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Understanding the Factors of Adult Learners Dropping Out of E-learning Courses

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Abstract: The purpose of this study is to determine the specific set of variables that can best predict the reasons that adults dropout of workplace e-learning courses. A model including the predictors of attention, relevance, confidence, marital status, number of learning hours for the course, mandatory/voluntary attendance, and hours worked per week fits well ($\chi^2 = 75.918$, $df = 7$, and $p < .000$).

Introduction

Although e-learning has some advantages as an efficient and effective learning delivery media, the big problem of e-learning is learner dropout. While e-learning seems to answer a lot of learner's needs, drop-out rates are higher than those for face-to-face course campus-based learning (Knowledgenet, 2001). Svetcov (2000) claims, "It is generally agreed that attrition rates from online schools are higher than from traditional schools ... the online student dropout rate [is] around 35 percent, [which is] 15 percent higher than traditional schools....The fact is, much of what passes for online education today would put most of us to sleep" (p. 3). More skeptically, Murphy (2001) argues that e-learning courses without face-to-face classroom training have low success rates--only about 10 percent of employees complete online-only courses. The "anytime, anywhere" nature of at-your-laptop learning all too easily becomes "no time, nowhere"; the average dropout rate for online courses can run as high as 50 or 75 percent, depending on the source (Ganzel, 2000). Although many studies related to e-learning have been conducted in the field of adult education or HRD, relatively little concern has been given to why adult learners dropout. In addition, there is not any research-based evidence about how and why the learners in workplace e-learning programs drop out.

The purpose of this study is to determine which specific set of variables can best predict the adult learner's dropout in the e-learning course in the workplace. The following research questions are a guide to the research purpose: 1) Can individual background variables and motivation variables predict the dropout of adult learners from an e-learning course? 2) Which factors are relatively strong among all the predictor variables that influence the dropout of adult learners in an e-learning course?

Conceptual Model

The framework for the study was developed based on a review of the literature in adult education, human resource development, and distance learning. Specifically, several models related to the dropout of adult learners serve as the conceptual framework of the study. These are Boshier's (1973) congruency model, Rubenson and Hoghielm's (1978) expectancy-valence model of dropout, Keller's (1987) ARCS model, Bean and Metzner's (1985) model of nontraditional undergraduate student attrition, Billings' (1988) model for completion of correspondence courses, and Kember's (1995) open learning model. The aforementioned six models of course dropout provide useful theoretical grounds in testing a model for logistic discriminant analysis (logistic regression) of dropout in e-learning. A logistic discriminant model was proposed to serve as a conceptual basis for this research. In constructing a model, I relied on the work of these six authors and examined variables based on the relevance to the context and e-learning. In other words, instead of relying on one of these models, none of which were developed specifically for the context in which I am working, I suggest a logistic discriminant model as the conceptual model of dropout for adult learners in e-learning (Figure 1).

Predictors

Criterion

Individual Background Variables

- Age
- Gender
- Educational level
- Number of learning hours for the course
- Number of e-learning courses completed
- Hours worked per week
- Mandatory/voluntary attendance
- Marital status

Motivation Variables

- Attention
- Relevance
- Confidence

- Dropout

Figure 1. Model of variable arrangement in logistic discriminant analysis

The model was specified based on the models of dropout mentioned in the above and as a result of an extensive literature review of empirical findings. Accordingly, the variables in the proposed model are based on the existing models of dropout and the literature review of dropout of adult learners. Variables included in the model for discriminant analysis are categorized into six individual background variables of age, gender, number of e-learning courses completed, number of hours employed, mandatory/voluntary attendance, and marital status and four kinds of motivational variables (attention, relevance, confidence, and satisfaction) reflecting partly academic integration, social integration, and technological support variables identified through literature review. Figure 1 presents a model of variable arrangement in the logistic discriminant analysis.

Individual background variables have been considered as very important variables that affects the dropout of adult learners (Bean & Metzner, 1985; Billings, 1988; Boshier, 1973; Driscoll, 1998; Keller, 1987; Kember, 1995; Osborn, 2001; Rubenson & Hoghielm, 1978; Vrasidas & McIsaac, 1999). The matter of which variables should be included in the model depends on the specific situation of the study. In this study, based on the literature review of studies of dropout, age, gender, number of e-learning courses completed, hours worked per week, educational level, number of learning hours for the e-learning course, mandatory/voluntary attendance, and marital status are selected as important variables. Specially, the mandatory/voluntary attendance variable is a very important component and has potential to affect the dropout of adult learners in e-learning settings. While the participation of adult learners in the existing adult education activities is voluntary, their employers often influence the participation of adult learners in e-learning courses in the workplace.

Motivation variables are usually located at the very top of the dropout variable, as shown in some models of dropout of adult learners (Bean & Metzner, 1985; Billings, 1988; Kember, 1995; Stahl & Pavel, 1992). As mentioned earlier, this is because motivation is the most powerful variable that affects the adult learners' decision to dropout. In this study, Keller's (1987) ARCS (attention, relevance, confidence, and satisfaction) was selected for testing the model because it is dealing with comprehensive motivation which is related to the dropout of

adult learners. This motivation reflects academic integration, social integration, and technological support variables identified through the literature review which are also partly related to the adult learners' dropout frequency.

Method

Data collection: Sampling and Sample Size

The sample of interest for this study was employees who were taking e-learning courses related to their work for improving job skills. The sample of 149 adult learners was drawn from employees enrolled at three e-learning institutions in Korea during February 2004. Based on the enrollment in the nine work-related e-learning courses in the three e-learning providers included in the study, the 149 learner participants represented a participation rate of 45%. Respondents were mailed a copy of the survey via e-mail. Table 1 presents the demographic information of the respondents.

The survey consisted of 15 Likert-scale items to measure learner's motivation on the work-related e-learning course and 10 internal, or ratio items. The response format on the Likert-scale ranged from 1 (strongly disagree) and to 5 (strongly agree). The creation of 15 Likert-scale items was based on Keller's (1987) ARCS model. Based on the judgment of a scale development panel that consisted of adult educators and statistical experts, out of four subscales of motivation (ARCS) on the e-learning course, only the three scales of attention, relevance, and confidence were used for the study because the three subscales already reflect the satisfaction motivation itself. An exploratory factor analysis of the participants' responses to the 15 Likert-scale items on the survey was conducted using a principal component analysis method extraction with Varimax rotation. Factors with eigenvalues greater than 1.0 were extracted. After inspection of the rotated factor matrices, the three-factor solution (attention, relevance, and confidence consisting of 4, 5, and 6 items respectively) was selected as the most conceptually meaningful representation of the data, accounting for 64.34% of the variance. The variances explained by the three factors were 20.71, 23.99, and 19.64 percent respectively. The Cronbach alpha coefficient was calculated separately for each subscale (.85, .89, and .84 respectively).

Table 1
Demographic Information of Respondents

Respondents	N (Valid %)	
Gender	Male	120 (80.5)
	Female	29 (19.5)
Age	21 - 30	39 (26.2)
	31 - 40	72 (59.0)
	41 - 50	20 (13.5)
	51 - 60	2 (1.3)
Educational level	High school diploma	9 (6.0)
	College's degree	14 (9.4)
	Bachelor's degree	86 (57.7)
	Masters/Doctorate degree	40 (26.8)
Dropout	Dropout	44 (29.5)
	Completer	105 (70.5)

Data analysis

After data screening, the proposed model was tested using SPSS 11.5. Logistic regression applies maximum likelihood estimation after transforming the criterion into a logit variable, called the logit of probability (p). Logit (p) is the log of the *odds* or *likelihood ratio* that the criterion is occurring or not (Lea, 1997). It is defined as:

$$\text{logit}(p) = \log[p/(1-p)]$$

Whereas p can only range from 0 to 1, $\text{logit}(p)$ ranges from negative infinity to positive infinity. The logit scale is symmetrical around the logit of 0.5 which is zero.

Logistic regression involves fitting to the data an equation of the form (Lea, 1997):

$$\text{Logit}(p) = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots$$

Unlike linear regression using a *least-squared deviations* criterion for the best fit, logistic regression uses a maximum likelihood method, which maximizes the probability of getting the observed results given the fitted regression coefficients (Lea, 1997).

Findings

A Proposed Logistic Regression Model

In order to test the significance of a proposed logistic regression model, the researcher used overall fit statistics of *model-chi-square test (Log-likelihood test of a model)*, *Hosmer and Lemeshow's Goodness of Fit Index*, *Nagelkerke's R-Square*, and *percentages correctly classified*. The statistics of *model-chi-square test* ($\chi^2 = 77.291$, $df = 13$, and $p < .000$) and *Hosmer and Lemeshow's Goodness of Fit Index* ($\chi^2 = 6.196$, $df = 8$, and $p = .625$) reveal that the proposed model fits well. The statistics of percentages correctly classified (See Table 2) show that the proposed model correctly classified 91.3% of the completer and 70.5% of the dropout, for an overall accuracy rate of 85.0%. Nagelkerke's R-Square (.580) is also high.

In order to determine which factors are relatively strong among all the predictor variables that influence the dropout of adult learners in an e-learning course, the researcher analyzed the statistics of *Logit coefficients* and *Wald's test statistics for the significance of individual regressors* (See Table 3). Based on the *Logit coefficients and Wald's test*, the researcher removed the four predictors of number of e-learning courses completed, age, gender, and educational level that are not relatively strong out of the list of predictors from the proposed model.

Table 2

Classification Table of A Proposed Logistic Regression Model

<i>Observed</i>	<i>Predicted</i>		
	Dropout	Completer	Percentage Correct
Dropout	31	13	70.5
Completer	9	94	91.3
Overall Percentage			85.0

Note: The cut value is .5.

Table 3

Logit Coefficients and Wald Statistics of A Proposed Logistic Regression Model

Predictors	Logit Coefficients	Wald (df)	<i>P</i>
Motivation (Relevance)	.093	1.010 (1)	.315
Motivation (Attention)	.077	.874 (1)	.350
Motivation (Confidence)	.414	14.510 (1)	.000
# of e-learning courses completed	.022	.049 (1)	.825
Age	.051	.626 (1)	.429
Gender	-.666	.855 (1)	.355
Educational Level		.290 (1)	.962
Marital status	1.124	2.900 (1)	.089
# of learning hours for the course	.171	1.543 (1)	.214
Mandatory/voluntary attendance	-.662	1.102 (1)	.294

Hours worked per week	-.082	5.846 (1)	.016
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An Alternate Logistic Regression Model

After removing the four predictors from the proposed model, the researcher conducted logistic analysis for an alternate model. The statistics of *model-chi-square test* ($\chi^2 = 75.918$, $df = 7$, and $p < .000$) and *Hosmer and Lemeshow's Goodness of Fit Index* ($\chi^2 = 5.689$, $df = 8$, and $p = .682$) reveal that the alternate model also fits well. The statistics of percentages correctly classified (See Table 4) show that the proposed model correctly classified 92.2% of the completer and 70.5% of the dropout, for an overall accuracy rate of 85.7%. Nagelkerke's R-Square (.572) is high. In sum, the alternate model fits well.

Table 4

Classification Table of An Alternate Logistic Regression Model

Observed	Predicted		
	Dropout	Completer	Percentage Correct
Dropout	31	13	70.5
Completer	8	95	92.2
Overall Percentage			85.7

Note: The cut value is .5.

Table 5 presents that logit coefficients and Wald statistics of the alternate logistic regression model. Examining the individual variables' relative utility within the predictor set, the researcher observed that confidence, marital status, and hours worked per week contributed most substantially to the function differentiating between the dropout and the persister, as indicated by the Wald's test for the significance of individual regressors (14.567 ($df=1$), $p < .05$; 6.722 ($df=1$), $p < .05$; & 5.888 ($df=1$), $p < .05$ respectively).

Table 5

Logit Coefficients and Wald Statistics of An Alternate Logistic Regression Model

Predictors	Logit Coefficients	Wald (df)	p
Motivation (Relevance)	.109	1.456 (1)	.228
Motivation (Attention)	.058	.564 (1)	.453
Motivation (Confidence)	.396	14.567 (1)	.000
Marital status	1.400	6.722 (1)	.010
# of learning hours for the course	.162	1.528 (1)	.216
Mandatory/voluntary attendance	-.620	1.052 (1)	.305
Hours worked per week	-.077	5.888 (1)	.015

Conclusion

The findings from this study suggest that the dropout of adult learners in e-learning is associated with motivational factors as well as individual characteristics or individual work environment. Confidence, one of e-learning motivation factors included in the model, is the most substantial factor to predict the dropout of adult learners in work-related e-learning courses. Those who have relatively higher scores on the confidence scale are more likely to complete the e-learning course. In light of marital status and hours worked per week, those who are married and have less hours of duty are more likely to complete courses. Although relevance, attention, number of learning hours for the course, and mandatory/voluntary attendance within the predictor set are not significant predictors, these variables make a contribution in a certain degree to a useful logistic regression equation for the study.

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