perceptions of learning environments could yield additional valuable insights into the dynamics of the laboratory classes. Thus, comparing student and teacher perceptions of the same environment would be possible. Third, the study could have included both psychosocial environment variables and physical environment variables within the same learning environments in classrooms in which information technologies are used. Nevertheless, even with an awareness of all of these limitations, this study still revealed a number of concerns that need to be addressed when implementing computer-assisted instruction in the learning process. Most of all, it points to

the need of adopting a holistic view of learning environments. As a first step in this direction, the study identified the strengths and weaknesses of a language learning environment in a computer laboratory. Investigating issues, such as the role of teachers and when and how to use computer technology effectively in foreign language instruction, will be crucial as research on learning environment and the use of technology continues to develop.

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