

Establishing of Education Strategy in New Technological Environments with using Student Feedback

Ali Kartal

Abstract—According to the new developments in the field of information and communication technologies, the necessity arises for active use of these new technologies in education. It is clear that the integration of technology in education system will be different for primary-higher education or traditional- distance education. In this study, the subject of the integration of technology for distance education was discussed. The subject was taken from the viewpoint of students. With using the information of student feedback about education program in which new technological medias are used, how can survey variables can be separated into the factors as positive, negative and supporter and how can be redesigned education strategy of the higher education associations with the examining the variables of each determinated factor is explained. The paper concludes with the recommendations about the necessity of working as a group of different area experts and using of numerical methods in establishing of education strategy to be successful.

Keywords—Distance education, student feedback, working as a group, numerical methods.

I. INTRODUCTION

ACCORDING to the recent developments in information technology, education associations come across to teach with the large numbers of student from diverse socio-economic places^[1]. At the same time these student group need continuously education in their life. Under these circumstances, increasing and continuously needed education can be given with integration of technology in education. Therefore many numerical researches about the integration of technology for education can be seen. For example, Baylor and Ritchie used stepwise regression in their model to understand of how technology accentuates student learning from the teacher perspectives^[2]. King examined the experience of the teachers as they learned technology for educational purposes within the framework of transformational learning^[3]. Undoubtly, all these studies are very important to have the best education strategy in education associates.

But there is the other reality that this new developments have triggered a shift from the teaching paradigm to the learning paradigm and students in these environments become more independent from teacher^[4]. An effective student learning became the central theme and organizing principle of

university educations^[5]. Therefore, it is also necessary to make some studies about education from the viewpoint of student perspectives. The study of Milliken and Barnes is an example for student perspective. In their study, the opinion of the student about structure and organization of material, lecture delivery, use of computer based teaching, quality issues and so on are collected with a questionnaire and these data are analyzed to determine the success of the module in improving the quality of student learning.

In short, observed important and continuously developments in technology are changing to the life style of society and these innovations also change to the education systems of these societies. Especially this change in the level of higher education, preparing opportunity of learning process gives to the student as individual. In this discussing, the subject of how can be established an education strategy with using student feedback information will be examined with using factor analysis.

II. RELATIONSHIP BETWEEN EDUCATION STRATEGY AND STUDENT FEEDBACK

To establish and implement of an education strategy, the following five main steps should be followed;

1. Establishing the mission of the education association.
2. Converting this mission into specific performance objectives.
3. Establishing education strategy to achieve the targeted performance.
4. Implementing the chosen strategy.
5. Evaluating performance and according to the feedback results and changing conditions initiating corrective adjustments in mission, objectives, strategy or implementing steps.

These five steps can be called as strategic management process^[6]. This process is never ended because of the changing conditions in environment of the education association, some adjustments are continuously needed on the mission, performance objectives, strategies and implementing steps.

During the evaluating performance steps, one of the most important information is student feedback to make necessary adjustments on establishing education strategy and the other strategic management process steps. For this reason, what are the objectives of students about the education program, what are the ideas of the students about the content of education

Ali Kartal is with the Department of Accounting, Faculty of Business Administration, University of Anadolu, Turkey (phone: +90 222 335 05 82/3232; fax: +90 222 335 36 16; e-mail: akartal@anadolu.edu.tr).

program, what are the student attitude about the using of technology in education program, what are the expectations of the students from the education program and so on questions should be investigated. Then again all of the steps in strategic management process should be corrected.

III. ESTABLISHING OF EDUCATION STRATEGY

Under the characteristics of teaching and learning environments in nowadays, all of the dimensions of educations must be considered in strategic management process. These dimensions can be classified under four titles as subject oriented, organizational, technical and educational perspective^[7]. For example, when we want to develop our accounting education program in distance education faculty;

- Faculty management should want this development
- Student feed back information about to program and their expectations from the program should be learned
- Subject expert (for this example accounting professor) should be employed
- Hardware and software technology expert should be employed
- An expert for pedagogical approaches should be employed
- A numerical expert should also be employed to establish a model for our educational problems and to solve this problem with using mathematical or statistical methods.

In other words, to teach accounting or any other subject in new technological environments, it is not enough to have only one area expert. With this reality, it is clear that in education, a group of different area experts as pedagogic, computer expert, and so on must be worked all together.

To have maximum success in an education program, which technological medias? Where? How? Should be used? Like these questions should be answered during having the answers of these kinds of questions. Student feed back is one of the most important information to determining and reconstruction of the education strategy. But student feed back information will probably be much and complex with depend on the number of student and used education tools in the program. To overcome with this kind of problems, factor analysis can be used as an alternative. But before using factor analysis, the preparation of the survey that will provide student feed back information is also very important subject. Therefore, we also need a survey-preparing expert to develop our education program in our working group.

IV. FACTOR ANALYSIS EXAMPLE TO DETERMINING EDUCATION STRATEGY

Factor analysis is one of the more widely used methods of data reduction in social sciences, economics, education, and psychology researches. This technique is used to derive a set of uncorrected variables for further analysis when the use of highly inters correlated variables may yield misleading results in regression analysis^[8].

A. Population, Sample Size and the Section of the Survey

The students who are registered to second class-room of Distance Education Faculty of Anadolu University were the population of the survey. Their number is 45.170 and among of these students, 1355 students were selected as sample for the survey with using random sample technique. Almost the 60 % of 1355 survey form was recollected and the sections of the survey about the objectives of the student and the ideas about content of lesson materials are used in our analysis^[9]. When these data about objectives and contents was used in SPSS for windows under the light of explained before strategic management process to determining education strategy and making corrective adjustments on the process, our education strategy will provide the opportunity to the our student to catch their expectations.

B. Applications of Principal Components Analysis to the Section of the Objectives of Students

The answers of the survey questions (appendix 1) that are concerned with the objectives of students about the foreign language education program were used in SSPS program and the following results were obtained.

TABLE I
KMO AND BARLETTT'S TEST

| | | |
|--|-----|---------|
| Kaiser-Meyer-Olkin Measure of Sampling | | |
| Adequacy | | .631 |
| Bartlett's test of Sphericity | | 532,948 |
| Approx chi-Square | | |
| | .df | 36 |
| | sig | ,000 |

Kaiser-Meyer-Olkin (KMO) value is .631. This value is not perfect but it can be an acceptable value to continue the analysis. Bartlett's test of sphericity value is also good for the analysis since it's value is $p = 0.000$. According to these results, sample size of the survey is sufficient for analysis.

TABLE II
TOTAL VARIANCE EXPLAINED
(AFTER APPLYING EQUIMAX ROTATION)

| Component | Eigenvalue | Pct of var | Cum pct |
|-----------|------------|------------|---------|
| 1 | 1,567 | 17,415 | 17,415 |
| 2 | 1,503 | 16,698 | 34,113 |
| 3 | 1,355 | 15,053 | 49,166 |

As you know in reality the table of total variance explained shows the equal numbers of the components with the numbers of survey variables. After applying equimax rotation to have simple component structure, the above result was taken with 3 components. In this table, cumulative percent of the variance for components 1, 2, and 3 is seen as 49,166 %. In other words the explanation percent to the variance of these 3 components is 49,166.

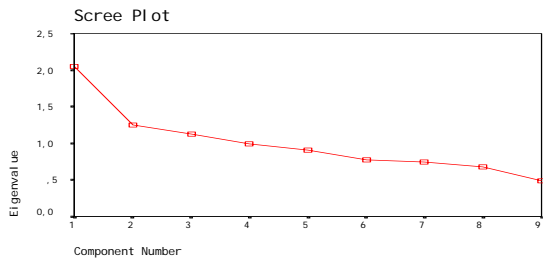


Fig. 1 The scree plot for objectives

In the above given exhibition of the scree plot of the analysis, there are 3 component that the value of eigenvalue of components is bigger than 1. Then 3 components can be selected for analysis. And these 3 components can also be seen in component matrix that is calculated before rotation.

TABLE III
COMPONENT MATRIX

| Objective | Component 1 | Component 2 | Component 3 |
|-----------|-------------|-------------|-------------|
| 8 | ,685 | -,9E-02 | -,510 |
| 9 | ,586 | ,298 | -,157 |
| 7 | ,568 | -,389 | -,453 |
| 6 | ,431 | ,424 | ,224 |
| 2 | ,317 | ,212 | ,284 |
| 1 | ,395 | ,566 | 6,2E-02 |
| 4 | ,338 | -,508 | ,349 |
| 5 | ,429 | -,443 | ,436 |
| 3 | ,422 | -2,E-03 | ,436 |

With using computer print out that is concerned with Rotated Component Matrix data, we can get our final solving about the objectives of the students.

TABLE IV
ROTATED COMPONENT MATRIX

| Objective | Component 1 | Component 2 | Component 3 |
|-----------|-------------|-------------|-------------|
| 8 | ,843 | ,161 | 3,1 E,02 |
| 7 | ,793 | -,110 | ,197 |
| 1 | 9,6 E -02 | ,673 | -,131 |
| 6 | 4,2 E -02 | ,638 | 7,8E -02 |
| 9 | ,440 | ,513 | -2,E -02 |
| 2 | -3,E-02 | ,433 | ,196 |
| 5 | 9,7E-02 | 5,2E-02 | ,747 |
| 4 | ,114 | -8,E-02 | ,686 |
| 3 | -1,E-02 | ,380 | ,474 |

It should be noticed that the rank and the weight of the variables changed after using rotation in rotated component matrix according to the component matrix. In every component, after ignored the weights that are lower than 40%, the variables that will include in which component are determined below.

Component 1; Objective 8 and 7. Component 2; Objective 1, 6, 9 and 2. Component 3; Objective 5, 4 and 3. With

analyzing of the variables that are belong to every component, selected these three component should be named. After examining of the variables, 8 and 7 in appendix 1, component 1 can be named as Hearing and Reading Ability of a foreign language. After examining variables, 1, 6, 9 and 2 in appendix 1, component 2 can be named as To be A Privilege Human Ability in the global world. After examining of the variables, 3, 4, and 5 in appendix 1, component 3 can be named as Improving Ability in their working life.

According to the above determined results, it can be said that the students' objectives that are expected from the foreign language program with the rank of importance is seen as Hearing and reading ability of a foreign language, to be a Privilege human ability, and Improving ability in working life. During the establishing of the education strategy, these expectations of students will be one of the most important information as student feedback for us.

On the other hand, after above given determined strategies were applied, it is also necessary to investigate the ideas of the students about the content of foreign language program. With using this kind of feedback information of students, our education program can be corrected if it is necessary to have the maximum success from the program. To do this, same analysis can also be used to the survey that is concerned with the ideas of the students about the content of foreign language program and the questions of this survey is given in appendix 2.

C. Applications of Principal Components Analysis to the Section of the Ideas of Students about Content

With using principles component analysis with equimax rotation to the answers of the survey that is seen in appendix 2, the following results were obtained.

TABLE V
KMO AND BARLETT'S TEST

| | | |
|--|-----|----------|
| Kaiser-Meyer-Olkin Measure of Sampling | | |
| Adequacy | | .781 |
| Bartlett's test of Sphericity | | 1219,865 |
| Approx chi-Square | | |
| | .df | 78 |
| | sig | ,000 |

Kaiser-Meyer-Olkin (KMO) value is .781. This value is a good value to continue the analysis. Bartlett's test of sphericity value is also good for the analysis since its value is $p = 0.000$. According to the results, sample size of the survey is sufficient for analysis.

TABLE VI
TOTAL VARIANCE EXPLAINED (AFTER APPLYING EQUIMAX ROTATION)

| Component | Eigenvalue | Pct of var | Cum pct |
|-----------|------------|------------|---------|
| 1 | 2,486 | 19,125 | 19,125 |
| 2 | 1,552 | 11,942 | 31,067 |
| 3 | 1,510 | 11,616 | 42,683 |
| 4 | 1,313 | 10,102 | 52,785 |

As you know in reality the table of total variance explained shows the equal numbers of the components with the numbers of survey variables. After applying equmax rotation to have simple component structure the above result was taken with 4 components. In this table, cumulative percent of the variance for components 1, 2, 3 and 4 is seen as 52,785 %. In other words the explanation percent to the variance of these 4 components is 52,785.

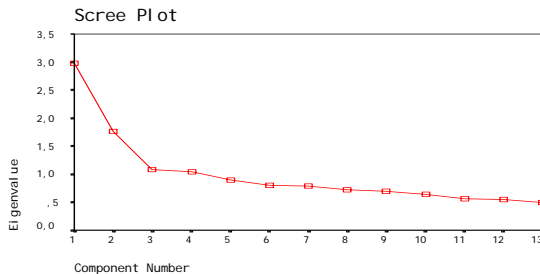


Fig. 2 The screen plot for content

In the above given exhibition of the screen plot of the analysis, there are four component that the value of eigenvalue of components is bigger than 1. Then four components can be selected for analysis. And these four components can also be seen in component matrix that is calculated before rotation.

TABLE VII
COMPONENT MATRIX

| Content | Comp.1 | Comp.2 | Comp.3 | Comp. 4 |
|---------|---------|---------|---------|---------|
| 3 | ,694 | -4,E-02 | -,209 | 3,9E-02 |
| 9 | ,666 | -,106 | -3,E-02 | -,154 |
| 1 | ,653 | -8,E-02 | -,226 | 3,8E-02 |
| 2 | ,651 | -5,E-02 | -,385 | 8,6E-02 |
| 5 | ,638 | ,148 | -,204 | -8,E-02 |
| 6 | ,584 | -,111 | ,353 | -,266 |
| 7 | -6,E-02 | ,678 | -,176 | ,311 |
| 4 | -2,E-02 | ,626 | 2,0E-02 | ,279 |
| 8 | 8,5E-02 | ,569 | -,210 | -5,E-02 |
| 10 | ,180 | ,530 | ,152 | -,449 |
| 13 | 2,3E-02 | ,484 | ,235 | -,450 |
| 11 | ,489 | -5,E-03 | ,590 | ,180 |
| 12 | ,416 | ,135 | ,412 | ,558 |

With using computer print out that is concerned with Rotated Component Matrix data, we can get our final solving for the ideas of the student about content.

TABLE VIII
ROTATED COMPONENT MATRIX

| Content | Comp.1 | Comp.2 | Comp.3 | Comp.4 |
|---------|---------|---------|---------|---------|
| 2 | ,752 | 5,1E-02 | 5,1E-02 | -,103 |
| 3 | ,703 | -1,E-02 | ,187 | -1,E-03 |
| 1 | ,678 | -4,E-02 | ,153 | -3,E-02 |
| 5 | ,648 | 9,2E-02 | ,120 | ,183 |
| 9 | ,599 | -,204 | ,231 | ,160 |
| 7 | -1,E-02 | ,765 | -2,E-02 | 7,5E-02 |
| 4 | -7,E-02 | ,654 | ,139 | ,135 |

| | | | | |
|----|---------|--------|---------|-------|
| 8 | ,154 | ,494 | -,128 | ,305 |
| 11 | ,113 | -1,E01 | ,763 | ,116 |
| 12 | ,114 | ,252 | ,756 | -,160 |
| 6 | ,343 | ,353 | ,436 | ,341 |
| 10 | 7,4E-02 | ,170 | 2,8E-02 | ,709 |
| 13 | -,100 | ,121 | 1,3E-02 | ,684 |

It should be noticed that the rank and the weight of the variables changed after using rotation in rotated component matrix according to the component matrix. In every component, after ignored the weights that are lower than 40%, the variables that will include in which component are determined below.

Component 1; Content 2, 3, 1, 5 and 9. Component 2; Content 7, 4 and 8. Component 3; Content 11, 12 and 6. Component 4; Content 10, 1nd 13. With analyzing of the variables that are belong to every component, selected these four component should be named. After examining of the variables, 2, 3, 1, 5 and 9 in appendix 2, component 1 can be named as positive aspects of the program about the content. These positive aspects of the program must be continued. After examining variables, 7, 4 and 8 in appendix 2, component 2 can be named as the negative aspects of the program about the content. For example exhibitions that are seen in books, radio and TV programs and computer lesson software are being insufficient.

These insufficient aspects of the program must be corrected as soon as possible. After examining of the variables 11, 12 and 6 in appendix 2, component 3 can be named as consulting service is supporting to the learning and this service should be continued. After examining of the variables, 10 and 13 in appendix 2, component 4 can be named as the other insufficient aspect of the program with this component, the information about the culture of the country in which that foreign language is used should also be given in the programs and after determining the advisors who are insufficient to give some of the answers to the students, the advisors should also be educated to improve their knowledge. All these activities will provide us to improve our education program.

V. CONCLUSION

According to the technological developments, people need life long education. Life long educations are needed by the people in their life in different time and places during their working time at the same time. In this situation, flexible education and individual learning and student orientation education concepts are important concepts. While technological developments are seen as a reason for educational problem, at the same time these technological developments are being used for solving these problems with using as media. For example with a distant education program, a person cans catch an opportunity to develop and renew of himself without separate from his living place to another place. At the same time, this, technological developments can also be used in face-to-face education to increase the quality of education. To catch the success, mathematical and statistical methods can be used to determine and solve the

problem in education and these studies should be made in a group of different experts.

APPENDIX 1: The objectives of the students about foreign language education program

1. Knowing a foreign language is an important phenomenon in global world.
2. Knowing a foreign language provides a privilege in society.
3. I want to learn foreign language to have improving in my working life.
4. The purpose of foreign language program of distance education faculty of Anadolu University should be teach to general subject of the foreign language.
5. The purpose of foreign language program of distance education faculty of Anadolu University should be teach to professional areas of the foreign language.
6. The purpose of foreign language program of distance education faculty of Anadolu University should be not only general but also professional areas of the foreign language.
7. I need to use the foreign language to understand what ever I hear.
8. I need to use the foreign language to understand whatever I read in different subject.
9. I need to use the foreign language to make communication in written and oral with foreigners.

APPENDIX 2: The ideas of the students about the content of foreign language program.

1. Foreign language lesson books, radio and TV programs and computer lesson software were prepared to the direction of the needs of students.
2. Speaking texts that include the examples from daily life were widely used in foreign language lesson books, radio and TV programs and computer lesson software.
3. Exercises that are seen in foreign language lesson books, radio and TV programs and computer lesson software have a quality that provides to intensify the subjects of lesson.
4. The exhibitions and pictures that are seen in foreign language lesson books, radio and TV programs and computer lesson software are insufficient.
5. Each section that is seen in foreign language lesson books, radio and TV programs and computer lesson software was prepared like a base to the following section.
6. Grammar explanations that are seen in foreign language lesson books, radio and TV programs and computer lesson software are sufficient.
7. Turkish explanations about the grammar that are seen in foreign language lesson books, radio and TV programs and computer lesson software are insufficient.

8. Foreign language lesson books, radio and TV programs and computer lesson software were not suitable to learn by himself or herself.
9. Foreign language lesson books, radio and TV programs and computer lesson software were prepared as a whole and with the quality of supporting each others.
10. The culture that is belong to country in which foreign language are spoken is not given as intense in foreign language lesson books, radio and TV programs and computer lesson software.
11. The subjects that are difficult to understand are given as clear in foreign language lesson books, radio and TV programs, computer lesson software and advising lessons.
12. Advising lessons are useful to develop our speaking ability.
13. Advisors are seen as insufficient to give answers of our questions sometimes.

REFERENCES

- [1] GPeters, Otto, Distance Education In Transition New Trends and Challenges, 2nd edition, (Carlson Ossietzky Universitat Oldenburg, Verlag, 2002).
- [2] Baylor, Amy L., Ritchie, Donn , "What factors facilitate teacher skill, teacher morale, and perceived student learning in technology using classrooms?", Computer&Education, Volume 39, Issue 4, December 2002, pp. 395-414.
- [3] King, Kathleen P., "Educational technology professional development as transformative learning oportunities", Computer&Education, Volume 39, Issue 3, November 2002, pp 283-297.
- [4] Pahl, Claus, "Managing evolution and change in web-based teaching and learning environments", Computer&Education, Volume 40, Issue2, February.2003, pp. 99-114.
- [5] Milliken, John, Barnes,L.Philip, "Teaching and technology in higher education student perceptions and personal reflections", Computer&Education, Volume 39, Issue3, November 2002, pp 223 - 235.
- [6] Arthur A. Thompson, A.J.Strickland, Strategic Management Concepts & Cases, Seventh Edition, (Richard D.Irwin, Inc., New York, 1993).
- [7] Pahl,Claus, "Managing evolution and change in web-based teaching and learning environments", Computer & Education, Volume 40, Issue2, February.2003, pp 99-114.
- [8] Kim,Jae-On, Mueller,W.Charles, Introduction to factor analysis, What it is and How To Do it, Series/number 07-014, London, 1978.
- [9] Kartal,Bilhan , Açıköğretim öğrencilerinin yabancıdil derslerinde teknoloji kullanımına ilişkin görüşleri, Eskişehir, Turkey, 2001.