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In this study learner characteristics’ factors were examined to predict student withdrawal from, or completion of, university distance education programs. The factors were examined using a pilot sample of 127 students, and then re-examined among a sample of 587 students. Mixed paradigms were used. The quantitative approach was the dominant technique using factor analysis, followed by discriminant analysis. This study seems to suggest that independent learning style is the only variable that significantly discriminates between the students who leave and those who remain at the Arab Open University (AOU) in Saudi Arabia.

Introduction

Nowadays, there is a vast and rapid growth of distance learning (DL) at all levels of education to the extent that it has moved from a marginal to an integral role of the overall educational and training provision (UNESCO, 2002). Besides, the National Centre for Education Statistics (NCES) in the USA claimed that the overall number of DL programs rose up tremendously. Meanwhile, the recent advancements in technology offer many options for delivering and receiving education over geographic distances. This is further enhanced and stimulated by the interest created among educators and technologists all over the world to experiment with various forms of distance and flexible learning. Consequently, DL has now emerged as one of the preferred options for millions of individuals who wish to study and learn at their own pace, and at their own venue in an atmosphere that is compatible with their own needs and interests (Paustain & Slovenes, 2002).

On the other hand, the overflow of incoming knowledge and the rapid changes in technology have made it possible to develop different academic and professional skills, which are necessary for the socio-economic development of a community. Accordingly, both government and private sectors will have to renew and renovate themselves in order to meet these demands, while those institutions that can not cope with the new situation (upgrading their competitive edge), will be deliberately excluded from the marketplace (Kamel, 2002). Also, DL, with its flexibility and accessibility, plays an essential role in some countries where the traditional system of education has proved to be inadequate in terms of covering the education and learning needs of the immediate community, especially in the rural areas and densely populated regions (Gandhe, 1995). Although it is clear that DL widens the scope of educational opportunities for those learners who already have an access to educational facilities, the high attrition in DL universities is regarded as a dilemma, which has not found an appropriate solution yet.

Background to the Problem of Definition

It has always been the concern of educators to retain the greatest possible number of learners in DL. All over the world, it has been found by researchers that the attrition rate of DL students is significantly higher than that in traditional classes (Carr, 2000; Diaz, 2002; Frankola, 2001). Student retention and attrition rates have all along been a concern of administrators of educational and training institutions not only in Asia and Latin America but also, as pointed out by Rwegasira (1988), in Africa. This problem is herein re-examined in the context of the Arab world. The questions posed are: Do the factors, which account for this phenomenon in the Middle East, differ from what has been found elsewhere? If so, how? And what are the theoretical and practical implications?

The major problem discussed and hence analysed in this paper is based on learning characteristics variables of students at the Arab Open University (AOU), with special reference to the campus in Saudi Arabia. There are a lot of students who fail to persist with degree completion or fulfilment of their goals. The reasons why these students drop out of university are not well understood.

Predicting student outcomes is actually a process of trying to determine what category an individual student
belongs to; that is, whether the student is classified under the category of attrition or retention. And this is the main concern of the present research. Of course, definitions of the two terms used above are important to determine student outcomes. Attrition and retention are the two categories of dependent variables. To begin with, attrition refers to the decrease in the number of students enrolled in some courses; and such decrease can be attributed to one reason or another. An antonym of attrition is retention. Retention refers to those students who are promoted from one phase of education to the next and stay enrolled over a considerable period of time. For the purposes of developing this model of attrition of students in DL, a dropout is considered to be any student who enrolled at an AOU institution for one semester, but who does not enrol for the next semester. Unlike attrition, retention will refer to any student who enrolled at an AOU institution one semester, and continues to enrol the next semester.

Objectives of the Study

The main objective of this paper is to test to what extent learner characteristics’ factors affect the attrition or retention of students in DL. This can be determined through the identification of the characteristics that differentiate significantly, from a statistical point of view, between attrition and retention of DL students. Our study is aimed to determine which of the independent variables account for the highest average score profile of attrition and retention of DL students, and to establish procedures for classifying a statistical unit into groups based on the score of the independent variables.

Research Question

To what extent do learner characteristics’ factors significantly discriminate between attrition and retention of students in DL?

The Importance of the Topic

There are several reasons behind the choice of studying the phenomenon of attrition and retention in DL in Saudi Arabia. These are:

The large size of the attrition problem; the percentage of students who drop out of traditional higher education remains constant between 40 and 45% (Tinto, 1982). While in DL the rates appear to be higher by 10 to 20%, according to Carr (2000), Frankola (2001), and Diaz (2002).

The need for further research; in 1999, the Institute for Higher Education Policy in the USA stated that “research does not adequately explain why the dropout rates of distance learners is higher than those in regular education.” However, in the Arab world, this topic has not been properly investigated (Mohammed, 2005). Moreover, according to the records of the AOU, there is a visible drop in the enrolments, as well as a leakage out of the system. Furthermore, DL is a new field of education in Saudi Arabia, and so it needs more studies to fill the gap of literature in this part of the world.

Lack of research on distance learner characteristics; the lack of sufficient literature on learners in the context of DL makes it difficult to investigate them in a fully rounded manner (Gibson, 2000). Moreover, a great bulk of literature, recently written on the effects of online education, has as its main goal such dimensions as learner outcomes (Russell, 1999), and also course evaluation, but has largely neglected the role of student characteristics as linked to instruction. However, Diaz and others (2000) believe that research should concentrate on those personal characteristics that may make it easier for students to succeed in a typical DL class.

Accessibility of the university: DL, with its flexibility and accessibility, can be of great benefit to adults who have missed their chances of traditional education. It can also be of great help for employees and workers, who do not have sufficient time available to attend a regular campus. On top of all clients come the women who would not be able to enrol for study on male campuses due to cultural considerations. Also, there are those women who are not allowed to be taught by men directly, and therefore receive much of their instruction by DL means of remote communication (Rawaf & Simmons, 1992). DL in Saudi Arabia is available to those Saudi students who, for one reason or another, are not successful in finding a place in state or private universities. Also, it is available for the non-Saudi students who wish to continue their education in such a context where the state universities provide education only for Saudi students, and because private universities are not affordable in relation to their income.

Limitations

The limitations of the present research may be ascribed to a number of reasons. Firstly, the study is exclusively applied in AOU. Secondly, the model used can not be generalized to new competitive settings. And thirdly, some variables were not addressed and these might have had a considerable effect on retention: variables related to bureaucracy, mission and policy, budgeting, and funding, institutional awareness, and structural system.

DL in the Arab World: Practice and Challenges

The Arab world has witnessed a notable increase in enrolment rates in higher education institutions. This increase is due to a number of reasons amongst which is the constant increase in public demand for education, which is the direct and natural result of high rates of population growth. Nevertheless, most Arab governments are not financially capable of meeting their needs of establishing higher education institutions. In this context, DL with its modern communication facilities and technologies, has appeared in an attempt to solve the dilemma; and according to a report
published by UNESCO in 1998, DL succeeded in making available the chance of pursuing higher education at a reasonable cost.

**A Glance at Distance Higher Education in the Arab World**

In the Arab world there are three modes of DL institutions: first, the dual mode university, which is an institution that provides conventional and distance education simultaneously. There are several established examples, such as the Open Learning Centres in Egypt, and the Distance Education Centre of Juba University in Sudan and Jordan. Second, the single mode university, wherein distance education is the sole mission, to which teachers and administrative staff are exclusively dedicated. This category encompasses many examples in some Arab countries, such as the Open University in Libya, Al-Quads Open University, and the Arab Open University. Finally, there is the virtual mode, such as the Syrian Virtual University, which is the first online university in the Arab world. It was established in 2002 to provide world-class education without limitations, and to link the Arab world to the West (Muhammad, 2005).

**The AOU as a Distance Higher Education**

Culturally speaking, Arab countries have many features in common, particularly on linguistic and religious levels. However, there are obvious differences amongst them in many aspects, such as population size, national income, natural resources, stability, and prosperity. AOU was established under the umbrella of the Arab Gulf Program for United Nations Development Organizations (AGFUND), adopting broad regional educational goals. The model adopted by AOU is that of the United Kingdom Open University, especially in areas of materials, consultancies, with a few adaptations in pre-entry qualifications. AOU requires pre-entry qualifications that confine accessibility to those who aim to get academic credits. AOU is a single mode university. Its main campus is in Kuwait, and it extends to cover six different Arab countries: Bahrain, Egypt, Lebanon, Jordan, and Saudi Arabia. In Saudi Arabia, it has four different branches, which are located in Riyadh, Jeddah, Ha’il, and Ehssa’.

**Factors with a Negative Impact on the Development of Distance Education in the Arab World**

The Arab League Educational, Cultural, and Scientific Organization (ALECSO) has identified a number of factors that may have a negative impact on the growth of distance education in the Arab world. These are traditional distance instructional media, which are still used broadly at open education universities; most delivery systems at the Arab open universities use printed materials, the majority of which is developed by existing traditional universities; The main bulk of the part-time instructors are hired on a loan basis from the traditional universities. Besides, these instructors are not trained to conduct classes of distance higher education, and their attitudes towards distance education are not much different from those adopted by many people who look at distance education as a second-class form of education. To overcome these problems, it is vital to guarantee the high quality of DL programs and also to ensure the suitability of the programs for Arab students.

**Some Obstacles of DL in the Arab World**

There are two important obstacles hindering the process of DL in the Arab world: one is related to the society and the other to the government. First, the majority of the Arab societies are still sceptic about the practices of DL education programs, believing that DL is another form of correspondence instead of a novel approach to instruction. This blurred image is even enhanced by the fact that quite a few DL students fail to finish their program. Second, some Arab countries do not recognize distance education institutions, and therefore do not confer a degree upon their graduates. These situations have serious implications for the development of DL mode in the region.

The notion that DL is new to the Arab region denotes that distance education may be distrusted because its graduates are oftentimes left without being awarded recognized qualifications. In support of this view, UNESCO states that: “Two attitudes have emerged towards the qualifications obtained from DL institutions. One could be considered as ‘pure market value’ and then leave the competencies take place without consideration of their source. The other option is more sensible and requires authentication of the qualifications through recognition by accreditation of the institution. The two attitudes have left heavy bills and no recognized qualifications”

To redress the doubts surrounding the concept and the practice of distance education, great efforts should be made to ensure low attrition rates on such programs. The retention of distance higher education students in the Arab world must be taken seriously if Arab countries want this mode of education to thrive. Developing a strategy to enhance the dropout rates for distance learners would be helpful in guiding those in charge for implementing such models in the region, and it would be a major step towards attaining accreditation of such institutions and their programs by internationally recognized bodies.

The observations discussed above are likely to lead to the conclusion that Arab countries are falling short in ensuring quality distance higher education programs. More worrisome is the persistence of this state of affairs, the predictable consequences of which contain poor programs and unrecognized credentials.
Literature Review

From a historical perspective, the percentage of students who drop out of traditional higher education remains constant between 40 and 45% (Tinto, 1982, Consortium for Student Retention Data Exchange 2000-2001, and Berge & Huang 2004). In the context of online learning, dropout rates appear to be higher than those in traditional learning. Despite the unavailability of reliable national statistics for completion rates of DL students, dropout rates are believed by some researchers in the field to be higher by 10 to 20%, according to Carr (2000), Frankola (2001), and Diaz (2002).

Tillman (2002) cited that in the study of Mountain Empire Community College, the dropout rate mounted to about 50% of first-to-second-year. This outcome needs to be taken serious since student attrition is usually costly for the institution as well as for the individual. More specific, the whole Mountain Empire Community College population collaborated to comprehend how to implement effective retention strategies. When reviewing all College records, it was found that there was a deterioration of more than five million dollars in tuition revenue; and this was due to student attrition over the three years preceding the study. With an annual operating budget of less than 10 million dollars, this amount was deemed significant.

Different Theories and Models of Student Attrition and Retention

When reviewing the academic empirical papers as well as the theoretical literature, it has been found that the phenomenon of retention underlies a lot of controversy, complexity, and multi-dimensions. In general, the retention theory basically discusses the factors that influence student retention positively or negatively (Kinder, et al, 2002). Several theoretical models of retention have been offered in both domains of traditional learning and DL (Boshier 1973; Tinto 1987, 1982, 1993; Kember, 1981; Sweet. 1986; Bean and Metzner, 1985, Bean et al.1987; Shields 1994; Braxton et al. 1997; Boyles, 2000; Frankola, 2001; Tillman 2002; Kinder, et al 2002; McEwen & Gueldenzoph, 2003 and Morris, 2005).

Models and Theories That Represent the Most Common Factors that Influence Retention

Tinto’s theory, developed in 1975, and elaborated on in 1987 and 1993, respectively, is one of the most widely recognized retention theories in the field. Many theorists adopted it as an accredited model of student departure and persistence. For example, in 1986 Sweet used Tinto’s hypothetical framework and applied it to DL. Similarly, McEwen & Gueldenzoph (2003) said that Astin’s Student Involvement Theory (1984) is analogous to that proposed by Tinto, but with more emphasis on the role played by student motivation and behaviour. In their elaborate explanation of Tinto’s theory, Cabrera, Castaneda, Nora, and Hengstler, (1992) pointed out that individual attrition from academic institutions can be ascribed to a longitudinal process of interactions between an individual and other members of the academic and social systems of the institution.

Unlike Tinto’s model of attrition (1975, 1987), the model proposed by Bean and Metzner (1985), and Bean et al (1987), which is further assessed by Stahl & Pavel (1992) focused more on the effect of the outside environment, i.e., on external variables on the non-traditional students. Bean and Metzner considered attrition behaviour as a function of the person and his/her environment; and thus DL students may be affected by their external environment, and hence drop out from the college. Because they do not regularly study on campus, they are likely to get affected more by the external environment rather than by the social integration variables, which affect traditional students on campus.

In his treatment of the variables affecting student persistence, Tillman (2002) cites Braxton and associates (1997) who indicated that the five perspectives stated hereafter account for college student persistence: economic, societal, psychological, organizational, and interactional. However, Garland (1993) believed that the reasons given by the students for withdrawing from DL courses can be grouped into four categories: situational, dispositional, institutional, and epistemological.

Boyles (2000) recommended a model of attrition which consists of three sets of variables: (1) background and defining variables, (2) environmental variables, and (3) academic variables. Moreover, the model has seven singular variables. The general framework of the model is based on the modified version of the Path Model (with additional variables), which was proposed by Bean et al in 1987 (Berge & Huang 2004). As for the importance of the role played by the instructor, Frankola (2001) initially emphasized it where he noted that students will drop out, even from the most refined course, in the absence of interaction between them and the instructor. Such interactivity is a key component of successful online courses.

The Institute for Higher Education Policy (1999) recommended that DL research should address distance learners’ unique characteristics and needs. Parker (1999) and Morris, (2005) found that locus of control was highly significantly correlated with student dropout from DL. Learners with an internal locus of control tend to have higher rates of completion in DL, because they invest the necessary time and hard work and therefore expect this effort to positively affect their academic achievement (Dille & Mezack 1991). Dille & Mezack (1991) and Thompson (1998) wrote that external locus of control, together with attribution, are characteristic for DL students at risk. Students who enjoy an independent learning style and who are less influenced by their environment are more suitable for DL courses. Similarly,
introduced individuals are more likely to be successful with DL classes (Barbadillo, 1998), Diaz & Cartnal (1999) and Diaz (2000, 2002).

In conclusion, several models can be adopted to conduct this study of student retention: For example, Tinto (1975, 1987, 1992) and Astin (1975, 1984, 1993) hold that ‘institutional involvement’ is the only factor expected to have a direct effect on persistence. In this respect, goal commitment is anticipated to influence both Grade Point Average (GPA) and progress (academic outcomes). However, according to the model proposed by Bean and Metzner (1985, 1987), external environment variables are expected to have a straightforward impact on the GPA, persistence, and progress, while Diaz (2000, 2002), Diaz & Cartnal (1999), Parker (1999) and Morris, (2005) focus on the effects of student characteristics, learning style, and locus of control on profiling successful.

This paper will examine learner characteristics factors that affect student retention at AOU, with special reference to the campus in Saudi Arabia.

Different Characteristics that Affect the Structure of Attrition and Retention

Learner Characteristics’ Factors: Knowledge about student characteristics and their sources of motivation will indicate to potential participants in DL. Knowles (1980) holds that behaviour is usually directed and controlled by the learner’s needs, situation, and personal characteristics. Awareness about student learning preferences can assist the instructor in class preparation, designing class delivery methods, choosing appropriate technologies, and developing sensitivity in accordance with differing student learning preferences within the DL environment. This will help create a successful process of education, and, hence, more retention of students will result (Diaz & Cartnal 1999). Research on the characteristics of distance learners has often focused on those personality variables. (Thompson, 1998).

Demographics (Age, Marital Status): there is a positive correlation between student age and their success in courses transmitted or delivered at DL institutions (Wojciechowski, 2005; Thompson 1998; and Sweet, 1986). This assumption makes sense when we consider the probability that relatively older students enjoy a greater ability of coping and dealing with problems, and that their maturity and self-discipline increase as they pursue DL (Galusha, 1997; Dille & Mezack, 1991). Such students are also believed to have a higher esteem of time and money than younger students do Daiz (2002). However, there are other studies that establish a positive connection between student age and attrition from colleges. For example, Bean and Metzner (1985), and Bean et al (1987) reported that older DL students will have more family responsibilities than younger DL students, and most of them will be engaged in full- or part-time hours of employment.

Gender: most studies of distance learners in North American higher education reveal that more women than men are enrolled in courses delivered at a distance (Galusha, 1997; Dille & Mezack, 1991). Other researchers studying DL in Canada have reported similar findings. Not only do females have a higher enrolment rate than males but they also show a higher success rate (Thompson, 1998).

Nationality: literature on DL is copious in those reports dealing with the potential effect of ethnicity on attrition in education (Tinto, 1975 and 1987; Bean et al, 1987, Stahl & Pavel 1992; Shield 1994; Parker, 1999; Diaz, 2000; and Morris, 2005). At the AOU in Saudi Arabia, the majority of the students are from Arabian origin, but they hold different nationalities. Some are citizens of Saudi Arabia while others are Egyptian, Jordanian, Lebanese, Syrian, etceteras. This paper proposes that differences in nationality have a discriminate role in the retention and attrition of DL students.

Individual Variables

Belief in DL: it is obvious that a lot of DL institutions are speeding up into the recent educational delivery systems without completely understanding how ‘place’, ‘time’ and ‘flexibility’ variables affect student learning styles, and hence they do not know how effective their belief in DL is. The recent developments in information technology assist DL in becoming more flexible and in breaking the barrier of time and location (O’Malley & McCraw., 1999). However, online students often require more time to be adjusted to the virtual course than the time invested in a face-to-face session (Murray, 2001). DL delivery methods are considered an innovative or rather a novel approach in educational system (Yang & Cornelius, 2005). Everett Rogers’ model of the diffusion of innovation discusses five stages in decision process: knowledge, persuasion, decision, implementation, and confirmation (Rogers 1995). Based on O’Malley and McCraw (1999), who adopted and adapted Roger (1995), the diffusion model of (Ramzi & Kamal 2000 P.3) in Lebanon found that “overt unfamiliarity with distance education by respondents is a factor chiefly responsible for their lack of sustenance for the idea of starting distance education in schools in Lebanon.”

Locus of Control: recent research has confirmed that an internal locus of control is strongly correlated, not only with completion (Parker 1999; Morris 2005; Dille & Mezack, 1991). Learners with an internal locus of control tend to have higher rates of completion in DL. According to Dille & Mezack (1991), and Thompson (1998) it has been found that external locus of control together with attribution are characteristic of DL students that are at risk.

Satisfaction: the importance of student satisfaction about course completion is clear Kelsey & D’souza, 2004; Moore & Anderson 2000). Such satisfaction is usually attained by positive interaction with the program staff, which can be initialized by a mandatory orientation seminar. The report of Lana Low, Vice President of Noel-Levitz Group asserts that satisfaction is a significant indicator of persistence. Low
(2000) indicates that it is the duty of successful institutions to meet the needs of their students, constantly improve the quality of the educational content, and use student satisfaction data to mould their directions (Tillman 2002).

Learning Styles: DL is not suitable for everyone. Grasha-Reichmann Student Learning Style Scales (GRSSLS) promotes understanding of learning styles in a broad context, spanning six categories (Grasha, 1996). Students who are more independent of and less influenced by their environment are more suitable for DL courses (Díaz & Carval. 1999). Similarly, introverted individuals are more likely to persist than those with barely traditional background in non-traditional education were more likely to be successful with DL classes (Barbadillo 1998).

**Prior Educational Variables**
**Minimal Requirements: Reading and Writing Skills**

In the DL class, nearly most communication is achieved through writing, so it is necessary that students feel comfortable in expressing themselves in writing. Meaningful and quality input into the online classroom is an essential part of the learning process in DL (Murray, 2001).

Students with a reasonable amount of computer literacy, especially when they have an easy access to computers, will hold a positive attitude towards using this technology for their DL process (Liu, Macmillan, and Timmons 1998, Hong & Kuek, 2003). Moreover a student’s skill with the modern communication media is necessary to participate in a DL course and this skill is positively correlated with success in that course (Cohen 2001). Moreover, technologies, such as computer and VCR greatly influence learning since they assist the learner in building up an interactive environment, which can enhance cognitive and social processes when accumulating knowledge (Thompson 1998, Phipps & Merisotis 1999).

Prior Experience in DL: prior experience in DL has been found to be significantly related to persistence (Fuertes & Sedlacek, 1994). It is not surprising that researchers have found that students with a better background in non-traditional education were more likely to persist than those with barely traditional experience (Rekkedal 1983, Galusha, 1997). The greater the time lapse between taking the distance course and being in a four-credit course, the less the likelihood that the student will complete the course (Barbadillo 1998).

When the educational background to DL increases, it is found to have a positive bearing on success of completion. Freshman year is the most critical period for student retention, with 21% on the average. While degree completion requires more than four years for most students, the eventual degree completion rate for entering freshman was estimated to be 58%


High School Academic Performance (GPA): there is a strong positive relationship between student persistence and their grades, both in high school and in college. Students who obtain high Grade Point Average (GPA) scores will probably remain in college while students with low scores are predicted to drop out (Tinto 1975, 1987, 1992, Astin 1975, 1984, 1993, Parker 1999, Diaz 2000, 2002, McEwen, & Gueldenzoph 2003).

**Conceptual Framework**

The most recent trends in DL focus on outcomes rather than structure. Student retention becomes an essential fundamental of higher DL quality. Thus, increasing retention has become a goal for many institutions, and a way of judging the quality of education. The review of literature has shown that several attempts have been made to link many variables to the student success; and these variables are to be considered significant in predicting attrition or retention for DL students.

On the basis of the previous studies, we can group Learner characteristics’ factors as follows:
1. Demographics variables: gender, age, marital status, working part- or full-time.
3. Prior Educational Variables: perception of DL system, prior experience in DL, (GPA), reading skills, communicate through writing skills, using computer skills.

**Research Design**

A blend of quantitative and qualitative paradigms was used. In the qualitative study, in-depth interviews were conducted with the teaching staff, administrators, students, and the students’ parents in the AOU. It was also conducted using the same categories of interview questions outside the AOU. The content analysis technique has been used to explore the details of the phenomenon of attrition, and also to interpret the inferences of the data collected in the in-depth interviews (Berger & Asa 1998).

The implementation of the factor analysis technique in the present research relies on the questionnaire results, which eventually aim to minimize the number of variables in order to represent the respondent’s point of view. Discriminant analysis was applied to determine which variables best discriminate between the attrition and retention clusters. Discriminant analysis is the most appropriate technique for this study because the dependent variable consists of two mutually exclusive, and collective categories: attrition or retention, and the independent variables are metrical. Moreover, there are significant differences that exist among the groups regarding the independent variables (Hair et al. 1998; Malhotra 1999).
Sample Size Determination and Sampling Technique: The random sampling technique has been selected. The sample is supposed to cover randomly all the students who are enrolled in AOU. Using 95% of the confidence level is the most common rule used for calculating the random sample size. Quantitative Research Considerations. The population examined in the study amounts to 4000 students, all enrolled in AOU, in Saudi Arabia. By convention, a sample error of 5% was accepted, thus allowing a sample of 400 students. To cover the percentage of non-responses, an additional number of 100 respondents was included.

In order to increase the motivation among the students to participate to the survey, the University Administration has permitted the researcher to assign three gifts as an incentive and bonus to be given to those who complete their task with enthusiasm and accuracy. At the end of the spring semester of the academic year 2005, students will be requested to complete an online survey. The items of the survey have been measured using a five-point Likert scale. Moreover, the students surveyed are given the opportunity to write down some additional comments.

Division of the Sample: The method used for validation followed the cross-validation approach. The sample was divided into one analysis sample and one holdout sample based upon the distribution in the total sample. Screening the Data and Assumptions Discriminant Analysis: Missing values, outliers, multivariate normality and linearity were the different techniques used to screen the data. The major assumption for deriving the discriminant function is that the dependent variable was non-metric and categorical with two groups at the same time. The independent variables were metric, normally distributed, but equal in dispersion and covariance structures (matrices). The second assumption concerned the normality of the independent variables.

Pilot Study and Field Work: The pilot study has been designed and conducted using the sample of students enrolled in AOU as a DL institution. The sample size of the pilot study included 127 students; and the technique for collecting the data required was random. This pilot study was intended to investigate the validity and effectiveness of the survey questions posed in the questionnaire. The pilot study can be seen as a pioneering one, because there are no previous studies that can be cited or consulted in this particular area of research. Moreover, the research has been conducted in Saudi Arabia, a venue that has never been mentioned in any of the studies, especially those cited in the review of literature. Depending on the results and interpretation of the pilot study, the field study was hence conducted. The field study has used almost the same technique as the pilot study, except for the following difference: an enlarged sample of more than 500 students; and the survey was conducted both on-line and on paper. Moreover, the students were motivated to answer all the questions of the survey by giving them three valuable gifts as an incentive. In the field study, the surveys were distributed randomly for 1000 students in the AOU. Only 587 students returned the survey questions answered completely.

Estimation and Interpretation of the Results of the Discriminant Functions: There are several reasons for choosing the stepwise estimation as the most suitable method for this research. At each step of the stepwise procedure, the variable that minimizes the overall Wilks’ Lambda will be entered in the discriminant function. Furthermore, from the variable meeting Wilks’ Lambda criteria, the variable that maximizes the Mahalanobis distance between the two closest groups will be entered. In this analysis, the overall impact of the discriminant function is closely observed. It is worth noting that the function should be statistically significant (less than 0.05), and measured by chi-square statistics.

Analyses

This article explores the learner characteristics’ factors that affect the retention/attrition rate of distance learning programs students at the AOU. To determine the factors that distinguish between those who stay versus those who leave, a multiple discriminant analysis (DA) was used. The dependent variable is the two-group categorical variable indicating whether the student stayed or left the programme. The independent variables comprised demographic variables and were included in order to better understand the characteristics of each group. The cross-validation approach is another way for validating the discriminant results. A sample that consists of 400 respondents was used for estimation and development of the discriminant function, while the additional 187 respondents were used for the validation of the DA results, using a holdout sample. The basic sample (N = 400) was randomly selected from the 587 respondents. To minimize the measurement error, internal validity and face validity were investigated, and appeared to be good. Cronbach’s Alpha (α) test was applied to investigate the internal consistency of the students’ responses. The reliability is appropriate > 0.5, which means that further analyses can be conducted. (Hair et al., 1998). More specifically, Alpha (α) = .6511.

At the beginning, exploratory factor analysis was used as a reduction technique to handle the large number of measuring items, and to eliminate badly differentiating items. Given that this is the first time this study is performed in this context, the factor analysis was necessary to group the variables based upon statistical outcomes. The used cut-off point for the Eigenvalues was 1, and items with factor scores below 0.5 were eliminated from factor analysis. Factor analysis was used as a further reduction technique. Multivariate Discriminant Analysis (MDA) has been applied to the variables with factor...
loadings equivalent to > 0.5 produced by the above-mentioned analysis. All factors were entered into the discriminant analysis using a stepwise technique, which allows for the determination of variables’ relative discriminant ability. See Table 1 for the outcomes of our analyses:

Table 1: Rotated Component Matrix of Factor Analysis

| Factor 1 independent learning style | 18- I prefer to work by myself on assignments in my courses. | 0.645 |
| 22- I learn a lot of the content in my classes on my own. | 0.591 |
| 23- I feel very confident about my ability to learn on my own. | 0.600 |
| 27- I prefer to work on class projects and assignments by myself. | 0.613 |
| 28- When I don't understand something, I first try to figure it out for myself. | 0.601 |

| Factor 2 External locus of control | 13- If I study hard enough, I can succeed any exam. | 0.631 |
| 14- A person is responsible for her/his own actions, good or bad. | 0.686 |
| 16- A person can change his/her personality and behaviour patterns. | 0.603 |

| Factor 3 Believe in the advantage and value of DL | 02- I prefer the AOU because I have not enough time to spend in the regular university classes. | 0.746 |
| 04- Flexibility is the main advantage of the study in AOU. | 0.664 |
| 29- I really believe in the value of distance learning. | 0.580 |

| Factor 4 Doubt in the advantage and value of DL | 30- I feel confident using the computer. | 0.700 |
| 34- I do not appreciate the value of distance learning. | 0.550 |
| 36- I believe I am a good user of the computer. | 0.731 |
| 70- I intend to leave the AOU. | 0.609 |

| Factor 5 sharing skills | 24- I like to develop my own ideas about course content. | 0.749 |
| 25- I have my own ideas about how classes should be run. | 0.596 |

| Factor 6 Writing skills | 33- I find difficulty in expressing myself in writing. | - |
| 41- It is easy for me to communicate through writing. | 0.809 |

| Factor 7 Internal Locus of control | 6- Heredity determines most of a person's personality. | 0.693 |
| 08- Intelligence is a given stunted and cannot be trained. | 0.598 |
| 11- Bad or good luck can really follow you around. | 0.572 |

| Factor 8 Reading skills | 31- I enjoy reading books and magazines. | 0.823 |

| Factor 9 Self-confidence | 35- In general, I do not like reading. | 0.638 |

| Factor 10 socio-economic effect | 09- School success is mostly a result of one's socio-economic background. | 0.750 |

| Factor 11 cost effect | 05- Prefer AOU because of its low fees. | 0.764 |

| Factor 12 last resort | 03- The AOU is the only access to finish my university study. | 0.750 |

| Factor 13 Believe in chance | 07- Chance has nothing to do with being successful. | 0.845 |

The standardized discriminant function coefficients serve the same purpose as beta weights in multiple regression analysis. That is to say, they indicate the relative importance of the independent variables in predicting the dependent. The discriminant function formulation which comes out finally can be written as follows:

Actual dropout = 1.0004 Independent Learning style + 0.001

In conclusion, the results of our fieldwork seem to point out that independent learning style is the key factor in keeping the students in the DL system at the AOU is Saudi Arabia.

Classification Statistics and Model Evaluation

How well does this model perform in such a predictive categorization or classification? This discriminant function was used to test the discriminative power of the two factors on the additional sample of 187 respondents. The overall hit ratio turns out to be 61.6% (correctly classified cases) (see Table 2). This performance is better than what could have been achieved by mere chance. The use of the additional sample data helped in avoiding ‘over-fitting’ the model. Over-fitting could have happened in case the model was tested using the data that were used to develop the model. This is why we chose for new data for our cross-validation purposes.

Retention plays a vital role in policy development. For this reason, decision makers have to choose models that will optimally suit their individual institutions. The factor that had discriminating power actually confirmed previous research. The importance of the use of various media types was demonstrated by Moore and Anderson (2000). AOU is the first university to use distance learning education systems in Saudi Arabia, where the rest of the educational institutions are using traditional forms of education. Thus, the barriers to accept the use of different media have put an extra load on the administration to develop the basics requirements needed by
the students. The requirement of an independent learning style from students implies that the programme administration needs to refine tests in the university admission policy and procedures which can best identify this attribute in the applicants.

Table 2: Classification Results (on additional sample of 178 cases).

<table>
<thead>
<tr>
<th>Actual dropout Fall 06</th>
<th>Predicted Group Membership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropout</td>
<td>Stay</td>
<td>Total</td>
</tr>
<tr>
<td>Dropout</td>
<td>70</td>
<td>67</td>
</tr>
<tr>
<td>Stay</td>
<td>92</td>
<td>185</td>
</tr>
<tr>
<td>Ungrouped cases</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dropout</td>
<td>51.1</td>
<td>48.9</td>
</tr>
<tr>
<td>Stay</td>
<td>33.2</td>
<td>66.8</td>
</tr>
<tr>
<td>Ungrouped cases</td>
<td>0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

61.6% of original grouped cases correctly classified. Overall Hit Ratio = 61.6%.
Errors = 38.4%.
Correctly classified "dropout" = 61.6%.
Correctly classified "actually stayed" = 51.1%.
Correctly classified "dropout" = 66.8%.

The results extracted from this study highly support the point of view that personal characteristics of the learners play a fundamental role in higher education. The design and application of distance learning is of remarkable importance to many educators. Research has been conducted from a diversity of perspectives in this area. Nevertheless, there is no sufficient research on how to adapt the design of distance learning education to student learning styles. It has been demonstrated that students with independent learning style orientations are more likely to succeed in distance learning. This implies that students who are more independent and less influenced by their environment are likely to be more successful in distance learning courses. It was concluded that distance learning is not appropriate for everyone. In addition, the original contribution of the research is that it has shown that independent learning styles are more practised and retained in distance learning universities than elsewhere.

It was also concluded that the educational background of the students plays an important role in their retention or attrition. Since all the educational institutes in the Kingdom of Saudi Arabia depend on the traditional methods of education, students are not well-prepared for a distance learning approach. Students who choose to join the AOU suffer the transfer from the traditional method of education to distance learning method in which students are expected to depend on themselves. The reason is simple: distance learning is a new field of education in Saudi Arabia as the AOU was inaugurated in 2002.

In conclusion, having an independent learning style is the key factor that significantly contributes to the outcome whether an individual would stay in or choose to leave the AOU Distance Learning programs.

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