

The Satisfaction of Using the RFID Product among College Students

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ABSTRACT

The project was to understand the students' satisfaction of using the RFID technological product. The study was conducted at Hsing Wu College focusing on Department of Applied English students. The result indicated students accepted this product highly. Therefore, the college intended to revise and rebuild up a professional language lab and cooperate with Hai Ying Company to enhance learning English environment of students.

Hai Ying Company entered into making analysis and sale tactics to develop RFID product and to popularize the idea of application and to cultivate excellent human resource. Through study structure, questionnaire, data collection instruction, data analysis and interviews, most of the students acknowledged the features of safety and product function. But habit and willingness of using the RFID product should be raised. Some suggestions from seminars and interviews were proposed. It is recommended that the company clarify the usage of its product and prevail on students to use it by means of constantly pursuing stability of the product and developing new function to meet the needs of instruction and market.

INTRODUCTION

In the 21st century, an era with communication, if teaching language provides more interactive environment for both teachers and learners can hence students' learning motivation. Using the RFID (Radio Frequency Identification) oral and listening exam technology can combine school information with the RFID student identity card as the interface of reaction.

This special project is to focus on Hsing Wu College as a demonstration point. With a friendly guide interface, users would be able to spontaneously obtain information by RFID interactive reading. Through the management and hyperlink of network system students' learning records become a series of information. Hence, the superintendent can manage the matters more effectively and quickly.

Through this system, for instance, students can use language oral and listening exam technology to test English comprehensive ability by placing a RFID electronic tag at the student's identification card. In addition, students can take advantage of this set of computerized system, freely choose items, simultaneously render items to the exam, and then store the exam answers in the computer files with the time. In this way, teachers will reduce teaching disturbance on correcting the exam scoring card. Moreover, students may also use a USB interface on the mainframe and then review the content of the exam, course notes, and information anywhere or anytime. To the school, this system can manage the administrative staff, students can carry the test content and program with them, and teachers will be easier for management of teaching. The purpose of this study is to understand users' (students') satisfaction of the RFID potential product (RFID language oral and listening exam technology) and it can be used as a practical example for adjusting inner system and self-improvement to provide reference for Hai Ying Company and the education field.

LITERATURE REVIEW

In abroad, there are many worldwide developments of evaluation system for e-learning websites; hence, it has many different evaluation systems. According to Scott, Robert and Larry (2000) pointed out that the typical evaluation system on e-learning websites might focus on the "passing through the general Browser web pages." The users could distinguish the identity of the user based on cryptosystems automatically collecting, recording, and evaluating students'

grades such as Michigan State University's CAPA (<http://capa2.nsc1.msuedu/homepage/homepage/>) and WebCT (<http://www.webct.com/>). The evaluation system for e-learning websites could replace text-based test items and add other audio and video on the answer sheets. In order to increase the flexibility of test items, it could also increase the virtual or dynamic design by JAVA on the test questions.

Several studies stated WebCT to be a successful online course tool and students who were taking WebCT courses responded positively (Carey, 1999; Wernet, Olliges & Delicath, 2000). Basile and Daquila (2002) found that students who were comfortable with the internet reported positive attitudes towards WebCT course. Kendall (2001) reported that there was a higher correlation between using WebCT functions and the achievement.

In domestic, scholars offered the evaluation system for e-learning websites, and confirmed the feasibility, usability, and stability of the system (Moundridou & Virvou 2003). For example, Wisdom Master pro E-learning system of the National Sun Yat-Sen University developed Web-based teaching system (<http://cu.nsysu.edu.tw>). National Kaohsiung Normal University (<http://nu.ncku.edu.tw>) set up the distant teaching website. In addition, the Department of Biology of National Chunghua University of Education also offered the computer Web-based Assessment and Test Analysis System.

Since the 1980s, Taiwan has focused its effort on the integration of technology into learning (Tu, Twu, 2002). Web-based instruction and Distant Education have gained energy in Taiwan in the past decades. WebCT has been widely used in the United States, and Taiwan has developed of her own Wisdom Master Institutes of higher education.

RFID is developed by a local company in Taiwan, providing web-based teaching and tends to widen its market to the enterprise and the education field.

The present research investigated Taiwan students' attitudes towards the satisfaction of using RFID in English curriculum. So the cooperation between Hsing Wu College and Hai Ying Company was to promote e-learning environment and contribute its findings of Taiwan experience to the literature. The following is the development of RFID.

1. In 2007 Hai Ying Company researched and developed RFID language exam technology of the audio on demand.
2. In 2008 "RFID English Oral and Listening Test System" was the only enterprise to win the prize of "Wisdom Master RFID Tendency Cup."
3. On February, 2009 RFID was to upgrade into Touch Style, and there were three major parts of listening, oral examination of GEPT/TOEIC on "RFID Oral and Listening Test System".
4. On May, 2009 RFID English examination technology promoted the various visions in technology classroom; the teacher could use the radio program system to control teaching or class exam by various listening test technology. There was a platform of the General English Proficiency Test of listening, speaking, reading, and writing. It could be used for self-research of "RFID English Examination Technology."
5. On July 2009 RFID provided children with ASUS top computer to immediately test, record, listen, and show their grades.

METHODOLOGY

This study used investigation method through study structure, questionnaire, data collection instruction, and data analysis.

Study Structure

The study structure of this project was shown as follows:

Table 1: Users' Satisfaction

Users' Characteristics	Habit and willingness
	Function value
	Safety function
	Product function
	Basic hardware

Through SPSS, the analysis yielded five factors, consisting of 33 questions. Factor one was named users' habit and willingness with 9 questions 21, 22, 23, 24, 25, 27, 30, 31, 32. Factor two was named value function, including 5 questions 1, 2, 3, 4 and 5. Factor three was named safety function, including 6 questions 9, 10, 11, 12, 13, 29. Factor four was named product function, including 7 questions 7, 14, 15, 19, 26, 28, and 33. Factor five was named basic hardware, including 5 questions 6, 16, 17, 18, 20.

Participations

This study was conducted at Hsing Wu Technology College in Taipei County. Hsing Wu Technology College offers four-year programs, two-year programs for college students, and five-year programs for junior college students. The participants were from Hsing Wu students, most of whom were Department of Applied English, Computer Center and Hai Ying Company's programmers included. The study focused on the students who used the set of facility.

Questionnaire

The survey measured students self-reported level of satisfaction with the use of the RFID system product. The questionnaire consisted of 33 questions (see Appendix). For each item, students were asked to indicate their attitude on using the RFID product. The survey used Five-Point Liker scale with 1 as "Strongly Disagree," 2 as "Disagree," 3 as "Natural," 4 as "Agree," 5 as "strongly Agree."

The questionnaire was linked on Hsing Wu College website (http://lien.idv.tw:8080/rfid_test/q1.php). After using the RFID facility, students were asked to fill the questions to indicate their perceptions. The duration of investigation was from Aug.2009 to Nov.2009. There were a total of 256 copies, but crossing out 13 improper ones, there were 243 copies.

Data Collection Instrument

In this study, the questionnaire was conducted a statistical package for the Social Science (SPSS) for Window 12.0 and were quantified with (a) Item, (b) Factor, (c) Reliability and (d) Validity analysis.

Item Analysis

The questionnaire consisted of 33 questions. The relative coefficient between each item and total was -0.012~0.799. The eighth item was -0.012, which was low or zero relation, so it didn't reflect the degree of testers. The item was crossed out (Lin, 1999).

Factor Analysis

In factor analysis, the KMO (Kaiser-Meyer-Olkin) was 0.942. Above 0.9 showed that the suitability of factor analysis was marvelous.

Table 2: KMO Statistical Quantity Amount (Source from Lord 1980)

KMO 2	suitability of factor analysis
>09.0	marvelous
0.80~0.89	meritorious
0.70~0.79	middling
0.60~0.69	mediocre
0.50~0.59	miserable
<0.50	unacceptable

Reliability Analysis

In this study, reliability of the questionnaire was judged to be fairly reliable, with a reliability coefficient (runback's coefficient alpha) of 0.963.

The table is following to examine the consistency of each item measured

Table 3: Reliability Analysis of the Questionnaire

Component factor	Cranach's α	Total Cranach's α
Habit and willingness	0.944	0.963
Function value	0.896	
Safety function	0.885	
Product function	0.834	
Basic Hardware	0.873	

Validity Analysis

To determine the validity of the questionnaire, main component factor analysis was performed, validity analysis of each factor was 0.617 – 0.907, which indicated the questionnaire had validity.

Data Analysis Method

In this special project, after collecting useful the questionnaire, the questionnaire was conducted using SPSS and was quantified with descriptive analysis and average variance analysis.

Descriptive Analysis

Results was displayed by frequencies and percentages to describe different users' distribution, including sex, age, experience of using RFID, related English certification, learning group and learning system.

Average Variance Analysis

T-test and One-Way ANOVAs were performed to examine each component factor difference of different users. If there was difference, Schaffer method would be adopted to compare, with $\alpha = 0.05$ as standard to do the statistical test.

RESULT ANALYSIS AND DISCUSSIONS**Table 4: Demographic Profile (basic data description of Hsing Wu College participants)**

Variable		sample	%
Gender	Male	35	14.81%
	Female	207	85.19%
Age	18(under 18 included)	127	52.26%
	19(above 19 included)	116	47.74%
Experience of using RFID	Yes	31	12.76%
	No	212	87.24%
Certification	Yes	119	48.97%
	No	124	51.03%
Learning group	Humanities and social science and others	218	89.71%
		25	10.29%
Learning system	Four-year technology college	87	35.80%
	Five-year junior college	156	64.20%

The following were the result discussions of participants, average number and standard deviation.

1. Gender

From the above report on the RFID system, the questionnaire was completed by 243 students, including female 207, male 36. Female was 85.19% of all the 243 students; male was 14.81%; apparently, the majority of the participants were female.

2. Age

Table showed that 127 students (52.26%) were under 18 years old; 116 students (47.74%) were above 19 years old. According to statistics, the participants were about 14-25 years old.

3. Experience of using RFID

212 students (87.24%) had no experience of using RFID; 31 students (12.76%) had experience, so most of the students had no experience of using RFID.

4. Certification

51.03% of the non-related certification students surpassed 48.9% students with English related certification, so almost two of groups were fifty percent respectively.

5. Learning Group

In Humanities and Social Science learning group, there were 218 students (89.71%); the others including students of Department of Business Management, Tourism and Technology were 25 students (10.29%). The experiment was held by Department of Applied English. So the students of Department of Applied English exceeded in the others.

6. Learning System

From the table mentioned, there were 156 (64.2%) of five-year junior college students, and 87 (35.8%) of four-year technology college students.

Average Number and Standard Deviation

The average number of the whole participants was 3.241; standard deviation was between 0.784 and 1.337. As to item 14 "I think the interface words of RFID are clear and moderate." ($\mu=3.617$), which indicated the best satisfaction to the product. As to item 19 "I think the reaction time of operating RFID was very quick." ($\mu=3.588$). Although it was next, participants felt affirmative to this product. As to item 30 "On the whole, the RFID meets my expectation." ($\mu=2.695$), which was lowest part. So the participants anticipated great improvement to RFID. Of all the components, product function was the best ($\mu=3.480$), next was safety function ($\mu=3.374$), basic hardware ($\mu=3.267$), function value ($\mu=3.234$), users' habit willingness ($\mu=2.954$). μ is under 3 meaning lower satisfaction.

Table 5: Satisfaction of Each Component

Component	Natural(3 scores)	Agree (4 scores)
Habit and willingness	58.68%	7.85%
Function value	73.97%	24.79%
Safety function	80.58%	24.79%
Product function	85.13%	26.86%
Basic hardware	76.45%	26.86%

From table 5, 58.68% to 85.13% of students showed no satisfaction or had no opinion about RFID. On the other hand, 7.85% to 26.86% of students showed high satisfaction about RFID.

In order to enhance the students' willingness of using RFID, the school and the company should promote its product more. Prevailing on students to use the product and strengthening technique to the product should be indispensable so that students would be willing to practice and operate RFID.

CONCLUSIONS AND SUGGESTIONS

After using and analyzing, the majority of students acknowledged the features of safety and product function. And the result showed the satisfaction to the value of RFID. However, students' habit and willingness of using RFID should be enhanced. Therefore, it is recommended that the company should clarify the usage of its product while promoting. Besides, a good set of Web-based Assessment and test Analysis System should be requested to be stable and convenient on students' and teachers' interface.

After seminars and interviews with specialists, counselors, and programmers, some suggestions are given for future development:

1. Increase control system to avoid substituting for others as examinees.
2. Restore individual learning data through internet to make users review simply.
3. Use Content-Oriented Intelligence (Devedzic, 2003) to make test system solve complicated assessment problems.
4. Increase guide reading model to make users gain multiple learning styles.
5. Offer after-sales service to bring more consumers and to enhance better quality of product.
6. Combine fashionable learning certification to irritate students' learning interest and go into the market fast.

7. Maintain the stability of product and development of new good function to anticipate meeting the market needs.
8. Accompany every kind of media, magazines, websites and newspaper to increase prevalence and to open up their enterprise.

It is hoped that the cooperation between Hsing Wu College and Hai Ying Company can be used a useful example to provide students with better learning English environment.

Questionnaire

Please read each statement and indicate the extent to which you agree or disagree, with 5 being strongly agree and 1 being strongly disagree. Using the following scale circles your response, after operating the RFID machine.					
	1-Strongly Disagree	2-Somewhat Disagree	3-Neither Agree Nor Disagree	4-Somewhat Agree	5-Strongly Agree
Usefulness of consciousness					
1. I feel language oral and listening test machine increases the technique of RFID and can save much more time.	↓ 1	↓ 2	↓ 3	↓ 4	↓ 5
2. I feel the test machine can increase the technique of RFID and can enhance the efficiency of test process.	1	2	3	4	5
3. I feel the test machine increases the technique of RFID and can improve the quality of test process.	1	2	3	4	5
4. I feel the test machine increases the technique of RFID and can reduce the chance of wrong information.	1	2	3	4	5
5. I feel the test machine increases the technique of RFID and can make me acquire more complete information.	1	2	3	4	5
Feasibility of Consciousness					
6. I feel the interface usage of the test machine is clear.	1	2	3	4	5
7. I feel the instruction of operating the test machine is clear and easy to understand.	1	2	3	4	5
8. I think the operational steps of the test machine is complicated.	1	2	3	4	5
9. I think using the test machine can acquire information and service that I want any time.	1	2	3	4	5
Risk of Consciousness					
10. I think using RFID technique can make individual data protected more safely.	1	2	3	4	5
11. I think using RFID technique can keep past historic files and do not lose them easily.	1	2	3	4	5
12. I think using RFID technique can make sure individual information can't be changed and revised.	1	2	3	4	5
13. I think using RFID technique can reduce the fault done by people because of carelessness.	1	2	3	4	5
System Quality					
14. I think the interface words of RFID are clear and moderate.	1	2	3	4	5
15. I think the broadcast voice of RFID is clear and moderate.	1	2	3	4	5
16. I think the interface of RFID is beautiful.	1	2	3	4	5
17. I think the process of operating RFID machine is fluent.	1	2	3	4	5
18. I think the function of operating RFID is complete.	1	2	3	4	5
19. I think the reaction time of operating RFID is very quick.	1	2	3	4	5
20. I think the stability of RFID is good	1	2	3	4	5
Attitude of Using the Machine					
21. I like to take part in the test by using RFID machine.	1	2	3	4	5
22. Using RFID test can increase the willingness of learning	1	2	3	4	5
23. I am willing to recommend RFID machine to others.	1	2	3	4	5

24. I will accept to use RFID test machine because of the effect of news report or advertisement.	1	2	3	4	5
25. I will accept to use RFID machine because most of the people around use it.	1	2	3	4	5
Satisfaction					
26. I think the test subject of RFID language oral and listening test machine meets my needs.	1	2	3	4	5
27. I think the consulting channel of RFID is convenient and can solve the perplexity.	1	2	3	4	5
28. Totally speaking, I think using RFID language test machine is convenient.	1	2	3	4	5
29. Totally speaking, I think using RFID language test is safe.	1	2	3	4	5
30. Totally speaking, using RFID machine is satisfactory.	1	2	3	4	5
31. Totally speaking, RFID test machine meets my expectation.	1	2	3	4	5
32. Totally speaking, that the school advocates RFID test is a good strategy.	1	2	3	4	5
33. I think acquiring professional English certification is helpful to finding future jobs and advanced study.	1	2	3	4	5

REFERENCES

- Basile, A. & D' Aquila, J. M. (2002). An experimental Analysis of Computer-Mediated Instruction and Student Attitudes in a Principles of Financial Accounting Course. *Journal of Education for Business* 19, 325-346.
- Carey, S. (1999). The use of WebCT for a highly interactive virtual graduate seminar. *Computer Assisted Language Learning*. 12, 4, 371-380.
- Devedzic, V. B. (2003, Aug). Key Issues in Next-Generation Web-Based Education. *IEEE Transactions On Systems, Man, And Cybernetics-PART C: Applications And Reviews*, 33(3), 339-349.
- Kendall, M. (2001). Teaching online to campus-based students: The experience of using WEBCT for the community information module at Manchester Metropolitan University. *Education for Information* 19, 325-346.
- Lin, C. S. (1999) Psychology and Education Statistics. Taipei, Tung Hwa Book Store.
- Lord, F. M. (1980). Applications of Item Response Theory to Practical Problems. Hillsdale, N. J.: Erlbaum Publishers.
- Moundridou, M., & Virvou, M. (2003). Analysis and Design of a Web-Based Authoring Tool Generating Intelligent Touring Systems. *Computer & Education*, 40, 157-181.
- Scott W. Bonham, Robert J. Beichner, and Larry Martin (2000). Education Research Using Web-based Assessment Systems. *Journal of Research on Computing in Education*, 33(1), 28-43.
- Tu, C. & Twu, H. (2002). Educational Technology in Taiwan. *International Council for Education Media* 39(2), 153-163.
- Warnet, S.P.; Olliges, R. H.; Delicath, T. A. (2000). Post course Evaluations of WEBCT k Students. *Research on Social Work Practice Statistical*.