Proceedings Manuscripts Needs Analysis of E-commerce Course for Practical Application –
Use of BNAM to Discuss Cognition after Learning

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Abstract—E-commerce went through a period of rise and decline, it stuck the .com trend during the times of so-called Internet Bubbles. Recently, the application of e-commerce fuses into the operation of every industry gradually, its re-rise situation is apparent; with the rise and development of industry, the academia also makes every endeavor on fostering relevant talents, and then every university establishes e-commerce course, even some universities directly establish e-commerce department or graduate school of e-commerce.

This study focuses on the students who have studied relevant courses of e-commerce and questionnaire investigation would be carried out on them, and BNAM (Borich Needs Assessment Model) is used to carry out needs analysis; a revised BNAM is proposed in the study, and the two models would then be compared and analyzed; based on this result, one can find out which course has higher needs and which course has lower needs in the practical application.

In this study, the questionnaire refers to Liang’s study in 2000 [1] as the foundation and domestic and international relevant documents as the auxiliary, and the course information from domestic universities is also collected so as to form the questionnaire. The study object is the employed person who has graduated from the department of information management or department of business administration of domestic university within the past two years, and he /she has also studied the relevant courses of e-commerce. There are 161 completed and valid questionnaires in total.

The study result shows that the interviewees think technological courses are important. From the top 10 courses with higher BDN value, technological courses account for at least 7 places, while everybody attaches importance to the question of information security. In addition, interviewees also address the importance of law issue when understanding relevant courses.

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Keywords— electronic commerce, curriculum, needs assessment, BNAM (Borich Needs Assessment Model)

I. INTRODUCTION

Although experiencing Internet Bubbles in 2000, the operation form of e-commerce gradually brings benefits to enterprises and companies after 2004, and general consumers can also experience the convenience that e-commerce has brought. In addition, the operation model of global enterprises adopting e-commerce technology grows up actively, and new operation model of Internet even pours new vigor into global economy [2].

Just when e-commerce has been developing fiercely in 1999, organizations that cooperatively and actively trained up talents also came with the tide of fashion. The surprising development of e-commerce education was almost as surprising as e-commerce’s development, while education was the most obvious among e-commerce education [3]. Because in 1999, not only the .com companies in U.S.A. but also all enterprises, medium- and small-scale companies also looked for graduates with e-commerce ability actively [4]. Before 2000, when enterprises needed e-commerce talents badly, the academia was unable to offer relevant talents and courses in time [5][6]. Studies pointed out the contract salary of e-commerce graduate from MIT Sloan was 1.5 times of the contract salary of general finance or marketing graduate in 2000 [7]; the relevant e-commerce courses from University of Chicago and University of California attracted many students to take. While the academic organizations actively studied how to develop e-commerce, they also recognized how urgent the business circles needed e-commerce talents, so they cooperated and developed education of e-commerce talents actively, and thus relevant courses for e-commerce have been opened.
Although e-commerce is namely another link of technical application of information management, the fact that it uses applied theory to lay all over the enterprise’s entire operation model makes the training of e-commerce talents become more complicated [7]. The development of e-commerce courses cooperated with the relevant department of information management to give a course in the early stages, it slowly develops into a single course [1], even though some scholars pointed out that the courses and academic degrees of e-commerce did not need to be planned or established independently, most of the scholars proposed that the development of e-commerce should be more specialized [8][9].

II. Literature Review

A. Laudon’s definition for e-commerce

Laudon’s definition for e-commerce is to utilize Internet and web to carry out the commercial transaction, and commercial transaction refers to the behavior of using value in exchange (such as money) to get product or service in return between organizations or individuals; without value in exchange, any commercial behavior would not been produced [10].

With regard to the transaction form of e-commerce, one can understand it further from the viewpoints that have been proposed by two scholars. Turban (2000) classifies e-commerce into seven kinds in accordance with the transaction target, which includes Business to Business (B2B), Business to Consumer (B2C), Consumer to Consumer (C2C), Consumer to Business (C2B), Non-business EC, Intra-business EC and others [11].

Besides, Rappa (2000) regards the function of websites to distinguish e-commerce, which includes (1) brokerage, (2) advertising, (3) infomediary, (4) merchant, (5) manufacturer, (6) affiliate, (7) community, (8) subscription, and (9) utility [12].

B. Areas of Study for E-commerce – A Deep and Wide Knowledge

The foundation of e-commerce includes information technology and management technology, it does not only have simple technological question or management problem; constructing website is only simple technological problems, and e-commerce involves problems such as Commercial Flow, Logistics, Payment Flow, and Information Flow; however, without websites, e-commerce does not exist. Therefore, the areas of e-commerce are very extensive, it is mainly based on information technology, with enterprise’s management method to reach the commercial transaction in order to obtain profits.

Fusilier and Durlabhji’s study (2003) divides e-commerce courses into four big categories, including class of course e-commerce, including commercial technology management, non-technical e-commerce, technological e-commerce, and information technology [7]. One can know that learning e-commerce completely involves general information technology such as data communications, user interface design, software and program; it also involves technology of management, for instance: Management of operations and supply chain, plan of enterprise resources, and financial affairs; and it involves the particular relevant technology of e-commerce including e-commerce marketing, e-commerce business strategy, and system development.

In practice of e-commerce, Luan and Luo divide e-commerce into six classes, including commercial flow, logistics, payment flow, information flow, design flow, and service flow [13]. In Davis’ study (2003), it regards professional manpower of e-commerce to consider the needs of e-commerce and divides the needs into two classes, including operation management and information technology. For operation management, its need is non-technological-oriented, and the manpower of this part relatively needs general managerial staff, such as operational analyst, enterprise administrator, management consultant, and other personnel [14]. For the manpower needs in information technology, it involves professionals in information technology, including Internet database, Internet planning, website design, website management, and manpower for relevant technical support.

C. Studies About E-Commerce Courses

Relevant studies that focus on e-commerce courses are uncommon domestically and internationally. The discussion that Liang and Li proposed in 2000 in accordance with the courses of information management was the main domestic study, this study also compared and discussed with the e-commerce courses in America, England, and Australia. Since Taiwan did not have any planning for e-commerce course at that time, the main method of learning relevant courses was taking the information management courses that were closely linked with e-commerce [1] (There are nearly 103 information management departments domestically at present). After six years, e-commerce courses have been opened in many universities in Taiwan. Inquiring through Internet, this study finds out about 75 schools have e-commerce courses; the data from Ministry of Education regarding the statistics of national institutes and universities in 2006 shows that there are 3 graduate schools of e-commerce and 6 e-commerce departments. After six years, the institutes and universities in Taiwan open relevant e-commerce courses in a great deal, which is such a big change. The study from Fusilier & Durlabhji (2003) also finds out e-commerce courses in U.S.A. grow considerably after 2000 [7], so this study believes that it is necessary to study it again.

On the other hand, Chang and Li (2005) focus on e-commerce courses and compliance of industry needs to compare and analyze, they understand the supply of e-commerce professionals through the study on e-commerce courses from top commerce schools in U.S.A. and universities in Taiwan, and they also confirm the needs of e-commerce talents through studying famous recruitment websites in U.S.A. and Taiwan, so as to compare the differences between them. Among them, the gap of management supply and demand in Taiwan is that there is a lack of Internet marketing personnel and general managers are more sufficient. For the gap of management supply and
demand in U.S.A., it is seriously insufficient of ERP/CRM/EAI consultants but there is an excess of marketing manpower. For the gap of technology supply and demand in Taiwan, it is seriously insufficient of JAVA and object-oriented programmers, but there is an excess of technology support. For the gap of technology supply and demand in U.S.A., there is an excess of information technology personnel, but it is insufficient of JAVA and object-oriented programmers [15].

He, Li, and Liang (2004) regard content analysis to discuss the credits and different types of new courses for e-commerce in Taiwan’s universities, this study collects the data from e-commerce courses of 16 universities in Taiwan, its analysis finds out the difference of total credits is not significant, and the total credits that private schools require are more than public schools, and management courses are significantly more than technology courses [16].

The course study that is carried out by Durlabhji & Fusilier with regard to 67 graduate schools of business management in U.S.A. points out that the new course emphasis should be placed in non-technological courses, and e-commerce course should be blended with every kind of course, namely in each management specialized field, e-commerce will become a subsidiary course but not the major course [17]. In addition, the e-commerce course discussion that Fusilier & Durlabhji carried out in 2003 with regard to bachelor degree courses in America’s universities, master courses in North America, and foreign master courses pointed out although e-commerce began to be bubbled in 2000, the e-commerce courses in school grew dramatically; it also found out bachelor degree courses in America’s universities and foreign master courses laid particular stress on technological courses more, while master courses in North America did not focus on technological side that much [7].

In addition, with regard to the content of course, Etheridge, Hsu & Wilson carried out study of e-commerce course for AACSB of U.S.A., their study analyzed the course planning of 77 departments and classified them into four categories, including MS, BS, NDC, and MBA. The course planning of MS, NDC, and MBA focuses on marketing field, while the course planning of BS focuses on the basic introduction of e-commerce [18]. King, Frank & Platt obtained the teaching programs of 65 types of e-commerce courses from WWW of 47 schools to carry out the study, they found that most of the courses are divided into different levels and 1 to 4 course materials have been used, but there are not many courses focusing on a single subject for in-depth discussion, for example, e-payment system, security problem, and enterprise operation model [19].

D. Cognition and Needs from Industrial Circles towards E-Commerce Courses

The rise of e-commerce has not merely offered another way for enterprise management, it also brings impact to the educational circles because educational circles need to provide what is demanded by the circle timely; and whether the courses and training that are provided by the educational circles are tallied with the manpower needs of circles is the subject that deserves to be discussed.

The academia provides courses, teachers, and education to training talents of e-commerce so as to foster the manpower that fits in with the enterprise’s expectation; in fact, after the enterprise receives the graduates from school, whether the graduates’ knowledge and abilities can meet the professional ability that enterprise requires or not.

This study would regard BNAM (Borich Needs Assessment Model) that was announced by Borich in 1980 as the method of evaluating course needs, this method has already been applied successfully to the educational circles and business circles [20]. The basic method of this model is to carry out investigation towards students who had taken relevant courses; first, questionnaire concerning the understandability towards course would be carried out, and then questionnaire regarding the cognition towards the course’s importance would be undertaken; next, the numbers from these two questionnaires would be transformed into formula and thus Borich Discrepancy Number (BDN) has been obtained; finally, the one with higher BDN value would be the course that has larger needs.

Lu & Mille (2002) made use of BNAM to investigate the knowledge, importance, educational needs of teaching skill, and comparison of teachers’ cognition from the teachers in Ohio’s and Taiwan’s institutes of technology [21]. Edward (1999) inquires teachers’ behavior on 163 teaching abilities and their training needs on each ability through the electronic questionnaire, the result is then arranged in order [22]. Next, the second questionnaire is carried out, teachers are asked to arrange the importance of these abilities in order, and then Borich’s Needs Assessment Model-Mean Weighted Discrepancy Score (MWDS) is used to carry out ranking study. In Garton’s study (1996), it uses Borich’s Needs Assessment Model to find out 12 agriculture teachers who only teach 1 or 2 years in Missouri of U.S.A. from 50 specialized abilities to carry out questionnaire investigation, trying to find out the most necessary training need in agricultural teaching and the prioritized order of needs. Besides, Waters & Haskell (1989) utilize BNAM to attempt to find out the training needs of the teaching and administrative staff of agriculture cooperative society [23]. Newman & Johnson (1994) also utilize this method to carry out study to the training needs of agricultural pilots [24]. Scholars such as Thompson & Balschweid (2000) [25], Edwards, Briers & Rohs (2004) [26], and Ricketts (2005)[27] have ever used this method to carry out the study of teaching needs.

E. The Interpretation of BDN Analytical Method

The analytical method makes use of suggestion investigation to allow participants bring up their opinions and ideas. In the questionnaire, a certain course is proposed and workers of the industrial circles answer the importance of course and their understanding level towards the course. The calculation of BDN is to subtract the understanding level towards course from the importance level of course, and the obtained difference is multiplied by the importance of course, namely $BDN = (Average\ of\ course\ importance - Average\ of\ teachers'\ cognition) \times (Total\ credits\ of\ course)$. For the gap of technology supply and demand in Taiwan, the analysis finds out the difference of total credits is not significant, and the total credits that private schools require are more than public schools, and management courses are significantly more than technology courses.
average of course understanding) * average of course importance. Papritan (1985) explains its content, a high negative number shows that the course is very enough; while a high positive number shows that the course at that time is needed very much, but the course is not enough [28]. For example, if one subject is JAVA design program, the people being investigated thinks that their understanding level towards the content of this course is 1, and they think the important level of this course is 4, BDN = (4-1)*4; BDN = 12, this value shows that the JAVA course is important and the quantity of relevant new courses must be increased.

F. Blind Spot and Modification of BNAM

In Borich’s original BNAM, the questionnaires are divided into two parts, the first part is the understanding level towards that course and another part is the importance level of that course, and then formula is applied to calculate out their BDN values. The blind spot among them is that if this interviewee does not understand about a certain course at all but uses his/her subjective ness to presume that course is very important, and then contradiction would be produced. In this study, the course range of e-commerce is quite extensive, so not all interviewees who have taken e-commerce courses can understand all of the courses, so this study puts forward the simple improvement method to this problem, namely certain course with “0” understanding level in the questionnaire would be deleted. The questionnaire does not especially state this method hoping that the interviewees can fill out the questionnaire in accordance to personal cognition. This can eliminate the deviation that is produced by total unfamiliarity towards that course.

III. STUDY METHOD

A. Study Framework

This study is carried out in the method of questionnaire, and then the original BNAM and modified BNAM are used for analysis. Next, comparison between two models would be carried out. Finally, this study hopes to understand the cognition and needs for e-commerce courses in practical work after university graduation. The study framework is shown as follows:

Chart of Study Framework:

![Chart of Study Framework](image)

B. Study Object

The study object is the employed person who has graduated from the department of information management or department of business administration of domestic university within the past two years, and he/she has also studied the relevant courses of e-commerce.

C. Study Model

The Borich Needs Assessment Model (BNAM) that was announced in 1980 by Borich is used as the method of evaluating course needs, and Borich Discrepancy Number (BDN) from the method would be used to carry out analysis. Besides, this study also proposes a modified BDN to further compare, because the first part in the questionnaire is the understanding level of this course, if understanding level is 0, showing that this student does not have concept towards this course at all. The reason that this situation would happen is because the involved area of e-commerce courses is quite extensive, some interviewees would have no concept to some courses. Therefore, the modification method is to delete the items that show no concept towards that course and compare again after re-calculating the BDN value.

D. Analysis of Reliability and Validity

According to Wortzel (1979), Cronbach’s $\alpha$ value which lies between 0.7 and 0.98 is considered as high reliability, while under 0.35 should be refused to use [29]. This study also adopts Cronbach’s $\alpha$ coefficient for analyzing and testing reliability, when the expected value of Cronbach’s $\alpha$ coefficient is more than 0.7, then it is acceptable. For validity, it refers to the validity level of questionnaire, namely the level that can truly measure the variable’s nature. In general, validity includes content validity, criteria related validity, and construct validity [30]. The questionnaire of this study has been tested and verified by Wu and Li in 2008 when carrying out relevant study for e-commerce courses, thus the problem of validity does not exist [31].

E. Design of Questionnaire

71 relevant courses of e-commerce that are proposed by Wu and Li in 2008 are used as the questionnaire; this questionnaire refers to Liang’s study in 2000 as the foundation and domestic and international relevant documents as the auxiliary, and the course information from domestic universities is also collected so as to form the questionnaire.

The contents of the questionnaire is divided into two big classes, which are technological course and management course, there are 10 technological courses and 21 management courses, and 71 courses have been distinguished in total. In the questionnaire, each course represents a question, and each question is divided into two parts, which are “knowledge level” and “importance”, each part has 5 choices which are shown as follows:

Knowledge level – 0 represents very unfamiliar with; 1 represents not quite familiar with; 2 represents quite familiar with; 3 represents familiar with; 4 represents very familiar with.
Importance of course - 0 represents very unimportant; 1 represents not quite important; 2 represents quite important; 3 represents important; 4 represents very important.

IV. STUDY RESULT

Questionnaire Distributing Object and Retrieval

The implementation of this study questionnaire is carried out through Internet; 164 questionnaires have been collected in total. And also, after sifting the contents of questionnaire’s answers, the questionnaires from three interviewees who have exactly the same answers are considered as invalid, thus there are 161 valid questionnaires in total.

The object of questionnaire is the personnel who has graduated from the department of information management or department of business administration of domestic university within the past two years, and has basic knowledge towards e-commerce.

A. Data Statistics and Analysis

- Analysis of Reliability and Validity

First of all, this study focuses on every questionnaire to carry out reliability and validity analysis, item total correlation coefficient and Cronbach’s α value are adopted to test the internal consistent reliability of each dimension and view the clustering effect between variables, and Cronbach’s α coefficient is used to test the internal consistency between each factor; the greater the α value, showing that the correlation between each department within that factor is greater, namely internal consistency is greater, Cronbach’s α value must be greater than 0.6. The purpose of using item to total correlation coefficient is to confirm a variable belongs to the core content of a certain dimension, its value must be greater than 0.5.

The reliability analysis that is carried out by this study shows that the α value of reliability of each course’s variable is greater than 0.98, and the α coefficients of three overall tables are 0.9847, 0.9854, and 0.9866 respectively.

- Statistical analysis of Questionnaire Data

Course importance analysis for original BNAM and modified BNAM:

*The top 10 ranks with higher BDN average value*

This part finds out after students finish school and get a job, the importance of which relevant course is higher and is needed to be added. The study first uses the values that are obtained from the questionnaire to carry out the calculation of BDN value, and then the average value of all BDN values would then be calculated. Next, the calculation of BDN value of modified BNAM would be undertaken, first regardless of the cognitive importance, any item with 0 familiarity level towards that course would be deleted, and then the average value of all BDN values would be calculated.

Among all 71 courses, the top 10 courses with the highest BDN average values and the top 10 courses with the lowest BDN average values from both calculations would be found out so as to compare them at last.

In the top 10 courses of original BNAM, everybody thinks technological courses are more important, there are 9 technological courses rank the top 9 places, in which information safety department has 3 places, taking the first, second, and fifth places; it is thus clear that the problems about information safety is important. For the others, only one e-business administration course belongs to management course. Since mobile network is the future trend, thus importance has been placed on a mobile network programming course. The result is shown in Table I. as follows:

<table>
<thead>
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<th>Table I. THE TOP 10 COURSES WITH HIGHER ORIGINAL BDN VALUES</th>
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</table>

Source of the materials: This research.

From the top 10 courses of modified BNAM, there are 7 technological courses, among them information safety department has the top three places, thus importance is placed on safety problems even more by someone who understands information safety course. In addition, the more special finding is that the law problem is also valued by someone who understands information safety courses, two courses ranks the fourth and sixth places. The e-business administration from management courses ranks the tenth place, which is the same as the one in original BDN. The result is shown in Table II. as follows:

<table>
<thead>
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<th>Table II. THE TOP 10 COURSES WITH HIGHER MODIFIED BDN VALUES</th>
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</table>

Source of the materials: This research.

From the comparison of the two above-mentioned tables, technological courses only have 29 items, while management courses have 42 items, but everyone thinks that technological courses are important in e-commerce, at least 7 courses rank the top 10 places; especially
information safety department, everybody places the most importance onto three relevant courses. Another interesting situation is the law problem, someone who at least understands information safety courses thinks that it is considerably important, two courses ranks the fourth and sixth places; even though most of the people ignores the law problem, but someone who understands information safety courses thinks this problem is relatively important.

The top 10 courses with lower BDN average values

Lower BDN values means that after students finish school and get a job, they think the importance of a course is lower and relevant course can be considered to be decreased.

In original BNAM, significant comparison is shown between the top 10 courses with lower BDN average values and the top 10 courses with higher BDN values; there is only one technological course, which is animated website design. Generally speaking, animated website is considered as entertainment website but not e-commerce website. There are 3 items in relevant courses of business administration, there are closer to the tope 10 lower BDN courses, interviewees think that enterprise relevant courses can be adjusted and reduced. The result is shown in Table III. as follows:

<table>
<thead>
<tr>
<th>Table III.</th>
<th>The top 10 courses with lower original BDN values</th>
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<td></td>
<td>Course</td>
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<td>1</td>
<td>Introduction to business management</td>
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<tr>
<td>2</td>
<td>Decision support</td>
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<tr>
<td>3</td>
<td>Knowledge management</td>
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<td>4</td>
<td>Information and society</td>
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<tr>
<td>5</td>
<td>Information ethics</td>
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<tr>
<td>6</td>
<td>Animated website design</td>
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<tr>
<td>7</td>
<td>Business process reengineering</td>
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<tr>
<td>8</td>
<td>Topics in e-commerce</td>
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<tr>
<td>9</td>
<td>Advanced business management</td>
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</tbody>
</table>

For modified BDN values, there is only one technological course, which is also animated website design. Mobile multimedia studies ranks the fourth place, what is quite interesting is that m-commerce is generally acknowledged as one of the commercial trends in the future, and mobile multimedia should be a focal point of development as well, but interviewees think it is not important; thus, it is a topic deserves to be discussed. The result is shown in Table IV. as follows:

<table>
<thead>
<tr>
<th>Table IV.</th>
<th>The top 10 courses with lower modified BDN values</th>
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<tbody>
<tr>
<td>1</td>
<td>Basic courses of business administration</td>
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<td>2</td>
<td>E-commerce introduction</td>
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<tr>
<td>3</td>
<td>Other business administration courses</td>
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<tr>
<td>4</td>
<td>Mobile multimedia studies</td>
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</tbody>
</table>

Comparing Table III and Table IV, one can fine that they have the same top three places, basic courses of business administration, e-commerce introduction and other business administration courses are not too important, other courses such as animated website design and knowledge management also rank in the top 10 places.

V. CONCLUSIONS AND SUGGESTIONS

This study regards e-commerce course from the demander’s position, and questionnaire is used to investigate the demander’s cognition so as to find out more important and less important courses.

The study result finds out interviewees think that technological courses are more important, it is thus clear that technological courses take at least 7 places from the top 10 courses with higher BDN values; among which everyone places importance on the information safety problem that almost takes the first three places, maybe the academia can refer to this result to plan more relevant courses of network safety. In addition, interviewees who understand information safety courses thinks the law problem is important, thus courses that strengthen law problems may also increase.

Similarly, courses with lower BDN values deserve to be discussed as well, they have strong comparison with higher BDN value situation. In the courses with lower BDN values, management courses take nine places in the top 10 courses, especially relevant business administration courses and e-commerce introduction, perhaps these courses lay particular stress on the theory, and interviewees think that they are less important, the academia can condense the relevant courses. Other relevant courses such as animated website design and knowledge management deserve to be discussed as well.

Besides, there are some interesting problems, such as m-commerce. Perhaps its relevant application is still a dispute for everyone nowadays, one of the mobile multimedia courses is considered as not important, and maybe the application of m-commerce is unable to make interviewees feel its importance in the real life.

E-commerce courses are extensive and complicated. This study focuses on practical users and carries out investigation, and original BNAM (probably the subjective and perceptual method) and modified BNAM (probably objective and rational method) are used to carry out analytical study. With regard to relevant demanders, maybe the academia can plan courses from the perspective of practice, so that the learners can concentrate their attention on the practical side in order to provide more choices for the needs on the technological ability of e-commerce.

Source of the materials: This research.
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