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Students' perception and attitude towards computer laboratory learning environment

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The fundamental objective of education is to facilitate students' learning which is influenced by multiple variables embedded mainly in the students' attitude and the characteristics of the learning environment. Many measures have been designed to identify students' attitude and perception of their learning environment. However, very few of these measures have integrated the role of computers in students' perception of their learning environment and their attitude towards computers and computing courses. The objective of this study was to identify environmental factors of the laboratory that affect the learning of computer and computing courses using the Computer Laboratory Environment Inventory. The study also explored students' attitude towards studying computer and computing courses using the Attitude towards Computers and Computing Courses Questionnaire. It was the purpose of this study to investigate the relationship between academic achievement, environmental, and attitudinal variables. Finally, it determined the role of the years of study on the above issues. The target population included all students in second, third, and fourth years at the Department of Health Information Management and Technology, University of Dammam, Saudi Arabia. Non-parametric statistics tests were conducted. The general findings indicated the following: (1) there were significant positive associations between environmental and attitudinal variables; (2) the year of study influenced the degree of satisfaction with the computer learning environment; attitude; and test anxiety; (3) there were significant positive associations between academic achievement and both the environmental and attitudinal factors. It is anticipated that the information gathered in this study will be used to improve the computer learning environment, and will be a constructive influence on students' learning in Saudi Arabia.

Keywords: Computer laboratory learning environment, academic achievement, attitudes, learning.

INTRODUCTION

Learning Environment

Since the 1960s, a considerable amount of research has been devoted to the exploration of the learning environment. However, there seems to be no general agreement on what exactly constitutes a particular learning environment (Tagiuri, 1968; Ramsden, 1979), or on the definition of learning or educational environment. Genn and Harden (1986, p.112) contend that the climate of an educational environment "like the concept itself, is rather intangible, unreal and insubstantial, yet climate, in its effects, is pervasive, substantial and very real and influential".

For Moos (1980) the learning environment, in general, encompasses teacher behaviour, interaction between students and teacher, and student- student. Whereas for Astin and Holland (1974), the college environment, in particular, is a yield of the number of students in the college, the level of students' intelligence, and the students' personality. For Ramsden (1979) the word 'environment', within higher education referred to the teaching, course organization, subject area, and assessment methods.

Within the context of higher education, one of the main approaches to studying the learning environment is to explore students' perceptions (Ramsden, 1979). This approach has gained the most currency, since percep-

tions are believed to be the greatest determinant of human behaviour (Ramsden, 1979; Fraser and Walberg, 1981; Rivera and Ganaden, 2001).

Learning environment measures can be applied to different areas. For example, to measure students' satisfaction with the effort of teachers (Marshall, 1978); to monitor the influence of curriculum change on student perception of learning environment; to determine the strength of students' pressure for curriculum change (Clarke et al., 1984); to furnish teachers with diagnostic feedback regarding the effectiveness of their teaching, which in turn might be helpful for the improvement of teaching (Marsh, 1987; Clarke, 1995). Walberg (1972, p.69) summarized the application of learning environmental measures as follows: "(a) to improve the accuracy of predicting learning and (b) to manipulate the environment to bring about optimal conditions of learning".

The first instrument designed to measure the environment in higher education was Pace and Stern's College Characteristics Index (CCI) (Pace and Stern, 1958). They viewed the college environment as "a system of pressures, practices, and policies intended to influence the development of students toward the attainment of important goals of higher education" (p.277). The items in the CCI include: curriculum; college teaching and classroom activities; rules, regulations, and policies of the college; student's organization; and feature of the campus. The development of the CCI instrument created a momentum that generated several opportunities for research in the development of learning environment inventories.

Computer learning environment

In higher education, computers have been used widely for many purposes. For example, as a discipline of study in itself, as a device to assist the learning process within other courses, as a method of conveying learning material, as a research tool, and for on-line assessment, (Newby and Fisher, 2000; Newby, 2002).

The practical component of a computer course is usually taught in the computer laboratory class. The main objectives of such a laboratory class include not only helping students to achieve proficiency but also to develop skills, such as critical awareness, problem solving, communication of technical concepts, and independent thinking. It also introduces students to the computing learning environment; narrows the gap between theory and practice; fosters motivation and interest in the material to be learned (Boud et al., 1986). To achieve these objectives, factors that constitute a productive or positive computer laboratory learning environment should be identified. In this regard, Newby (2002) highlighted the following factors:

(1) The institutional support. This includes not only workstations but also infrastructure of technical support for hardware as well as software, and a help desk accessible to staff as well as students.
(2) The ways in which a computer laboratory may be staffed. This may affect instructor interaction with students.
(3) The level of assistance provided in a computer laboratory.

According to Newhouse (2001), some key parameters which can be utilized to explain the situation of computer systems in a learning environment involve:
(a) the students- computer ratio, (b) whether computers are in a laboratory or in a normal classroom, (c) whether they are stand-alone or networked, (d) whether they are fixed or portable, (e) whether students have the unrestricted access to computers or have access through a register/schedule system, and (f) whether students perform their jobs at the computers on individual bases or in groups.

The evolution of the use of computers in classroom has triggered more researchers to investigate the impact of utilizing computers on students learning (Teh and Fraser, 1995). Accordingly, an instrument has been developed to measure students' perceptions toward their computer learning environment. This instrument is called "Computer laboratory Environment Inventory" (CLEI).

There is no doubt that the learning environment has an effect on students' learning and outcome. Previous studies have confirmed the strong association between classroom learning environment and students' outcome. Therefore identifying the features of this learning environment will definitely help minimize factors that diminish students learning, and maximize factors that foster students' learning.

In addition, factors such as attitude are an important as influences on students' cognitive and affective outcomes. An exploration of students' perceptions of their educational environment; and attitude toward study will help sharpen the strengths and diminish the weaknesses of environmental and attitudinal factors.

It is hoped that this study will contribute to the existing knowledge base on the computer laboratory learning environment.

To the best of the author's knowledge, the computer laboratory learning environment at the Department of Health Information Management and Technology (HIMT) setting at the University of Dammam in Saudi Arabia has not been measured officially. The HIMT program started in 2003. It is bachelor's degree course consisting of a four-year program and one year's internship, with a total of 117 credit hours. Up to the present time, only female students have been admitted.

The objective of this study was to identify the factors of the learning environment affecting the learning of computer and computing courses by HIMT students. The

Table 1. Description of CLEI Scales

Scale	Description	Sample item
Student cohesion	Extent to which students know, help and are supportive of each other	I get on well with students in this laboratory class. (+)
Open-endedness	Extent to which the laboratory activities encourage an open-ended divergent approach to use of computers	There is opportunity for me to pursue my own computing interests in this laboratory class. (+)
Integration	Extent to which the laboratory activities are integrated with non-laboratory and theory classes	The laboratory work is unrelated to the topics that I am studying in my lecture. (–)
Technology adequacy	Extent to which the hardware and software are adequate for the tasks required	The computers are suitable for running the software I am required to use. (+)
Laboratory availability	Extent to which the laboratory is available for use	I find that the laboratory is crowded when I am using the computer. (–)

Note. Items designated (+) are scored 1, 2, 3, 4 and 5, respectively, for responses Almost Never, Seldom, Sometimes, Often, Almost Always Items designated (–) are scored 5, 4, 3, 2 and 1, respectively, for responses Almost Never, Seldom, Sometimes, Often, Almost Always
Sources: Adopted from Newby and Fisher (1997a)

study also investigated students' attitudes toward studying computer and computing courses. It was also the purpose of this study to explore the relationships between students' achievement, as measured by (GPA); and both perception toward their computer learning environment, as measured by Computer laboratory Environment Inventory (CLEI); and the attitude toward computer and computing courses, as measured by Attitude towards Computers and Computing Courses Questionnaire (ACCC). Finally, it determined the role and significance of the year of study on the above perceptions and attitudes.

MATERIAL AND METHODS

Study setting

The study was conducted in the Department of Health Information Management and Technology at College of Applied Medical Science, University of Dammam, Saudi Arabia.

Study design

A cross-sectional study, in May, 2009.

Target population and sample size

The target population was all second (n=34), third (n=28), and fourth (n=22) year students in the department of HIMT. A total of 33 out of 33, 26 out of 26, and 22 out of 22 surveys (excluding those participated in the pilot study) were completed by 2nd, 3rd, and 4th year students, yielding a response rate of 100%.

Data collection tools

The questionnaires were delivered personally (self-administered). Approximately 20 minutes was required to complete the questionnaires.

Instruments

(1) The computer laboratory environment inventory

The Computer Laboratory Environment Inventory (CLEI) was developed by Newby and Fisher (1997a) to measure students' perceptions of the computer laboratory class as a learning environment. It measures the students' perceptions of their computer laboratory environment on five scales: Student Cohesion, Open-Endedness, Integration, Technology Adequacy, and Laboratory Availability. It consisted of 35 items. Each item was scored on a 5-point Likert scale, ranging from "1= Almost Never" to "5= Almost Always". The scoring was reversed for negative items. This implies that the overall score of CLEI had a possible maximum score of 175 and a minimum score of 35. An overall score of 105 out of 175 would indicate a neutral perception, any value > 105 would indicate a more satisfactory environment, while value < 105 would indicate a less satisfactory learning environment. Table 1 provides a description of each of the five scales with a sample item.

(2) The attitude towards computers and computing courses questionnaire

The Attitude towards Computers and Computing Courses Questionnaire (ACCC), developed by Newby and Fisher

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 working on a computer	I enjoy learning on a computer. (+)
Usefulness of Computers	Extent to which the student believes computers are useful	My future career will require a knowledge of computers. (+)
Usefulness of Course	Extent to which the student found the course useful	I do not think I will use what I learned in this class. (–)

Note. Items designated (+) are scored 1, 2, 3, 4 and 5, respectively, for responses Strongly Disagree, Disagree, Not Sure, Agree, Strongly Agree Items designated (–) are scored 5, 4, 3, 2 and 1, respectively, for responses Strongly Disagree, Disagree, Not Sure, Agree, Strongly Agree
Sources: Adopted from Newby and Fisher (1997a)

(1997b), to assess students' attitudes towards computers and computing courses. It consisted of 28 items and measured the students' attitudes on four scales, namely: Anxiety, Enjoyment, Usefulness of Computers, and Usefulness of Course. Each statement was scored on a 5-point Likert scale, ranging from "1=Strongly Disagree" to "5=Strongly Agree". The scoring was reversed for negative items. Table 2 provides a description of each of the four scales with a sample item.

Statistical analysis

A non-parametric statistical analysis was performed using the Statistical Package for Social Sciences (SPSS, IBM, Chicago, Illinois, USA) version 16. Cronbach's alpha coefficient was used to assess the internal consistency of the questionnaire. Spearman rho coefficient was calculated to assess the association between: a) students' perceptions of their computer laboratory environment and their attitudes towards computers and the computing courses, and b) students' academic achievements and both environmental and attitudinal variables. Furthermore, regression analysis was used to explore the most important predictors for academic achievement as well as the attitude toward computer and computing courses.

Kruskal-Wallis test was conducted to explore any statistical significant differences among students' perceptions of the computer laboratory learning environment and their attitude towards computer and computing courses based on the year of study. In addition, Pair-Wise comparisons were conducted using the Mann-Whitney U-Test to elicit any statistical significant differences between students' perceptions of the above issues.

A pilot study was conducted with a group of three HIMT students (one in second-year and two in third-year) at the end of their academic year, April 2009 to discover any possible ambiguities in the surveys. The result showed that the surveys were clear with no ceiling or floor effect.

RESULTS

Reliability and validity analysis

Cronbach's alpha coefficient was computed for the whole inventory and for the individual scales to measure the internal consistency of the individual scale and the whole inventory. The results of the Cronbach's alpha values, presented in Table 3, were interpreted using to Richardson's (1988) suggestion.

For the CLEI, the Cronbach's alpha reliability coefficient for the whole inventory and all five scales ranged from 0.403 to 0.708 indicating that the inventory and its scales had *average to high* reliability. With regard to the ACCC scale, the Cronbach Alpha coefficient for 'usefulness of course' scale was 0.501, indicating *average to high* reliability. While that for all remaining scales ranged from 0.710 to 0.795, indicating *high to very high* reliability of the items.

The literature emphasizes that the "mean correlation of a scale with other scales of the questionnaire is accepted as a measure of discriminant validity and is the extent to which the scales are unique in what they are measuring" (Newby and Fisher, 1997a). The result of this study revealed that the mean correlations of the scales of the CLEI ranged from 0.02 to 0.21 and that of ACCC ranged from -0.46 to 0.17, demonstrating that each scale of both instruments had adequate discriminant validity. It appears that both the CLEI and the ACCC measure distinct although slightly overlapping aspects in what they measure.

Student's perceptions of the computer laboratory learning environment

With regard to the CLEI scale, table 3 showed that the highest mean scores were accorded to the 'student cohesion' and the 'integration' (mean= 3.55 and 3.41 respectively). 'Technology adequacy' had the lowest mean score' (mean= 2.76).

Table 3. Mean, standard deviations, Cronbach Alpha coefficient, and mean correlation coefficient for the scales of CLEI and ACCC (N=81)

Scale	Mean	Standard deviation	Alpha Reliability	Mean Correlation
CLEI				
Student Cohesion	3.55	.599	.56	0.10
Open-Endedness	2.98	.459	.40	0.02
Integration	3.41	.617	.71	0.10
Technology Adequacy	2.76	.652	.66	0.21
Laboratory Availability	2.97	.646	.61	0.16
ACCC				
Anxiety	2.39	.694	.79	-0.46
Enjoyment	3.87	.667	.78	0.12
Usefulness of Computers	4.33	.573	.71	0.17
Usefulness of Course	3.36	.504	.50	0.13

Table 4. Associations between the CLEI scales and the ACCC scales

Scale	Anxiety		Enjoyment		Usefulness of Computers		Usefulness of Course	
	r	β	r	β	r	β	r	β
Student Cohesion	-.007	-.041	.104	.075	.289**	.294**	.148	.201
Open-Endedness	.116	.078	.157	.158	.215	.077	.097	.080
Integration	-.057	.004	.204	.210	.175	.219*	.019	.007
Technology Adequacy	-.141	-.214	.063	.027	-.184	-.279*	.035	.152
Laboratory Availability	-.010	.078	.049	.012	.002	.118	-.045	-.175
MultipleR^2	-.020		.027		.145**		.015	

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)
r= simple correlation coefficient, β= standard regression coefficient

Association between environmental and attitudinal variables

In order to find out the associations between students' perceptions of their computer laboratory environment and their attitudes towards computers and the computing courses, simple correlation coefficients (r) and standardised regression coefficients (β) were calculated. In Table 4, the result of simple correlation analysis shows that only one out of a possible twenty relationships were significant, between computer laboratory environment variables, namely, 'student's cohesion' and 'usefulness of computer' in attitude variables (r=.289, p<.01). The regression analysis shows three significant relationships out of 20, with only one multiple correlation being significant. Three out of the five independent variables contributed significantly to the prediction of 'Usefulness of Computers' with 'Student Cohesion' contributing the most. Altogether, 15% of the variability in 'Usefulness of Computers' was predicted with the knowledge of the values of the environment variables.

Association between environmental and attitudinal variables based on year of study

The correlation analysis between the computer laboratory environment and student's attitudes towards computers and their computing class based on their year of study showed the following; for second year students, the results revealed that there were only three significant relationships out of twenty potential relationships, between computer laboratory environment variables and attitude variables. These significant positive correlations were found between 'student cohesion' and 'enjoyment' (r= .427, p<.01), 'student cohesion' and 'usefulness of computers' (r=.605, p<.01), and 'open-endedness' and 'enjoyment' (r= .393, p<.05).

For third year students, there were only two significant

Table 5. Associations between environmental variables and both computer grade and overall grade

Scale	Computer grade		Overall grade	
	r	β	r	β
Student Cohesion				
Year 2	.351*	.391	.272	.281
Year 3	.489*	.520*	.603**	.623
Year 4	.193	.149	.310	.193
Open-Endedness				
Year 2	-.092	-.199	-.121	-.305
Year 3	.030	.046	.037	-.019
Year 4	.267	.215	.173	.179
Integration				
Year 2	.016	-.098	-.037	-.157
Year 3	.178	.014	.265	.064
Year 4	-.147	.004	-.163	-.255
Technology Adequacy				
Year 2	-.236	-.112	-.170	-.152
Year 3	.342	.222	.350	.262
Year 4	-.004	-.051	-.016	.130
Laboratory Availability				
Year 2	-.209	-.112	-.035	.047
Year 3	.280	.130	.102	-.029
Year 4	.022	-.018	-.153	-.153
Multiple R^2				
Year 2	.033		-.051	
Year 3	.234		.346*	
Year 4	-.218		-.109	

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)
r= simple correlation coefficient, β= standard regression coefficient

relationships out of twenty likely relationships, namely between 'open-endedness' and 'usefulness of computers' (r=.542, p<.01) and between ' integration' and 'enjoyment' (r= .392, p< .05). The results revealed no significant association between computer laboratory learning environment variables and students' attitudes variables for fourth year students.

Association between environmental variables and students' achievement based on year of study

Associations between the computer laboratory environment and both 'overall grade average for computer courses' and 'overall grade average for general courses' are shown in Table 5. For second year students, the result revealed that only 'students' cohesiveness' (r=.351, p=.045) correlated significantly and positively with 'overall grade average for computer courses'. However, the standardised regression coefficient and the multiple correlation coefficients were both not significant.

For the third years, 'student cohesion' (r=.489, p<.05) correlated significantly with their 'overall grade average for computer courses', and the standardised regression coefficient was also significant. However, the multiple correlation coefficient was not significant. In addition, significant positive correlation was found between 'students' cohesion' (r=.603, p<.01) and 'overall grade average for all courses'. However, the standardised regression coefficient was not significant but the multiple correlation coefficient was.

No significant associations were found between environmental variables and students' achievement for the fourth years.

Association between attitudinal variables and students' achievement based on year of study

Correlation analysis between attitudinal variable and achievement grades revealed that only 'enjoyment' (r=.498, p=.010) correlated significantly and positively

Table 6. Associations between attitudinal variables and both computer grade and overall grade

Scale	Computer grade		Overall grade	
	r	β	r	β
Anxiety				
Year 2	.144	.013	.218	.169
Year 3	-.248	.180	-.027	.203
Year 4	-.119	.938*	-.324	.597
Enjoyment				
Year 2	-.256	-.640*	-.014	-.091
Year 3	.498**	.219	.260	.104
Year 4	.528*	.809*	.573**	.664
Usefulness of Computers				
Year 2	.085	.430	.040	.058
Year 3	.322	.387	.268	.471
Year 4	.495*	.465*	.558**	.408
Usefulness of Course				
Year 2	.069	.208	.076	.350
Year 3	.377	.248	.207	.100
Year 4	.251	.299	.110	.017
Multiple R2				
Year 2	.117		-.008	
Year 3	.249*		.121	
Year 4	.331*		.104	

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed)
r= simple correlation coefficient, β= standard regression coefficient

with 'overall grade average in computer courses' for third year students (Table 6). The standardised regression coefficient was not significant. However, the multiple correlation coefficient was significant.

For fourth students, significant positive correlations were observed between both 'enjoyment' ($r=.528$, $p<.05$), and 'usefulness of computer' ($r=.495$, $p<.05$) and the 'overall grade average in computer courses'. The standardised regression coefficients for Anxiety, Enjoyment, and Usefulness of Computers were all significant. The multiple correlation coefficient was also significant. Furthermore, significant positive associations were found between both 'enjoyment' ($r=.573$ $p<.01$), and 'usefulness of computer' ($r=.558$, $p<.01$) and the 'overall grade average for general courses'. The standardised regression coefficients for both scales were not significant, nor were the multiple correlation coefficient.

Comparison of students' perceptions on the CLEI and ACCC based on year of study

In order to discover any significant differences in students' perceptions of their computer learning environment and their attitudes toward computer and computing courses based on their year of study, a Kruskal-Wallis test was conducted. The test revealed that there were significant differences among the three groups on the perceptions of their laboratory environment, namely, 'technology adequacy' ($p=.031$) and 'laboratory availability' ($p=.033$). The mean ranking by fourth year students were higher for these two scales than their counterparts. With regard to the attitudinal variable, there were two significant differences among the three groups on 'anxiety' ($p=.066$) and 'enjoyment' ($p=.027$) scales. The mean rank for the 'anxiety' scale for second year students was higher than their colleagues, while fourth year students accorded a higher mean rank for the 'enjoyment' scale than their counterparts.

In order to find out which group differed, Mann-Whitney tests were performed. The Mann-Whitney test showed no significant differences in the perceptions of laboratory learning environment between second and third year students. However, with regard to the attitude toward computer and computing, the test revealed significant differences between students' attitudes to 'anxiety' ($p=.021$), 'enjoyment' ($p=.036$), and 'usefulness of course' ($p=.025$). Second year students reported a higher mean rank for 'anxiety' than third year students. While third year students reported higher mean ranks for both 'enjoyment' and 'usefulness of course' scales.

A comparison between second and fourth year students revealed no significant differences between them on their perceptions of laboratory learning environ-

ment. However, with regard to attitude toward computer and computing classes, the Mann-Whitney test revealed only two significant differences between the two groups of students in their attitudes to 'anxiety' (p=.003) and 'enjoyment' (p=.014) scales. Second year students accorded a higher mean rank for 'anxiety' scale but a lower mean rank for the 'enjoyment' scale compared with the fourth year students.

A comparison between third and fourth year students revealed that there were two significant differences between them in their perceptions of laboratory learning environment only. These significant differences were on 'technology adequacy' (p= .007) and 'laboratory availability' (p=.007). The mean ranks for these two scales for fourth year students were higher than those of the third year students.

DISCUSSION

The findings revealed that the CLEI questionnaire was a reliable instrument for the assessment of the computer learning environment of Health information management and technology.

In general, the computer learning environment was perceived as satisfactory by HIMT students (110/175) at the University of Dammam. The learning environment was considered more positively by fourth year students than third year students. As compared with third year students, the fourth year HIMT students were more positive towards adequacy of technology; and the availability of the laboratory for the computer laboratory class. This could be explained by the fact that the class size of the fourth year students is smaller (22 students) than the other groups, which in turn might have had an effect on positive perceptions of the students toward the laboratory environment where computer hardware was adequate, and that the laboratory was available for them to work in whenever required. The third year students complained of an overcrowding of the computer laboratory; of the working condition of the computers; and of the availability of computer software. This would imply that for the third year students more space is required in the laboratory class, because of the size of their class as compared with their counterparts. Class size should be taken into consideration when scheduling the laboratory classes. Making the lab readily available for use by students would have a positive impact on their perceptions toward their laboratory environment.

Although the general findings showed a satisfactory learning environment, there is much room for improvement. Overall, the findings indicated that CLEI could be used as a diagnostic measure to assess the computer laboratory learning environment for HIMT students.

With regard to attitudinal variables toward computer and computing, the findings indicated that third year students had more enjoyment and were more appreciative of the usefulness of their computer courses, than the second years. Second year students expressed greater anxiety than their counterparts. They had higher test anxiety than others. This would imply that at the beginning of their program/speciality, second year students were uncertain about their study plane. It may be why the Department of HIMT initiated an orientation day for second year students in May, 2009, in the second term, in order to address students' concerns on the program, curriculum, and their expectations after graduation, career prospects, postgraduate study and other related issues. This orientation program, as agreed, will be conducted yearly in the 1st term for second year students.

This suggests the importance of designing courses, or supplementary educational material such as study guides, to help minimize the effect of test anxiety, that tends to have negative impact to some extent on students' learning.

The significant positive correlation between 'students cohesion' and the 'usefulness of computer' (r=.289, p<.01) would indicate that a laboratory environment where the students interact as a more cohesive group leads to a computer environment perceived by students as better and useful. The existence of such a positive correlation between environmental and attitudinal variable is consistent with finding of Newby and Fisher (1997b). The absence of significant associations between other environmental and attitudinal variables in this study is in agreement with the findings of Newby and Marcoulides (2008).

The simple correlations indicate that enjoyment and usefulness of computers are associated with achievement in computer courses, a finding that is in partial accord with that of Newby and Fisher (1998, 2000) and Newby and Marcoulides (2008). However, the regression coefficients demonstrate that all attitudinal variables did not contribute significantly to the prediction of achievement, a finding that contradicts that of Newby and Fisher (1998, 2000).

The regression analysis, in general, supported the results of the simple correlation analysis; however, there were some discrepancies. Student cohesion, integration, and technology adequacy were significant predictors of usefulness of the computer. But the correlation analysis indicates that only student cohesion correlated significantly with usefulness of computers. This result supports partially the findings of Ogbuehi and Fraser (2007) that there were associations between perceptions of the classroom learning environment and students' attitudes.

Usefulness of the computers is the only attitudinal variable, 15% of which is explained by the environment variables. The most significant contributions came from 'Student Cohesion and Integration'. There was also a significant contribution from Technology Adequacy. This

would imply that a computer laboratory whose activities are integrated with non-laboratory and theory classes, and had more student cohesion would be more useful.

The findings of the correlation analysis for the environmental variables with achievement revealed that only 'Student Cohesion' was associated significantly with both achievements in computer and in general courses ($p<.05$). One possible explanation for such an association may be traced back to the culture of the HIMT department where students are divided into small groups at the beginning of the academic year. Students are, therefore, used to working together on their practical assignments, which form a major component of student assessment.

With regard to the attitudinal variables, 'Enjoyment' and 'Usefulness of Computer' are correlated significantly with achievement. This result would imply that students who enjoy using computer and who perceive the computer as more useful tend to achieve better grades. The significant association found between perceived usefulness of the computer and achievement contradicts the finding of Newby and Fisher (1998). But the association found between enjoyment and achievement is in accord with Newby and Fisher's (1998) findings.

The association of environmental variables based on students' year of study revealed that in the second and third years, students' achievement is greatly associated with the extent of student cohesion. However, for fourth year students, the absence of significant association might suggest that there are factors other than laboratory environment or attitudinal variables that affect students' achievement.

Association of attitudinal variables and achievement based on students' year of study revealed that in the 2nd year, students' achievement is not greatly associated with attitudinal variables. This might imply that some aspects other than attitudinal variables affect students' achievement. However, by the time they get to the 3rd year, the association of students' achievement with their level of enjoyment emerges, peaking in the 4th year when students' achievement was highly associated with the extent of their enjoyment of using computer lab and their perception of the usefulness of computers.

CONCLUSIONS AND RECOMMENDATION

The most significant observations from these results are the associations between the environmental and the attitudinal variables as follows: 1) the associations between 'student cohesiveness', 'usefulness of computer' and 'enjoyment'; 2) the association between both 'open-endedness' and 'integration' with 'enjoyment'. Generally, this could imply that a laboratory class which is characterised by strong cohesion between students, where there is an integration of theoretical and practical classes, with a more open-ended approach, would enhance students' feeling of enjoyment and generate more positive perceptions towards the usefulness of computers.

Moreover, students who enjoy computer and computing courses more and find computers useful tend to achieve better grades.

The results of this study are expected to add value to the accreditation process which is a vital objective for a higher educational institution in the Kingdom at the present time.

Limitation of the study

This study was limited to undergraduate students at Health Information Management and Technology Department, one of the colleges of the University of Dammam. Therefore, any generalization should be limited to colleges with similar characteristics.

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