

Components of effective academic learning environment: Case studies of Croatian and American students

Violeta Vidaček-Hainš
University of Zagreb, Faculty
of Organization and
Informatics Varaždin, Croatia
vvidacek@foi.hr

Victoria Appatova
University of Cincinnati, Box
210205, OH, USA
appatovs@ucmail.uc.edu

Harry Prats
University of Cincinnati, Box
210205, OH, USA
pratshj@ucmail.uc.edu

Abstract: *Learning environment factors have been increasingly taken into consideration by different higher education systems in two target groups of students in Croatia and the USA. In addition to curriculum and technical support provided at a higher educational institution, other factors have been gaining importance, including student services, mentor support, learning skills development, self efficacy, as well as the prior knowledge gained in the course of secondary education and from family backgrounds. The results are interpreted in the context of identifying the key factors for successful tertiary-level education, especially in the field of information and communication technology in Croatia. Students' feedback is suggested to be used for introducing possible modifications towards a creative and effective learning environment at colleges and universities.*

Key words: learning environment, information communication technology, higher education

1 Introduction

Higher education is expected to create a high-quality learning environment. Learning environment encompasses a whole range of variables in the area of psychological, pedagogical, technical, cultural, and pragmatic research [14]. Students in the effective learning environment acquire more diversified knowledge [17], [8]. Research results [16]

show that students' perception of their current learning environment is even a stronger predictor of learning outcomes at a university than their prior achievements at school. Authors [15] emphasize the importance of the learning space concept as a framework for understanding the interface between student learning styles and the institutional learning environment. Other research has also confirmed that approaches to learning, regulation of learning, and cognitive strategies are interdependent and impact the overall academic success [12]. Students' approaches to learning [11] are also significant as students' perceptions of their personal goals vary. They use different learning strategies [18], and their academic performance [3] also depends upon their individual learning styles.

In addition to these learning environment factors, authors like [6] and [19] emphasize the importance of peers and their effect on the higher education process. There is also a need to re-conceptualize the role of higher education and to reconsider conventional relationships among teachers and students [4]. A very important factor of a learning environment is the application of the state-of-the-art technology in education [10] as its use means enhancement of the quality of studying leading to better knowledge acquisition, development of skills, and encouraging motivation [13], [19].

This paper uses the concept of effective learning environment (ELE) as an open system of variable factors that influence the effectiveness of student learning from the perspective of learners, faculty, administrators and professional staff [1]. Its objectives include analysis of the importance of various ELE factors assessed by students in the higher education system. Research has been conducted with an appropriate sample of students from one American and one European university, and the results collected from the two sets of respondents have been analyzed. As it is known, Europe is experiencing the process of higher education system transformation to comply with the Bologna Declaration signed in 1999 by the Ministers of Education from thirty European countries. The main goal of this document is to establish the common European system of higher education and promote quality assurance in higher education [21]. The process of higher education itself seeks to integrate the international dimension [7].

2 Method

2.1. Respondents

The respondent sample includes N= 126 first year (freshmen) students at the University of Zagreb, Faculty of Organization and Informatics (FOI) in Varaždin (of whom 68% are male students and 32% are female students) and N= 255 students at the Center for Access and Transition University of Cincinnati (CAT), of whom 53% are male students and 46% are female. For the CAT students the results were taken from the Appatova & Prats [1] research.

The age of respondents is mostly 18 to 21 (68% of all respondents at the FOI and 95% at the CAT were of that age). The collected data include demographic details of respondents in both sample groups. Some students did not answer all the questions; therefore, the total of the percentages in each category of answers does not always equal 100%. It has also been found that, during their studies at the university, students may live at home with their own family (FOI 31%, CAT 43%), or in a dorm or a student shared

apartment on campus (FOI 26%, CAT 37%), or in a dorm or student shared apartment off campus (FOI 41%, CAT 10%), or at other types of residences (FOI - 2%, CAT - 9%). A total of 96% of surveyed students at FOI and 93% surveyed students at CAT do not have their own children who currently live with them while they study at the university; 3% of FOI and 4% of CAT students have one child who lives with them during the study, and 4% at FOI and 2% at CAT have two or more children. Almost 85% of the surveyed students at FOI and 42% at CAT do not work or earn any income while studying at the University; 10% at FOI and 9% at CAT have part-time jobs up to 10 hours per week and a small percentage (4% FOI), but much higher at CAT (49%) work more than 11 hours per week. 21% of CAT students work over 20 hours a week, which is a huge difference compared to the surveyed Croatian students (2%). Research was at both universities conducted in calendar years 2006 and 2007.

All the surveyed American students were freshmen placed in the CAT program immediately upon entering the university. The fact that they were placed in the CAT program means that they either did not earn sufficient scores for direct admission into the University of Cincinnati colleges of their choice, or did not take the appropriate classes in high school to gain direct admission. While they are in the CAT program, the students take mostly developmental courses (such as English, Math, and Oral Communication), and upon successful completion of the program, they are eligible for transfer to baccalaureate colleges of the University of Cincinnati.

2.2. Measurement

The survey has been adapted from the ELE study for college students [1]. The results have been obtained from Part 1 (Demographics), which contains 10 questions, and Part 2 (Components of Effective Learning Environment), which contains 28 questions. Questions in Part 1 relate to assessment of demographic data such as family status, place of residence, economic indicators, etc. Each question in Part 2 evaluates a component of the learning environment on a slightly modified 5-point Likert scale, including answers from “not important at all” to “very important”. The

questions relate to evaluating the importance of each of the ELE components (ELE factors are stated and explained in the paragraph below). The alpha coefficient of reliability (α) for "Effective Learning Environment Scale (Part 2)" is high and reads 0.871, which indicates sufficient reliability for further statistic processing and interpretation.

3. Results and Interpretation

3.1. Comparing importance ranks of ELE factors from the perspectives of Croatian and American students

Croatian and American students' perceptions have been compared using Part 2 of the ELE instrument, which evaluates effective learning environment factors contributing to student success at a higher education institution. Diagram 1 below shows arithmetic means of American [1] and Croatian students' evaluation of various ELE factors. A similar curve trend can be noticed with both group of students, and the level of evaluation of all statements is higher with American students.

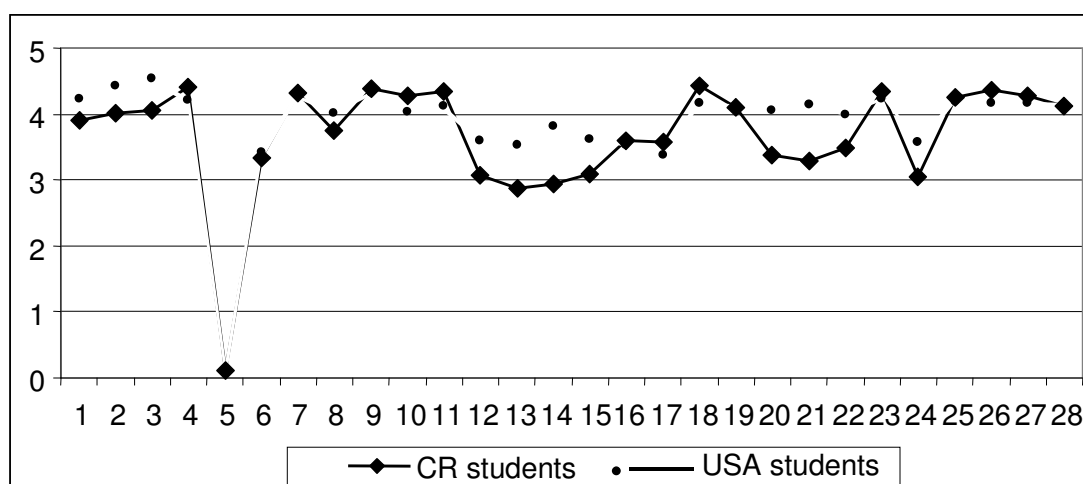


Figure 1 Estimates of ELE factors importance in groups of students at FOI (CR) and CAT (USA)

Legend: Axis x: 1=experiencing non-discriminative attitudes; 2=availability and cooperation of college/university administration; 3=commitment and availability of professors; 4=stress-free environment; 5=competitive, stressful environment; 6=small classes; 7=time management skills; 8=effective note-taking skills; 9=test-taking skills; 10=effective memory techniques; 11=knowledge of individual learning styles; 12=taking a study skills class; 13=taking an effective reading class; 14=taking advanced classes with confidence; 15=taking a writing class; 16=taking a communication class; 17=learning communities; 18=access to adequate technology; 19=access to library resources; 20=regular guidance by academic advisors; 21=availability and adequate level of individual tutoring on campus; 22=student support services on campus; 23=feeling

comfortable with people and offices on campus; 24=involvement in campus life; 25=quiet place to study; 26=self-confidence and assertiveness; 27=ability to apply strengths and improve; 28=clear short-term and long-term goals.

Axis y: Estimates of ELE factor's importance

For these two samples of respondents, a correlation has been calculated between the estimated ranks of factors in an effective learning environment. The resulting correlation is positive and statistically significant ($r=0.684$, $p<0.01$). This result shows that, despite cultural and language differences, there is a high level of correspondence in the students' assigning importance to various factors influencing their learning environment. However, if we compare sums of average values related to 28 ELE factors in the two

student samples, results show that the CAT students [1], on average, evaluate the importance of these factors statistically higher ($M= 386.04$, $sd=80,10$) than their Croatian peers ($M= 386.36$, $sd= 86.63$). The resulting t-test is statistically significant and reads $t=22.24$ ($df=27$, $p<0.01$). Such result may be interpreted in the context of different availability of certain services at American and Croatian universities and colleges. Considering that the Bologna Process initiated numerous positive changes enhancing quality of the higher education in the Republic of Croatia only three years ago, it is also possible to assume that Croatian student have not yet become aware of the benefits and support available to facilitate their studies. Some support services are only being established, and students are slowly getting used to the newly offered benefits.

The analysis of the arithmetic means for ELE factors shows that FOI students highly rank access to technology ($M=4.44$, $sd=0.72$), followed by a stress free environment ($M=4.40$, $sd=0.89$) and test taking skills ($M=4.38$, $sd=0.77$). High rank of access to state-of-the-art technology should have direct implications for designing specific curriculum features in the area of information systems. The American student sample gives the highest estimate to commitment and availability of professors, followed by availability and cooperation of college/university

administration and test taking skills (arithmetic means range from $M=4.31$ to 4.53 , sd reads from 0.775 to 0.949), probably, because of higher availability of services provided at American institutions of higher education. Both student samples ranked test taking skills rather high, and they are obviously one of the key factors of college success. Interestingly enough, students from both countries estimate the competitive, stressful environment as the least important for their successful learning – with the FOI students the result is $M=0.104$, $sd=1.143$), and with American students it is $M=2.67$, $sd=1.367$ [1].

3.2. Factor Analysis of ELE from the Perspective of Croatian Students

Factor analysis (FA) of items using the Likert Scale was conducted on Part 2 of the survey (Components of Effective Learning Environment), which contains 28 questions. The factor analysis used the method of principal component as an extraction method with Varimax rotation and Kaiser Normalization, eigen values being over 1. The first iteration extraction resulted in 8 extracted components that together explain a total of variance amounting to 63.925%. The percentage of the variance explaining certain factors is shown in Table 2 below:

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative
F1: Learning Techniques	3.475	12.410	12.410
F2: Written and Spoken Communication Skills	3.454	12.336	24.746
F3: Advisory Options	2.666	9.523	34.269
F4: Cooperation with Administration and Professors	2.010	7.180	41.449
F5: Physical Environment	1.758	6.278	47.727
F6: Acceptance by Social Community	1.650	5.894	53.621
F7: Sources of Support	1.526	5.451	59.072
F8: Competitive Environment	1.359	4.853	63.925

Table 2: Total variance items explained by individual factor in the procedure of factor analysis using the method of principal component

Factors have been named based on items with the highest correlation to each factor and the lowest inter-correlation among them. Thus, F1 (*learning techniques*) contains statements whose content related to describing test taking skills and effective memory techniques; F2 (*written and spoken communication skills*) describes statements emphasizing the importance of communication skills training; F3 (*advisory options*) includes statements relating to communication of students and academic advisors, as well as personal, active involvement in campus life; F4 (*cooperation with administration and professors*) covers items related to services

provided by administration and faculty, as well as organization of courses in small groups; F5 (*physical environment*) relates to learning in a stress free environment and possibilities of adopting effective reading techniques; F6 (acceptance by social community) includes a non-discriminatory social community and feeling comfortable with other people; F7 (*sources of support*) relates to support coming from other students and technological support of teaching and learning; F8 (*competitive environment*) includes mechanisms encouraging an individual to value competition and self-concept.

Factor markers /Items	Components (FA)							
	F1	F2	F3	F4	F5	F6	F7	F8
20. effective memory techniques	0.759	0.153	0.000	0.000	- 0.146	0.000	0.000	- 0.204
19. test-taking skills	0.649	0.241	0.000	0.117	0.350	0.000	0.000	0.000
25. taking a writing class	0.169	0.769	0.197	0.151	0.000	- 0.133	0.138	0.000
26. taking a communication class	0.212	0.750	0.103	0.000	0.128	0.000	0.242	0.000
30 regular guidance by academic advisors	0.127	0.196	0.745	0.241	0.000	0.000	0.000	0.000
34. involvement in campus life	- 0.169	0.175	0.693	0.134	- 0.136	0.155	0.135	- 0.156
12. availability and cooperation of college/university administration	0.000	0.000	0.000	0.878	0.000	0.000	0.000	0.000
13 commitment and availability of professors	0.193	0.000	0.238	0.717	0.248	0.000	0.000	0.135
14. stress-free environment	0.000	0.219	0.000	0.366	0.679	0.142	0.000	0.000
23 taking an effective reading class	0.103	0.448	0.150	0.000	0.603	0.000	0.000	- 0.124
11. experiencing non-discriminative attitudes based on the student's cultural, ethnic, racial, religious, academic, social, etc. characteristics	0.101	0.145	- 0.190	0.247	0.120	0.747	0.249	- 0.129
33 feeling comfortable with people and offices on campus	0.122	0.000	0.417	0.000	0.000	0.727	0.000	0.000
27 learning communities	0.000	0.000	0.000	0.000	0.153	0.000	0.766	0.000
28 access to adequate technology	0.384	0.000	0.000	0.000	- 0.327	0.102	0.554	0.209
15. competitive, stressful environment	0.000	0.000	0.000	0.000	- 0.177	0.000	0.000	0.771
21. knowledge of individual learning styles	0.451	0.253	0.000	0.000	- 0.267	0.231	- 0.264	- 0.504

Table 3: Factor markers or statements with highest correlation to each factor (Rotated Component Matrix)

Table 3 shows factor markers, i.e. statements with the highest correlation to the primary factors and the lowest to other factors. The selection criterion for factor markers was the item correlation with the main factor of not less than 0.50, and correlation to other factors that is as low as possible. Rotation was converged in 20 iterations. Since correlation between responses of the students in both samples is high, a separate factor analysis procedure on other sample of the students has not been given.

3.3. Gender differences among Croatian students in evaluating factors of effective learning environment

To identify gender differences in perception of the importance of various ELE factors, we have analyzed responses of Croatian female and male students to Part 2 of the ELE survey. Each result formed a sum of points on all 28 statements. Following the independent sample T-test, a significant difference has been found between female and male understanding of the importance of effective learning environment factors ($t=1.763$, $df=19$, $p=0.04$, one tailed). Overall, female students rank importance of effective learning environment higher ($M=107.78$, $sd=11.19$) than their male peers ($M=103.40$, $sd=13.870$). It may be inferred that more female students realize that in order to succeed in college, one needs, in addition to knowledge acquisition, confidence and personal development, written and spoken communication skills, social support of his/her peers and of the college services.

4 Conclusion

Despite existing differences in American and Croatian higher education systems, partial correspondence has been identified in assigning importance to a wide range of ELE factors. Thus, for example, answers of respondents from both groups show high importance ranking of test taking skills, i.e. students have recognized the need for developing skills like good data organization, memorizing, problem solving, verbal expression, etc. It will probably be useful to further consider trainings that encourage these

particular skills, as has already been recommended in similar research by other authors [3], [8], [12].

Results of the ELE Importance Factor Analysis conducted on a sample of Croatian students show that learning techniques, communication skills and availability of state-of-the-art technology are important to the students' college success. Furthermore, advisory options and cooperation with administration and professors are important to Croatian students, as supported by other research results [4]. This finding supports efforts of the Bologna Process and trends of cutting down the size of groups while increasing the number of teachers, as well as collecting the feedback on the quality of services. These results may be used in the creation of any higher education organizational structure, by considering a possible increase in number of services used to support learning and to organize classes and workshops focused on the development of learning and communication skills.

Significant gender differences have been found in estimating the importance of an effective learning environment, i.e. female students generally estimate these factors as more important than their male peers. One of the possible explanations of results received on the sample of Croatian students may be the fact that female students have more developed communication and social skills and perceive such skills as highly important [20]. In addition, research confirms gender differences in using certain technological ELE components, such as a computer, which male students use much more often than their female peers [2]. According to gender differences, there is a need for an individual approach in creating the teaching process [8].

Based on the two case studies, these results demonstrate how the study of different national higher education systems result in different student perceptions of levels of importance and ranks of various ELE factors. Since different characteristics of the learning environment influence student achievement in higher education, the study of ELE factors is very important [5]. Considering the importance of the results, a continuation of this research effort is planned with the inclusion of respondents from different countries and a refined focus on personality development and self-efficacy.

Hereby, we would like to thank Professor Dann Marketos, Assistant Professor of Mathematics, University of Cincinnati, who helped us with parts of the statistical analysis.

References

- [1] Appatova V., Prats, H.: **Effective academic environment for under-prepared college/university learners: listen to student voices.** Paper presented at the 16th EAN Annual Conference “Access to Success: The Student Experience from Pre-Entry to Employment”, Galway, Ireland, 2007. Available at http://www.ean-edu.org/about/victoria_appatova.ppt Accessed 15th February 2008
- [2] Barrett E., Lally V.: **Gender differences in an on-line learning environment.** *Journal of Computer Assisted Learning*, 15, 1, pp. 48–60, 1999.
- [3] Boyle E.A, Duffy T., Dunleavy K.: **Learning styles and academic outcome: The validity and utility of Vermunt’s Inventory of Learning Styles in a British higher education setting.** *British Journal of Educational Psychology*, 73, 2, pp. 267-290, 2003,
- [4] Brew A.: **Teaching and research: New relationships and their implications for inquiry-based teaching and learning in higher education.** *Higher Education and Research development*, 22, 1, pp. 3-18, 2003.
- [5] Bruinsma M.: **Motivation, cognitive processing and achievement in higher education.** *Learning and Instruction*, 14, 6, pp. 549-568, 2004.
- [6] Dochy F., Segers, M.: **The use of self-, peer and co-assessment in higher education: a review.** *Studies in Higher Education*, 24, 3, pp. 331-350, 1999.
- [7] Enders J.: **Higher education, internationalization, and the nation-state: Recent developments and challenges to governance theory.** *Higher Education*, 47, 3, pp. 361-381, 2004.
- [8] Entwistle N.J., Peterson, E.R. (2004).: **Conceptions of learning and knowledge in higher education: Relationships with study behavior and influences of learning environments.** *International Journal of Educational Research*, 41, 6, pp. 401-406.
- [9] Fallows S. & Bhanot R.: **Educational development through information and communications.** Routledge Taylor & Frances Group, London, UK, 2002. Available at <http://books.google.com/books?hl=en&lr=&id=3TTEqy4GqkC&oi=fnd&pg=PT149&dq=ICT+skills+higher+education&ots=sGPCg5SGLo&sig=NsPIOatWBHaTds2f1iMjAghWGNs#PPT4,M1>, Accessed 27 March 2008.
- [10] Gerjets P.H. & Hesse F.W.: **When are powerful learning environments effective? The role of learner activities and of students’ conceptions of educational technology.** *International Journal of Educational Research*, 41, 6, pp. 445-465, 2004.
- [11] Haggis T.: **Constructing Images of Ourselves? A Critical Investigation into ‘Approaches to Learning’ Research in Higher Education.** *British Educational Research Journal*, 29, 1, pp. 89-104, 2003.
- [12] Heikkiä A., Lonka K.: **Styding in higher education. Students’ approaches to learning, self-regulation, and cognitive strategies.** *Studies in Higher Education*, 31, 1, pp. 99-117, 2006.
- [13] Issroff K., Scanlon, E.: **Using technology in Higher Education: an Activity Theory perspective.** *Journal of Computer Assisted Learning*, 18, 1, pp. 77-83, 2002.
- [14] Jonassen D.H., Land S.M.: **Theoretical Foundations of Learning Environments.** Lawrence Erlbaum Associates, Mahwah, NJ, 2002. Available at http://books.google.com/books?hl=en&lr=&id=QhbBLtPudScC&oi=fnd&pg=PR3&dq=learning+environment&ots=paG8114iz&sig=hqJQOn9aoRnSiFFmjV_vlHb7CEk#PPA223,M1 Accessed 20 March 2008.

- [15] Kolb A.Y., Kolb D.A.: **Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education**. *Academy of Management Learning & Education*, 4, 2, pp. 193–212, 2005.
- [16] Lizzio A., Wilson K., Simons R.: **University Students' Perceptions of the Learning Environment and Academic Outcomes: implications for theory and practice**. *Studies in Higher Education*, 27, 1, pp. 27-52, 2002.
- [17] Lowyck J., Lehtinen E., Elen, J.: **Students' perspectives on learning Environments**. *International Journal of Educational Research*, 41, 6, pp. 401-406, 2004.
- [18] Nijhuis J., Segers M., Gijssels W.: **The extent of variability in learning strategies and students' perceptions of the learning environment**. *Learning and Instruction*, 18, 2, pp. 121-134, 2008.
- [19] Topping K.J., Ehly S.W.: **Peer assisted learning. A framework for consultation**. *Journal of Educational & Psychological Consultation*, 12, 2, pp. 113-132, 2001.
- [20] Shaw G., Marlow N.: **The role of student learning styles, gender, attitudes and perceptions on information and communication technology assisted learning**. *Computers & Education*, 33, 4, pp. 223-234, 1999.
- [21] Wende M.C.: **The Bologna Declaration: Enhancing the Transparency and Competitiveness of European Higher Education**. *Higher Education in Europe*, 25, 3, pp. 305-310, 2000.