

SATISFACTION CLUSTERING ANALYSIS OF DISTANCE EDUCATION COMPUTER PROGRAMMING STUDENTS: A Sample of Karadeniz Technical University

Assist. Prof. Dr. Hacer OZYURT
Karadeniz Technical University,
of Technology Faculty,
Trabzon, TURKEY

ABSTRACT

In line with recently developing technology, distant education systems based on information technologies are started to be commonly used within higher education. Students' satisfaction is one of the vital aspects in order to maintain distant education efficiently and achieving its goal. As a matter of the fact, previous studies proved that student satisfaction is one of the most important factors in deciding the success of a system in terms of application.

Therefore, this paper analyzes satisfaction variables of distant education computer programming students regarding this program as well as their clustering tendencies. 96 students who were having their majors in distant education computer programming at Karadeniz Technical University during 2012-2013 academic term constitute the sample of the study.

The study employed *Satisfaction Scale for Students of Distant education Based on Information Technologies* as data collection tool which comprised of 42 items. Data obtained from the scale was analyzed via Ward method, one of the hierarchical clustering methods, in order to reveal their clustering tendencies.

Accordingly, satisfaction variables were divided into three main clusters which were A, B and C. Of these main clusters, it was seen that A and B has two sub-clusters each which were A1, A2 and B1, B2 respectively. These divisions were named after the variables they include; A1: "Interest of the instructors and the implementation of program content", A2: "Support and rapport of the university", B1: "Scope of the program", B2: "Individuality and the opportunity for interaction" and C: "The defects in application by both the program and the university". From an overall perspective, it is seen that Cluster A covers variables positively affecting the satisfaction which are "the quality of service provided by the university for this program", "application of program content fitting to the purpose" and "teachers' dealing with students properly". It is seen that Cluster B covers variables positively affecting satisfaction in terms of program scope, individuality and interactive environment. Finally, it is seen that Cluster C covers variables negatively affecting satisfaction which are about the defects in the application both by the program and the university.

Keywords: Distance education, online learning environment, clustering analysis, students' satisfaction.

INTRODUCTION

In line with recently developing technology, distant education systems based on information technologies are started to be commonly used within higher education. Lately, almost all of the universities in our country founded distant education units and started to provide education services by this means (Kukul, 2011).

It is possible to evaluate distant education programs and applications based on various parameters. Of these parameters, students' satisfaction is considered among the most important ones (Bolliger, Supanakorn, &Boogs, 2010; Moore, 2005). In the broadest terms, students' satisfaction can be defined as the satisfaction and content of students regarding the education services they receive (Bollinger, &Martindale, 2004; Harvey, &Green, 1993; Ilgaz, 2008). Allen, Bourhis, Burrell, and Mabry (2002) revealed that factors regarding students' satisfaction are influenced by individual characteristics. To Sun, Tsai, Finger, Chen, & Yeh (2008), factors affecting students' satisfaction in a distant education/e-learning environment can be divided into six categories which are student, instructor, course, technology, system design and environmental aspects.

Students' satisfaction is one of the vital aspects in order to maintain distant education efficiently and achieving its goal.

That is because students' satisfaction may influence preferences of individuals who would prefer having education by this means.

As a matter of the fact, Moore (2005) refers to students' satisfaction as one of the vital components quality in distant/online education. Rivera, McAlister & McAlister (2002) also emphasized the importance of students' satisfaction as well as his/her performance for the achievement of a distant education program.

Considering from this aspect, it is obvious that educational activities carried out in distant education environments where there is a high level of students' satisfaction would be unquestionably more efficient. Again, it is possible to view some previous studies in literature relating the achievement of distant education environments to students' satisfaction. Chen, Lin, & Kinshuk (2008) stated that the success of e-learning environment depends on students' satisfaction.

Besides, there are also studies expressing that there is a positively significant relationship between the quality of education and students' satisfaction (Donavant, 2009; Palmer, &Holt, 2009; Picciano, 2002; Swan, 2001).

Studies proved that students' satisfaction is one of the most important factors in deciding the success of the system in terms of application (Delon and Mclean, 1992; Şahin, 2007).

Hence, it is important to determine the satisfaction levels regarding distant education in order to achieve the goal of distant education.

Students' satisfaction on their own learning experiences may both influence their ideas of preceding the courses and their general online learning experiences (Bolliger and Wasilik, 2009).

Though there are many studies in literature to determine the factors influencing students' satisfaction (Arbaugh and Duray, 2002; Artino, 2008; Calli, Balcikanlı, Calli, Cebeci and Seymen, 2013; Hung, Chou, Chen and Own, 2010; Ke and Kwak, 2013; Lin, Lin and Laffey, 2008; Sahin, 2007; Sun et al., 2008; Shen, Cho, Tsai&Marra, 2013; Womble, 2008), there are only a limited number of studies assessing students' satisfaction levels in these environments (Ates and Altun, 2008; Rivera, McAlister and McAlister, 2002; Chen, Lin and Kinshuk, 2008; Karatas and Ustündag, 2008). To this end, determining clustering tendencies of students' satisfaction variables (of distant education students) will contribute to the eradication of a lack in literature.

Therefore, this paper aims at analyzing satisfaction variables of distant education computer programming students regarding this program as well as their clustering tendencies.

METHODOLOGY

This study employed descriptive approach and relational screening model which are two of general survey methods. Relational screening is a research model which aims to determine the existence and/or degree of joint variation between two or more variants (Karasar, 2006).

Participants

This study was carried out with 96 students studying at Karadeniz Technical University in distant education computer programming during 2012-2013 academic term.

Research Instrument

Satisfaction Scale for Students of Distant Education Based on Information Technologies (Kukul, 2011), comprising 42 items, was used in order to reveal clustering tendencies of distant education computer programming students' satisfactions.

Data Analysis

Clustering tendencies of distant education computer programming students' satisfaction variables regarding the program was researched. To this end, Ward method, one of the hierarchical clustering methods, was employed.

Squared Euclidean distance was preferred as similarity/variance measure to calculate the distances between variables. Similarities between attitude variables are presented in dendrogram. SPSS 16.0 statistical packet program was employed to analyze data.

FINDINGS

Data obtained from the study was subjected to hierarchical clustering analysis. Findings derived from data analysis are given in Figure 1.

According to dendrogram in Figure 1, it is seen that student views were clustered under three main clusters which are A, B and C. Examining the dendrogram, it is seen that Cluster A and B have two sub-clusters each which are A1, A2 and B1, B2 respectively.

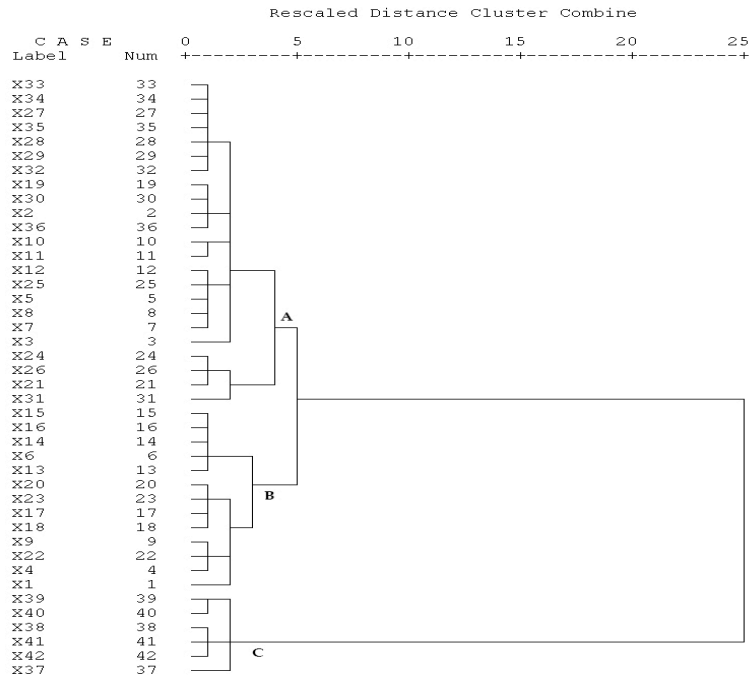


Figure 1:
Dendrogram of Satisfaction Variables Regarding Distant Education Computer Programming Program Belonging to Students of the Same Program

Table: 1 shows clusters and sub-clusters which contain satisfaction variables of students studying in distant education computer programming.

Table: 1
Clusters and Sub-clusters Which Contain Satisfaction Variables of Students Studying in Distant Education Computer Programming

Clusters	Sub-clusters	Variables	Names of clusters
A	A1	X33,X34,X27,X35,X28,X29, X32,X19,X30,X2,X36,X10,X10, X11,X12,X25,X5,X8,X7,X3	Interests of the instructors and the implementation of program content
	A2	X24,X26,X21,X31	Support and rapport of the university
B	B1	X15,X16,X14,X6,X13	Scope of the program
	B2	X20,X23,X17,X18,X9,X22,X4, X1	Individuality and the opportunity for interaction
C		X39,X40,X38,X41,X42,X37	The defects in application by both the program and the university

The variables constituting the clusters A, B and C according to Table 1 are listed below.

Cluster A

A1:

- (X33) Instructors help me to detect the problems regarding my work within the program.
- (X34) Instructors provide me with beneficial feedbacks.
- (X27) I find the opportunity to discuss my personal experiences regarding the subjects of the course.
- (X35) Instructors provide comprehensive feedbacks for my take-home assignments.
- (X28) Instructors allocate time whenever I have a demand regarding my studies.
- (X29) Instructors are able to comprehend the problems I encounter in distant education.
- (X32) Instructors encourage me to participate in online discussions.
- (X19) Instructors answer my questions in due time.
- (X30) I can interact with instructors during the courses.
- (X2) Student assessment methods of the program are fair.
- (X36) Instructors inform me about my progress within the program.
- (X10) The tests and assignments in the program control my learning and help me to improve.
- (X11) The courses and discussion which are given cover all the explained objectives of the program.
- (X12) Content of each course in the program are clearly expressed.
- (X25) Instructors spend effort to participate all of the students in learning activities.
- (X5) This program enables me to study at my own pace.
- (X8) Expectations regarding the tasks in the program are clearly expressed in the subjects.
- (X7) Program content is organized in such a way that it facilitates the learning.
- (X3) I am provided with tests and assignments apart from exams and regarding the subjects I learnt in the program.

A2:

- (X24) The university collects information about my content regarding support services.
- (X26) The university monitors my academic progress.
- (X21) The university informs me regularly about support services.
- (X31) The university which I am affiliated with asks me periodically what kinds of learning support I need.

Cluster B

B1:

- (X15) General objectives of the program are clearly expressed.
- (X16) Program objectives are well-selected.
- (X14) The sequences of the subjects covered by the courses are logical.
- (X6) Instructors are loyal to the curriculum.
- (X13) Program content is not completely theoretical; it covers practices as well.

B2:

- (X20) I am granted with the opportunity to express my ideas regarding what I expect to learn in this program.
- (X23) I can share what I learn with other students in the same program.
- (X17) I can interact with other students in the same program.
- (X18) I feel that we are a community with other students of this program.
- (X9) I can access learning activities presented online at times when I am available.
- (X22) Instructors appreciate me individually.
- (X4) I decide how much I will learn within the specified time period.
- (X1) I can use my individual approach to achieve my working objectives.

Cluster C

- (X39) I do not think that program content is comprehensive enough.
- (X40) Online discussions lack a specific goal and aspect.
- (X38) There is no positive interaction between instructors and the students.
- (X41) I am not allowed to benefit from all the means provided to students of the university.
- (X42) There is no opportunity for me to criticize program activities.
- (X37) The university does not reply my applications or complaints.

Satisfaction variables of students studying in distant education computer programming regarding their program are clustered under three divisions. These clusters and sub-clusters were analyzed according to the variables they contain and named as follows;

- Sub-cluster A1 *"Interests of the instructors and the implementation of program content"*.
- Sub-cluster A2 *"Support and rapport of the university"*.
- Sub-cluster B1 *"Scope of the program"*.
- Sub-cluster B2 *"Individuality and the opportunity for interaction"*.
- Cluster C *"The defects in application both by the program and the university"*.

Under the light of the data obtained from the study, it is seen that cluster A covers variables "the quality of service provided by the university for this program", "application of program content fitting to the purpose of the program" and "teachers' dealing with students properly".

Accordingly, it is clear that cluster A covers variables positively affecting the satisfaction. Similarly, cluster B covers variables "scope of the program", "individuality" and "maintaining interactive environment". Accordingly, it is seen that cluster B covers variables positively affecting the satisfaction.

Finally, cluster C covers the variable "defects in application both by the program and the university". Accordingly, it is seen that cluster C covers the variable negatively affecting the satisfaction.

RESULTS AND DISCUSSION

This study deals with clustering analysis of satisfaction variables of students studying in distant education computer programming. According to the analysis, satisfaction variables were clustered under three main clusters which are A, B and C. It was seen that of these main clusters, A and B have two sub-clusters each which are A1, A2 and B1, B2 respectively. These clusters were named after the variables they cover as follows: A1: *"Interests of the instructors and the implementation of program content"*, A2: *"Support and rapport of the university"*, B1: *"Scope of the program"*, B2: *"Individuality and the opportunity for interaction"* and C *"The defects in application both by the program and the university"*.

Examining sub-cluster A1, it is seen that it covers variables about course structure, dialogue of instructors with students and discussion environments created during the lectures.

These variables clustered in sub-cluster A1 are in line with the facts in literature. Relatedly, Swan (2011) mentions three factors contributing a great deal to online course achievement in his/her study. These are clear and consistent course structure, instructor communicating constitutively and frequently with students and a rewarding dynamic discussion environment. In addition, it is seen that items (X33), (X34), (X27), (X35), (X28), (X29), (X32), (X19), (X30), (X2) and (X36) in sub-cluster A1 (variables regarding instructor dialogue with students) were specifically emphasized in many studies.

Areti (2006) and Sahin (2007) denoted in their studies that interaction of the instructor with students in online learning environments is a factor increasing student achievement as well as learning and those who receive adequate support from the instructors are more satisfied than others in online learning environments.

The relationship of instructors with students in face-to-face learning environments was revealed as a factor influencing satisfaction level (Özgüngör, 2010). It is unquestionably obvious that this factor is vitally important for online learning conducted in virtual environment.

To Wegerif (1998), success or failure of individuals studying in distant education programs are related to the sense of being out of this 'community'. Examining the variables clustered under sub-cluster B2, it is seen that the variables (X23) "I can share what I learn with other students in the same program", (X17) "I can interact with other students in the same program" and (X18) "I feel that we are a community with other students of this program" support the study of Wegerif (1998). Examining the variables clustered under the sub-cluster of A2, it is seen that it covers satisfaction variables regarding the services of the university.

This finding is consistent with other findings in literature. As a matter of the fact, Kukul (2011) emphasized in his/her study that university variable influences student satisfaction both generally and in terms of program structure and functioning as well as opportunities provided to interact. Besides, s/he also underlined the fact that aforementioned student satisfaction varies from university to university.

BIODATA and CONTACT ADDRESSES of AUTHOR



Hacer OZYURT was born in Trabzon, Turkey in 1982. She received the B.Sc. degrees in department of Computer and Instructional Technologies Karadeniz Technical University (KTU) in 2007. She completed his doctoral studies (Ph.D.) on adaptive testing system at Karadeniz Technical University, 2013. Now, she has been working as a full-time faculty member, Assist. Prof. Dr., in the Software Engineering Department, OF Technology Faculty, Karadeniz Technical University, Trabzon, Turkey. Her major research interests are in the use of artificial intelligence in education, adaptive testing system, distance education software, e-learning.

Hacer OZYURT,
Karadeniz Technical University, of Technology Faculty,
Software Engineering Department, 61830, Of, Trabzon, TURKEY
Emails: hacerozyurt@ktu.edu.tr, ngh.hacer@gmail.com

REFERENCES

Allen, M., Bourhis, J., Burrell, N. & Mabry, E. (2002). Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. *The American Journal of Distance Education*, 16(2), 83-88.

Arbaugh, J. B. & Duray, R. (2002). Technological and structural characteristics, student learning and satisfaction with web-based courses— An exploratory study of two on-line MBA programs. *Management Learning*, 33(3), 331–347.

Areti, V. (2006). Satisfying distance education students of the Hellenic Open University. *E-mentor*, 2 (14), 1-12.

- Artino, A. R. (2008). Motivational belief and perceptions of instructional quality: Predicting satisfaction with online training. *Journal of Computer Assisted Learning*, 24, 260–270.
- Ates, A. & Altun, E. (2008). Investigating Pre-service Computer Teachers' Attitudes Towards Distance Learning Regarding Various Variables. *Gazi University Journal of Gazi Educational Faculty*, 28(3), 125-145.
- Bollinger, D. U. & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning*, 3(1), 61–67.
- Bolliger, D. U. & Wasilik, O., (2009). Factor influencing faculty satisfaction with online teaching and learning in higher education. *Distance Education*, 30(1), 103–116.
- Bolliger, D. U., Supanakorn, S. & Boogs, C. (2010). Impact of podcasting on student motivation in the online learning environment. *Computers & Education*, 55(2010) 714-722.
- Calli, L., Balcikanlı C., Calli, F., Cebeci, I. & Seymen, F. (2013). Identifying factors that contribute to the satisfaction of students in e-learning. *Turkish Online Journal of Distance Education-TOJDE*, 14(1), 85-101.
- Chen, N. S., Lin, K. M. & Kinshuk (2008). Analyzing Users' Satisfaction with ELearning Using a Negative Critical Incidents Approach. *Innovations in Education and Teaching International*, 45 (2), pp.115-126.
- Delon, W. & Mclean, E. (1992). Information system success: The quest for the dependent variable. *Information Systems Research*, 3(1), 60–95.
- Donavant, B. W. (2009). The new, modern practice of adult education: online instruction in a continuing professional education setting. *Adult Education Quarterly*, 59(3), 227-245
- Karasar, N. (2006). *Scientific Research Method*. Ankara: Nobel Publication.
- Karatas, S. & Ustündag, M. T. (2008). Gazi University The Relationship Between Distant Education Program Students' Internet Based. Curriculum Satisfaction and Demographic Features. *Yüzüncü Yıl University Journal of Educational Faculty*, 5(2), 62-73.
- Harvey, L. & Green, D. (1993). Defining quality. *Assessment and Evaluation in Higher Education*, 18(1), 9–34.
- Hung, M., Chou, C., Chen, C. & Own, Z. -Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers in Education*, 55(3), 1080–1090.
- Ilgaz, H. (2008). *The Contribution of Technology Acceptance and the Sense of Being Community to Learner Satisfaction in Distant Education*. Unpublished M.Sc. Thesis. Hacettepe University, Institute of science, Ankara.

Ke, F. & Kwak, D. (2013). Online learning across ethnicity and age: A study on learning interaction participation, perception, and learning satisfaction. *Computers & Education*, 61 (2013) 43-51.

Kukul, V. (2011). Student and faculty satisfaction in information technologies-based distance education. Unpublished M.Sc. Thesis, Ankara University Institute of Educational Sciences, Ankara.

Lin, Y. M., Lin, G. & Laffey, J. (2008). Building a social and motivational framework for understanding satisfaction in online learning. *Journal of Educational Computing Research*, 38(1), 1–27.

Moore, J. C. (2005). *The Sloan consortium quality framework and the five pillars*. Newburyport, MA: Sloan Consortium. Retrieved May 25, 2013, from <http://www.sloan-c.org/publications/books/qualityframework.pdf>

Ozgüngör, S. (2010). Student and School Characteristics Which Determine Satisfaction Levels Regarding Life in Faculty for Students of Faculty of Education. *Turkish Education Sciences Journal*, 8(3), 623-644.

Palmer, S. R., & Holt, D. M. (2009). Examining student satisfaction with wholly online learning. *Journal of Computer Assisted Learning*, 25(2), 101–113

Picciano, A. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks*, 6(1), 21–40

Rivera, J., McAlister, M. K. & Mc Alister M. L. (2002). A Comparison of Student Outcomes and Satisfaction between Traditional and Web Based Course Offerings. *Online Journal of Distance Learning Administration*, 5 (3).

Sahin, I. (2007). Predicting student satisfaction in distance education and learning environments. *Turkish Online Journal of Distance Education-TOJDE*, 8(2), 113-119.

Shen, D., Cho, M-H., Tsai, C-L. & Marra, R. (2013). Unpacking online learning experiences: Online learning self-efficacy and learning satisfaction. *Internet and Higher Education*, 19 (2013) 10-17.

Sun, P. C., Tsai, R. J., Finger, G., Chen, C. C., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, 50(2008), 1183–1202.

Swan, K. (2001). Virtual interactivity: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, 22(2), 306–331

Wegerif, R. (1998). The social dimension of asynchronous learning networks. *Journal of Asynchronous Learning Networks*, 2(1), 34-49.

Womble, J. (2008). E-learning: The relationship among learner satisfaction, self-efficacy, and usefulness. *The Business Review*, 10(1), 182–188.