

An Application of Benchmarking and Root Cause Analysis of the Co-Education Model

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ABSTRACT

In this paper application, success or failure of a novel model of distance education, Co-Education model in Sakarya University Department of Industrial Engineering is discussed. A brief literature about distance education models which assumes insignificant difference between formal education and distance education were abstracted. Then a couple of statistical tests including formal and Co-Education students' scores and a survey were conducted to investigate any difference in both models. Benchmarking results showed that there is a relativistic failure of Co-Education model according to students' exact same lectures' exam scores. Main reasons and sub reasons for this failure are analyzed with Ishikawa Diagram which is a special technique of Root Cause Analysis. 4 main Reasons and 10 sub reasons are extracted via Ishikawa diagram. Finally the results were discussed.

Keywords: Co-Education, Root Cause Analysis, Distance Education, Benchmarking of educational models

1. INTRODUCTION

With the advent of multimedia and information technologies, popularity and importance of distance education have been

increasing rapidly. Today, many universities around the world give distance education services.

The first distance education system swings into action in Turkey with Dewey's report which is about "training and treatment of teachers" in 1924. First implementation of distance education starts with using letter for communication in 1950's [1]. Distance education progress is followed by the establishment of Open Education Faculty in Anadolu University in 1982. Today, distance education level is conducting with 2-year associate degree programs, undergraduate and internet supported formal education graduate programs (Co-Education programs).

Distance education applications in Sakarya University (SAU) began with the opening of the Adapazarı Vocational College in 2002 and these applications have been progressing with establishment of eMBA (distance Master of Business Administration) program in Graduate School of Social Science since 2003. Final exams of distance education has been carried out in the facilities of Sakarya University, all other activities are conducting via internet by LMS (Learning Management System) [2]. The first implementation of Co-Education in higher education system had been started in fall semester of 2008. Initially, Co-Education in Sakarya University began with the departments of Industrial Engineering (IE), Computer Science and Human Resource Management. After 2010, with the established of the other programs in different fields the number of departments reached to nine.

Co-Education is a combination of the conventional education techniques and the synchronous and asynchronous lecture approach in conjunction with the face to face training in distance education by using technology support. Co-Education splits by 30% of formal education which is carried out in Friday and Saturday and 70% of distance education which is carried out on the other week days.

Co-Education students reach the distance education portal via SAULMS (Sakarya University Learning Management System). In this portal, a student can reach weekly lecture materials, lecture videos and other staff with the same username and password information which is in the University Student Information Database. Also he/she can download these documents to his/her computer and the system provides students an asynchronous study opportunity.

In this paper, we compared conventional formal education model that already have been applied and the Co-Education Model which has been executed a few years ago, by the means of students' success rates and a student survey to evaluate professors performance. The survey outcomes are statistically analyzed and a significant difference between formal education and Co-Education is observed. We investigated root causes of success or failure of Co-Education Model in SAU IE.

2. LITERATURE REVIEW

Keegan (1986) mentioned the following properties related to distance education; first teachers and students are separated during the learning process and second distance education students consider themselves alone because of not being physically in the classroom and third student and teachers use video and other similar technological devices [3]. Mitchell and Honore (2007) describe the Co-Education as an education model which includes face to face interaction in classroom and online communication via computer [4].

In the World first distance education studies started with "Steno Lessons" in a newspaper in 1728. The British Open University, starting with newspaper and established in 1960s in England [5]. In Turkey initial application was performed in academic year of 1958-59 by surveying Institution of Banking and Law of Commerce, bound to the Law Faculty in Ankara University [6].

In 1981, commissioned to universities to grant distance education and then this mission was given to Anadolu University by means of law, counted 41, made in 1982 [7]. In following years it is seen that not only Anadolu University but also other universities grant distance education. After the base of Internet was formed in 1993 in Turkey, distance education based on Internet began with the leader of Middle East Technical University in 1997 [8]. Nowadays Ankara University, Sakarya University, and Mersin University have background for not only to grant distance education by granting certificates but also to grant university degree in distance.

Kleinman and Entin (2002) made a comparison between the students who take their computer science lecture in the classroom and via internet in their study [9]. This study shows that there is no difference in student learning outcomes between online course and conventional course students. Rivera and Rice

(2002) made a comparison between three class formats (conventional, web base and Co-Education) [10]. In this study, the performance of the students measured by exam scores and this study points out that there is no significant difference between those three formats. Işık and Güler (2011) made a comparison between conventional and distance education master programs via survey and oral interviews. Outputs of this study indicate that students prefer distance education because of time and work permission problems [11].

The quality of the academic experience and intensity of the high school curriculum affect almost every dimension of success in postsecondary education. Indeed, those students who are best prepared coming out of high school are best positioned to do well in college, regardless of who they are, how much money they have, or where they go [12].

3. BENCHMARKING OF FORMAL EDUCATION AND CO-EDUCATION MODELS

In this part of study we investigated the performance of education models in 2 aspects, student basis and faculty basis. We performed a couple of statistical analyze to measure students' success. And a survey was conducted to figure out professors' performance.

Students' statistical analysis

In Sakarya University, every student including Co-Education and conventional formal education has the right to obtain same diploma. Therefore Co-Education students and conventional education students have same lecture contents. Co-Education models relativistic success or failure is measured by Co-Education students' exam scores. And this is compared with conventional formal education students' exam scores. The measurements are based on the performances of these two types of students' exam scores on the common professors' lectures to sustain a better evaluation (Success rate= Number of students who passed the course successfully/ Number of all students who take the course).

The success values were applied to normality test and the edge values of formal education excluded from evaluation. The success values which fit to normal distribution (sig.=0.200) indicate that two types of students has different success rates (for group statistics, formal education student are more successful than Co-Education students).

Survey for Evaluating Professors

Evaluation of professors by students is one of the most common and effective methods that perform the success of an educational institution at the university level [13]. In SAU, students fill out the survey about the course which is taken by them in relevant semester, professors and the outputs of IE program at the end of each semester. At this stage, all answers which was belong to each course in the academic year 2010-2011, had analyzed to assess the difference between Co-Education and formal education.

32 courses conducted by the same faculty member at Co-Education and formal education programs. Therefore, 711 students' responses at these courses were used in the analysis of the mentioned survey.

In the statistical evaluation, all data has been found to comply with the normal distribution. Accordingly, the hypotheses which were generated for analyzing with independent-sample t test.

· H_0 : “The averages of formal education and Co-Education evaluation scores are equal (There is not a significant difference between them)

· H_1 : “The averages of formal and Co-Education evaluation scores are not equal (There is a significant difference between them)

Levene’s test shows that the group’s variance of formal education model and Co-Education model are not equal with 95% confidence. (Mean difference is 0, 56 and Std Error Difference is 0, 137). Difference of professors’ evaluation between those models (approximately 0, 5646 points) is statistically significant ($P=0, 000$). Faculty performance analysis resulted in a lower score by students in Formal Education than others.

4. ROOT CAUSE ANALYSIS OF SUCCESS OR FAILURE OF CO-EDUCATION MODEL IN SAU IE

Root cause analysis (RCA) is a class of problem solving methods aimed at identifying the root causes of problems or events. We used Ishikawa diagram which is one of the most common Root cause analysis techniques to determine the sources of relativistic failure of Co-Education model according to formal education model.

We used brain storm technique to determine the possible candidate reasons of relativistic failure. Then a team which consists of professors voted the candidate reasons. After this phase the reasons were sorted by degree of importance. Reasons with weak relations and reasons which are less relevant were pruned. Furthermore main reasons, sub reasons were displayed.

Briefly, the main reasons are; Time Management, Past Educational Habits, Lack of Motivation, Less-Scored Students in University Qualification Exam. A detailed Ishikawa diagram is shown in Figure I.

5. CONCLUSION

The results of this study show that, on the contrary to researched literature there is a significant difference in formal education and Co-Education on the aspects of students’ performance criteria. Students of Co-Education have noticeably lower scores compared to students of formal education on the exact same exams of same courses. The main reasons and sub-reasons for this relativistic failure have been determined with Ishikawa diagram which is a technique of Root Cause Analysis. Ishikawa diagram of this relativistic failure points out that there are both student basis problems and faculty based problems. Student basis problems are such as time management and less-scored students in university qualification exam and faculty based problems are such as inadequate support of time management for students and less effort for students’ motivations.

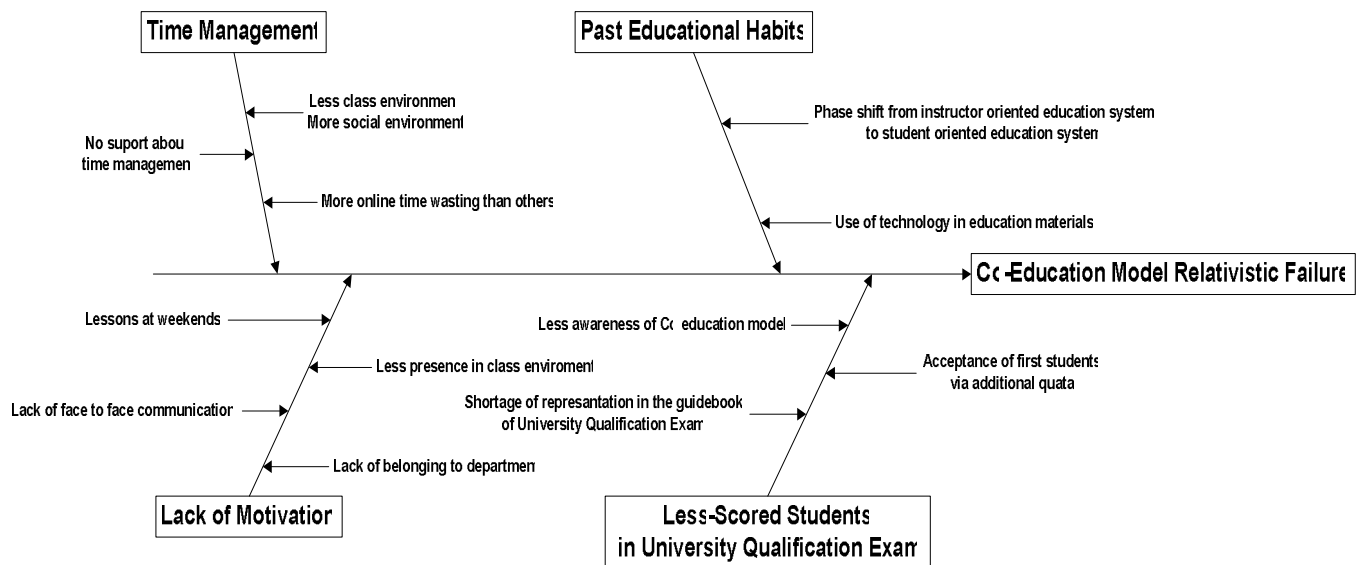


Figure I. Ishikawa diagram of Co-Education Model’s Relativistic Failure

6. REFERENCES

- [1] A. İşman, **Uzaktan Eğitim**. Ankara: Pegem-Akademi Pub., 2005.
- [2] Ü. Kocabiçak, G. Çağıl, N. Açıkgöz, “Sakarya Üniversitesi Mühendislik Fakültesi Uzaktan (Karma) Eğitim Programlarının Swot Analizi Yardımıyla Değerlendirilmesi” **International Higher Education Congress: New Trends and Issues**, 2011.
- [3] D. Keegan, **Foundations of Distance Education. Second edition**, London: Croom Helm., 1986.
- [4] A. Mitchell, S. Honore, “Criteria for successful blended learning”, **Industrial and Commercial Training**, Vol. 39, No. 3, 2007, pp. 143-148.
- [5] T. Tavukcu, İ. Arap, D. Özcan, “General overview on distance education concept”, **Procedia Social and Behavioral Sciences**, Vol. 15, 2011, pp. 3999–4004
- [6] A. Duman, “Yetişkin Eğitimi Açısından Türkiye’deki Uzaktan Eğitim Uygulamalarına Bir Bakış”, **Journal of Faculty of Educational Sciences, Ankara University**, Vol. 25, No. 1, 1992, pp. 285-293.
- [7] Y. Gülbahar, **E-Learning**, Ankara: Pegem-Akademi Pub., 2009.
- [8] B. Horzum, **İnternet Tabanlı Eğitimde Transaksyonel Uzaklığın Öğrenci Başarısı, Doyumu ve Özyeterlilik Algısına Etkisi**, Doctoral Dissertation, Department of Educational Sciences, Program of Educational Technology, 2007.
- [9] J.N. Kleinman, E.B. Entin, “Comparison of In-Class and Distance-Learning Students' Performance And Attitudes In An Introductory Computer Science Course”; **Journal of Circuits, Systems, and Computers**, Vol. 17, No. 6, 2002.
- [10] J.C. Rivera, M.L. Rice, “A Comparison of Student Outcomes & Satisfaction Between Traditional & Web Based Course Offerings”, **Online Journal of Distance Learning Administration**, Vo. 5, No. 3, 2002.
- [11] A. H. Işık, İ. Güler, “Comprehensive comparison of traditional and distance learning master programs”, **Procedia - Social and Behavioral Sciences** Vol. 31, 2012, pp. 120-123.
- [12] G.D. Kuh, J. Kinzie, J.A. Buckley, B.K. Bridges, J.C. Hayek, “What Matters to Student Success: A Review of the Literature”, **Commissioned Report for the National Symposium on Postsecondary Student Success: Spearheading a Dialog on Student Success**, 2006.
- [13] P. Seldin, **Changing Practices in Faculty Evaluation**. San Francisco: Jossey- Bass. , 1984.