Self-Directed Learning and the Effectiveness of e-Learning in Enterprises

Huang Yuhui and Liu Hongxin

Abstract—**Is there a substitutable or complementary relationship between the e-learning in employer enterprises and self-learning of individual? Based on the Self-directed Learning (SDL) and Technology Acceptances Model (TAM), we use our survey data of China bank custom managers on e-learning to explore this question. The result of our ordered-logit regression show that better learning habits, higher efficiency, higher levels of knowledge improve the e-learning utilization whilst controlling the demographic variable, perceived usefulness and so on. The findings enrich the idea of e-learning, and give real life suggestions on the application of enterprise e-learning.**

Index Terms—**Adult education, China, e-learning, self-directed learning.**

I. INTRODUCTION

With the latest developments of internet technologies, enterprises are increasingly investing larger resources in e-learning systems in order to support their trainings of employees and to improve their human resource management. China is not an exemption to that trend. According to the 2011 Research Report of Chinese Enterprise E-learning (edited and published by www.online_edu.org), many enterprises have adopted the usage of an e-learning system, and it is been more and more popular since 2011 [1]. As a tool of intra-management, it has many advantages, such as flexibility, lower training costs, asynchronous interactions, new educational approaches etc. [2].

The development of e-learning has put forward a new need for better research in this field. The research should focus more and more on the specific rather than general industries. As differences exist in different industries regarding the required knowledge, techniques, staff structures, work forms and so on, it is a new challenge on how to improve the e-learning to fit well with different enterprises and industries.

In the era of the knowledge economy, people also need to fit in for an constantly changing environment. That is the conception of life-long learning: to sense, to acquire and to integrate information timely and to learn continuously.

So there comes the question: what is the relationship between individual learning and e-learning in enterprises, is it substitutable or complementary? Does a person's knowledge, learning skills and SDL level affect his utilization of enterprise e-learning, and how? We will focus on this question in this article.

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This paper uses the survey data of China bank custom managers on e-learning for the following reasons:

1) The finance industry is a fast developing industry, just like the information technology industry. People working in the financial market are required to enrich their profession-related knowledge and apply it in their daily work.

2) The banking industry already presents itself as being on a rather high level regarding e-learning applications in China. The banking industry is one of the earliest industries implementing e-learning systems in China. The Industrial and Commercial Bank of China (ICBC) and the Agricultural Bank of China constructed a web college in 2002, which was a predecessor of an e-learning system. The ICBC also won the 2012 award of excellence for their e-learning system.

3) E-learning in the banking industry develops real fast. For example, the demand for paid curricula in the banking industry ranks right after four rather general curricula (Management skills, Marketing skills, IT skills, Foreign language skills), it totals to 8% and therefore is well above other industries [1].

This survey is about the conditions and demands of enterprise e-learning and behavior preferences in e-learning. It enables us to combine the usage of enterprise e-learning and individual behaviors.

Based on the TAM and SDL theories, we employ the number of useful classes as a proxy variable for perceived usefulness, the preferences for enterprise e-learning as a proxy variables for perceived ease of use, and all of the learning habits, efficiency of learning, information channels, management of learning time and certificated cumulated professional knowledge as the proxy variables for self-directed learning level. An ordered logit regression model has been used to analyze the ordinal dependent variable. The results showed that the SDL level actually promotes the usage of e-learning while controlling the demographic factors. The findings can enrich the idea of e-learning applications and improve the e-learning utilization.

Th paper proceeds as follows: In Section II we present the literature review and our research hypothesis; Section III discusses the survey data and gives the descriptive statistics for key factors; Section IV is dedicated to the empirical analysis; Section V concludes the findings and suggests the possible content for future research.

II. LITERATURE REVIEW

Prior literatures mostly focused on the technological and the cognitional parts. Taking e-learning as a new technology,

research combined the cognition theory and the technology model in order to analyze the behavior and utility of e-learning. There are the theory of reasoned action (TRA) [3], the theory of planned behavior (TPB) [4], the technology acceptance model (TAM) [5], the model of personal computer utilization (MPCU) [6], Social Cognitive Theory (SCT) [7], the innovation diffusion theory (IDT) [8], the self-determination theory (SDT) [9]. The determinant factors include perceived usefulness, perceived ease of use, fun to use, system quality, information quality, service quality, self-efficacy, usability. The affecting factors concerning behaviors are individual use, continued use and habitual use. [10]

Reference [11] show that e-learning require a high level of self-discipline, which is often perceived as a disadvantage of e-learning. It enlightens our mind, we maybe use the theory in the adult education field to consider e-learning. In my opinion, factors based on the TAM should be rated lighter since the IT is into our daily life already and people have been familiar with the form of e-learning. SDL is a matching theory for our research. Allen Tough 1967 firstly provided a comprehensive description of SDL as a form of study [12]. SDL is the learning process of self-control, self-direction and self-management. The definition has different foci: Firstly, it is based on the learner's self-cognition, then it is a learning process of self-plan, self-management, self-direction. SDL system includes the following activities [13]:

- Setting one's own learning goals
- Identifying appropriate learning resources
- Selecting appropriate learning strategies
- Differentiating important parts from unimportant parts
- Integrating of material from different sources
- Time management
- Monitoring the achievements of learning outcomes

Therefore, TAM and SDL theories are the theoretical base of this paper. We employ the number of useful classes as a proxy variable for perceived usefulness, the preference of enterprise e-learning as a proxy variable for perceived ease of use, and all of learning habit, efficiency of learning, information channels, management of learning time and certificated cumulated professional knowledge as the proxy variables of SDL level. Thus, we hypothesize the following:

1) *H1*. Better learning habits should positively affect the utility of e-learning.
2) *H2*. More efficiency in learning leads to higher usage of e-learning.
3) *H3*. Better management of learning time should positively affect the utility of e-learning.
4) *H4*. More knowledge leads to more usage of e-learning.

The four hypotheses present the different scales of SDL levels. The first hypothesis and the third hypothesis relate strongly to self-planning and self-management. The other two put more weight on current level of skill and knowledge.

III. DATA

In this study we used the e-learning survey of bank customs managers, which was conducted by Tsinghua University Web Finance Research Center. The e-learning demand of on-the-job custom managers is most representative in bank. Two facts may be interpreted:

1) Facing customers directly require a custom manager to familiarize themselves with updated knowledge, updated information about the market, the industry and the economy.
2) Traditional training systems in China banking industries care more about senior executives and entry level staff. There is a gap between the above two. E-learning could fill the blank.

The draft of the questionnaire was first reviewed by two bank custom managers. Based their suggestion, we further revised the questionnaire. The formal version of questionnaire includes three sections: the demographic section, the conditions and demands regarding e-learning section, the individual behavior and preference of learning section. Disproportional stratified sampling and convenience sampling have been adopted. Taking the enterprise culture into consideration, the sample was allocated proportionally to the market share of the different bank ownership forms, and the interviewer could select the branch of bank and the interviewee arbitrarily. Finally we got 138 usable responses from 35 branches. The ownership structure matches basically with our pre-target goals: observations from stock-listed banks account for 34.78%, observations of state-owned banks 31.16%, observations of city commercial banks 17.39%, observations of foreign banks 7.25% and other banks 2.7%. More female (56.52%) responded to our questionnaire than male (43.48%). Average length of professional experience is 2.14 years, which is the most important stage for learning since most of them have finished the regular learning by the point.

IV. STATISTICAL ANALYSIS

A. Effectiveness of e-Learning

The question in the questionnaire, "For enterprise e-learning, which kind of case you belong to?", has three optional answer "Often used", "General used", "Rarely used". We take the answers to the questions as three different levels of efficiency measurement using online education system. The majority of respondents used online course in general, and which accounts for more than 56.62%. The respondents who choice "often used" or "rarely used" account for 19.85% and 19.12% respectively, which is roughly equal.

B. Analysis of Customer Manager Access to Information

In the information age, there are many information channels. For the question "how do you get financial information?", many custom managers get financial information through "financial website", accounting for 79.71%. The second channel is "newspaper, TV", which accounts for more than 57.25%. Only 23.91% respondents acquire financial information through their friends. It is worthwhile to note that 41.30% of respondents choice mobile devices to e-learning, which shows the trend of m-learning. M-learning has been accepted by more and more people because of convenience and flexibility.

C. Customer Manager Behavior Analysis of e-Learning

The questionnaire explored the behavior preference of custom managers in e-learning from time frequency in

e-learning, efficiency of e-learning, preference on e-learning mode, which will show the custom and level of self-directed learning.

TABLE I: VARIABLE DEFINITION AND DESCRIPTION

Var.	Variable Definition	Mean	Min	Max
Dep. Var.				
C2	Effectiveness of enterprise e-learning	2.01	1	3
Indep. Var.				
B1	Numbers of your information channels	2.91	1	6
B2	Times of learning per week	3.68	0	7
B3B	Whether or not learning in 10-30min per time	0.45	0	1
B4	Numbers of your time choices	1.52	0	3
B5A	Prefer learning via intranet or not	0.10	0	1
C22	Numbers of helpful classes in e-learning	3.67	0	8
D2	Professional experience	2.13	0.5	6
D3	Numbers of professional certificates	0.63	0	7
D8	Gender, 1 for male, 0 for female	0.45	0	1

The above analysis shows that custom managers are not very enthusiastic in e-learning, and in average they learn 2 times per week and no more than 60 min. each time. As for the e-learning time, they are more willing to learn on the mobile phone in the traffic way. But there are still almost 50% people like to learn in special time.

In case of preferred form of e-learning, most people choose mobile phone (61.59%). The facts show that m-learning is more convenient, more flexible than e-learning, and it will be future trends. The tablet computer followed secondly , accounted for more than 26.81%, and the enterprise's intranet thirdly.

Table I lists the variable definitions and description summary. The original questions in the questionnaire are listed in the appendix. Most of the people have 2-3 information channels, and they are learning 2-3 times a week, 10-30 minutes per time. A few of them have professional certificates, and they mostly do not like learning on intranet of the enterprise. We take B2, B3B, B4 and D3 as proxy variables for our hypothesis.

V. EMPIRICAL ANALYSIS

A. Regression Mode

Because the dependent variable is an ordinal variable, we used an ordered logit model for analysis.

$$P(Y_j > i) = \Phi(\theta_i - X\beta) = \frac{\exp(\theta_i - X\beta)}{1 + \exp(\theta_i - X\beta)}, \quad (1)$$
$$i = 1, 2$$

Y for dependent variable vector, *X* for independent variable vector, β as the coefficient vector, *i* represents cut-off point for the *i*th cumulative logit probabilities. As Table I showing, C2 is dependent variable and others are independent variables.

B. Regression Result

Table II shows the result of the ordered logit regression.

TABLE II: ODERED LOGIT REGRESSION RESULT

Variable	Coef.	Std. Err	Z Value
B1	-0.1484	0.1837	-0.81
B2	0.3154***	0.087	3.63
B3B	0.8433**	0.3964	2.13
B4	-0.2573	0.2909	-0.88
B5A	0.7467	0.6488	1.15
C22	0.0696	0.0788	0.88
D2	-0.0636	0.1214	-0.52
D3	0.4695*	0.2659	1.77
D8	0.1424	0.3736	0.38
Cut1	0.3017	0.8382	
Cut 2	2.7986	0.8820	
N	128		
LL	-111.98		

Note:*significant at 10%,** at 5%, ***at 1%

As the regression results show, the coefficients of B2, B3B, and D3 are statistically significant. Our hypotheses H1, H2, H4 have been supported. If someone add one time of learning per week, the probability of his "often use" will increase 7.7% ($1/(1+e^{2.7986-0.3154}) = 7.7\%$); if someone could learn effectively every time, the probability of his "often use" will increase 10.38% ($1/(1+e^{2.7986-0.8433}) = 10.38\%$); if someone has one certificate more, the probability will increase 8.93% ($1/(1+e^{2.7986-0.4695}) = 8.93\%$). So we find that better study habits, higher level of accumulation of knowledge, more efficiency in their daily learning, all lead to more efficient utilization of enterprise e-learning after controlling for gender, perceived usefulness, and perceived importance variable. Thus in order to improve the business efficiency and utilization of e-learning, we could improve staff learning efficiency in beginning, encourage and help staff to obtain occupation certificates, even organize the special activity for above. As well as staff has established a good SDL habit, the e-learning in enterprise will be more effective than before.

VI. CONCLUSION

Our study shows that, in the era of a knowledge economy, enterprise e-learning should be closely linked to the life-long learning of employee. The relationship between the two is not substitutable, but rather complementary. Higher level of self-directed learning, including higher learning efficiency, stronger learning abilities, should lead to more efficient usage of enterprise e-learning.

This paper simply analysis the relationship between e-learning in enterprise and life-long learning of individual based on survey data. The further research should design specially for information channels, or for interaction in e-learning to explore the details in SDL.

APPENDIX

A: Questions used in the study

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B1	Do You get finance information from: Books/Newspaper & TV /Financial website/Intra-enterprise train/Friends/Mobile carrier/Other(blank for filling)
B2	How often do you take on e-learning every week?
B3B	Do you spend 10-30 min. per time of e-learning?
B4	You could utility some time to e-learning, such as: Specific time/On traffic/Trivial times/Other(blank for filling)
B5A	Which carrier do you like when you do e-learning?
C2	For enterprise learning, which kind of case you belong to? Often use/General use/Rarely use
C22	What kinds of e-learning classes do help you?
D2	How long have you engaged in banking customer manager?
D3	Have you currently obtained certificate of? AFP/CFP/ChFP/CFA/CPA
D8	Your gender: 1 for male, 0 for female

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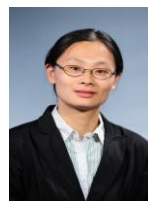
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