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Active Learning of E-Commerce: A Case Analysis of Online Auction Game

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Abstract

This paper describes a simulation exercise that allows business students from two tertiary institutions, namely The Hong Kong Institute of Education (HKIEd) and The Hong Kong Polytechnic University (PolyU) to learn a particular domain of E-Commerce – online auction. Results of student evaluation of the online auction game were analyzed within the same group and across groups. The results indicated that students from two tertiary institutions like to learn the on-line auction using simulation approach, which is one of the active learning strategies that have been used in the two institutions. We have found that business student teachers from HKIEd, who are better equipped with pedagogical knowledge and skills, tended to rate the online action game (OAG) higher than their PolyU fellows in a number of areas. The favorable comments from the pre-service teachers are informative and conclusive. In this case, simulation approach in teaching and learning online auction has proved itself to be effective. It is believed that active learning strategies such as simulation game should be adopted to maximize learning effects in various E-Commerce domains.

Keywords: Learning and teaching of E-Commerce, simulation, active learning, online auction

1. Introduction

Online auction business has emerged as a huge E-Commerce business sector. The leading market player in this business is eBay Inc. The company alone recorded consolidated net revenues of $3.27 billion in 2004 (eBay Inc. 2005). It becomes clear that it is essential for E-Commerce students to understand how online auction is conducted. Online auction is characterized by the high level of interactions among one seller and many buyers. Such a one-to-many relationship is complicated in nature and typically requires an effective use of strategies. In this regard, traditional textbook approach may not be enough to allow students to truly comprehend the essence of online auctions. Thus, supplementary teaching aids such as simulations should be considered to enhance learning and teaching experience.

This paper describes an E-Commerce simulation game carried out at two Hong Kong tertiary institutions, namely The Hong Kong Institute of Education (HKIEd) and The Hong Kong Polytechnic University (PolyU) for undergraduate business students. The results of the evaluations were compared within the same institution and between the two institutions. Both groups of students share a number of similarities. Yet, they differ primarily in two aspects. First, the career goal of the majority of PolyU students is to become business practitioners, while that of HKIEd students is to succeed in becoming business teachers in secondary schools. Second, the academic training of PolyU students emphasizes more strongly on business skills whereas HKIEd students receive vigorous training on pedagogical skills.

2. Simulation as an active learning strategy

In the past decades, every aspect of our society has been revolutionized by the rapid development of information technology (IT). Education is no exception. IT has been deployed widely to facilitate self-directed and student-centered learning which has been well-received by educators (Spiro et al. 1991). Among various advocates of IT in education, it is widely perceived that IT is particularly effective in shaping students' skills such as critical thinking, problem solving, teamwork, entrepreneurship and construction of knowledge (Hannafin and Land 1997).

E-Commerce is both a multi-facet and applied discipline. In this connection, it is asserted that it would be more appropriate for students taking an E-Commerce course to learn by gaining hands-on experience whenever possible (Byerly 2001). Once the student is engaged in experimenting with various techniques of a particular E-Commerce area, e.g. website development, programming, animation design, etc., he or she becomes an active player in the learning process. Allowing students to play an active role, educators embrace student-centered learning across disciplines (McKeachie 1994).

Business major students have preferences over instructional methods. Previous research shows that they particularly endorse active pedagogies (Nulty and Barrett 1996). Simulation exercise has been recognized as an effective tool for learning (Dekkers and Donatti 1981; Taylor and Walford 1972). Blumenfeld (Blumenfeld et al. 1991) further pointed out that simulation exercise promotes contextual learning through student-centered explorations and learning effectiveness is maximized if the context encourages free-form but structured student-centered learning. Fellers (1996) and other education researchers recommended that group learning is an effective way in learning and teaching of information systems (IS) courses. The Online Auction Game (OAG) was designed to meet all of the above potential benefits in the process of learning and teaching of E-Commerce.

3. Research design

The Online Auction Game (OAG) is a teaching and learning E-Commerce platform developed and hosted by The Hong Kong Polytechnic University (PolyU). This E-Commerce education project was funded by Teaching Development Grants of University and Grant Committee (UGC) of HKSAR to develop activities that empower students to take direct action in addressing E-Commerce issues using hands-on learning. OAG is a web-based simulation game allowing participants to learn in an interactive environment using an active learning strategy (Meyers and Jones 1993). It enables an interactive and dynamic learning environment for students to practice "learning by doing". It is a role-playing game where individual players play the roles of bidder and seller in electronic marketplace. The main screen for OAG is shown in Figure 1.

A sample of 10 undergraduate business student teachers at HKIEd had participated in this exercise. The findings from this study were compared with the findings from 51 undergraduate business students who participated separately in the same exercise at PolyU. In this study, HKIEd business students adopted OAG exercise based on same setting and materials given for PolyU counterparts. They were assigned the OAG exercise while taking "IT in business" course in Semester I in 2005. The exercise lasted for two weeks. Students took turn to play bidder and seller.
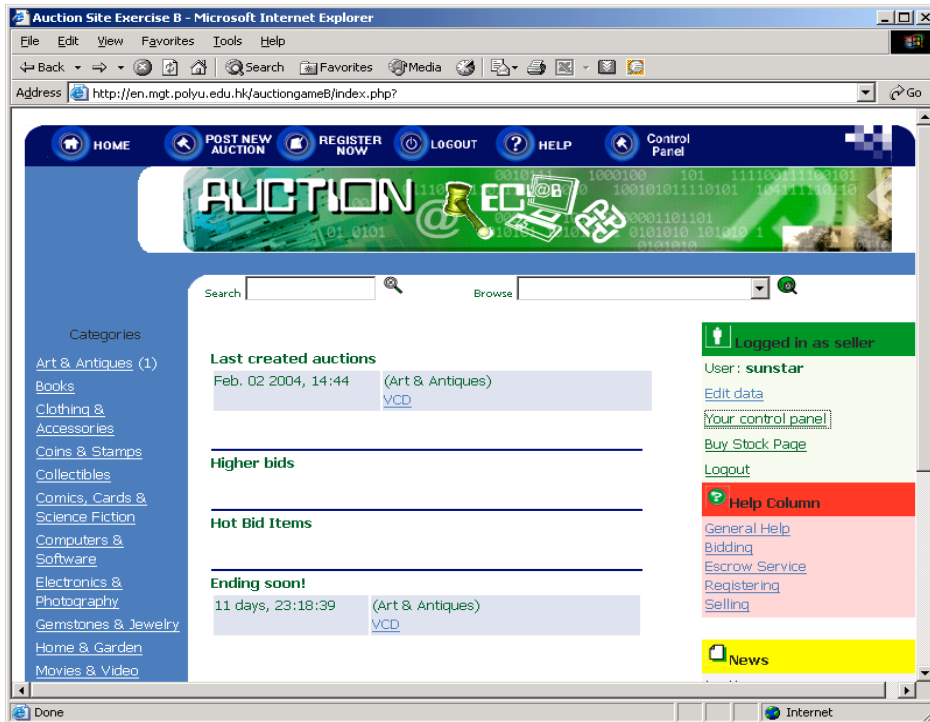
Figure 1: Main screen for the OAG

3.1 Scenario for the online auction game

OAG is conducted in a scenario where a famous international CD chain store company named HMW expands by increasing their number of CD stores in Hong Kong. HMW plans to develop three types of CD store in different districts. The three types of CD chain store are dubbed Plan A, Plan B, and Plan C. The requirement to form a CD store and HMW's budget for each type are varied. HMW wants to call for tenders to set up the stores. The criteria for a successful tender is that it can offer the largest number of completed chain store (i.e. Plan A + Plan B + Plan C = a completed CD chain store) in the most cost-effective manner.

3.2 Bidder

The goal for each bidder is to tender for setting up CD chain stores, while that of a seller is to provide items for bidders to set up their stores. Each bidder will find all items that he or she needs at an online auction site. HK$80,000 virtual money ($40,000 in saving account + $40,000 credit card limit) is allocated to each bidder. Once a bidder has successfully bid some items, he or she has to organize them to form a CD store (Plan A, Plan B, or Plan C). The bidder who has completed the maximum number of completed CD chain stores with the lowest cost wins.

3.3 Seller

If a student is a bidder in the 1st week, he or she will play seller in the 2nd week of the game. As a seller, the student will buy stocks from a supplier and place them on the online auction site for buyers to bid. Since there are 5 sellers in the same week, they compete with each other for business from the 5 buyers. The seller who makes the highest profit wins.

4. Evaluation results and analysis

4.1 HKIEd Evaluation Results

HKIEd and PolyU participants were asked to evaluate it after this. Student questionnaire items fall mainly into 4 domains: i) effectiveness of the assignment in helping develop skills

and knowledge (Question 1 – 3), ii) usability of the system (Question 4 – 8), iii) attitudes toward OAG platform (Question 9 – 13, iv) attitudes toward this approach of learning (Question 14 – 18). Each item in the questionnaire is measured using 5-point Likert scale, with strongly disagree =1 and strongly agree =5 at the ends of the spectrum.

Ratings from each domain were averaged and tested against $H_0 : \mu \leq 3$ and $H_1 : \mu > 3$ at α=0.05, where μ = population mean score of each domain from HKIEd participants. HKIEd participants rated all the 4 domains statistically larger than the "neutral = 3" value, whereby the hypothesis $H_0 : \mu \leq 3$ is rejected at α=0.05. As a result, it shows that HKIEd participants positively rated the exercise and the system in the aspects of "effectiveness", "usability", and "attitude". PolyU participants indicated the same results – the average rating of each domain is significantly higher than the "neutral = 3" value. In a nutshell, both groups of students agreed that the assignment was effective in enabling them to gain hands-on experience. They also agreed that OAG was a usable system and had a positive feeling toward using OAG. Results from the forth domain, which reveal if participants welcome a simulation approach for learning and teaching E-Commerce, are indicative. The participants agreed, if not strongly, that the learning approach supported by OAG was more effective and enjoyable than traditional approach, and particularly so for E-Commerce courses.

A micro-analysis of the results from each questionnaire item was conducted to provide further insight into the findings. The mean value of each of the 18 questionnaire item results from HKIEd participants was tested against $H_0 : \mu \leq 3$ and $H_1 : \mu > 3$ at α=0.05, where μ = population mean score of each questionnaire item from HKIEd participants. The results were conclusive. Among the 18 hypothesis tests conducted, H_0 was rejected in 17 cases. HKIEd participants agreed on 17 out of 18 questionnaire items. The only exception was Question 7 – *"The system is stable and reliable"*. It appears that HKIEd participants were unsatisfied with the system performance in terms of its stability and reliability. At least, HKIEd participants expected a more fault-proof system.

4.2   HKIEd and PolyU Comparative Results

Although the results from both groups of students are encouraging, it is of particular interest to see if they would share a common view on every questionnaire item. In order to reveal more critical findings, *t-test for differences in two means* was carried out for the mean score of each questionnaire item pair-wise. Two hypotheses were formulated: $H_0 : \mu_1 - \mu_2 = 0; H_1 : \mu_1 - \mu_2 \neq 0$, *where μ_1 and μ_2 are the population mean scores of corresponding questionnaire item from HKIEd and PolyU participants respectively,* for each mean-pair. Results are shown on Table 1.

Questionnaire items, which report a statistical difference (i.e. H_0 is rejected), will be discussed in more detail. Among the 18 items, 10 of them showed a significant statistical difference between the two sets of data. The majority of the differences are found within the last two domains – 8 out of 10. For the 1st domain, HKIEd and PolyU participants significantly disagreed on how they evaluated the degree of practical experience gained on optimization concept (Question 2). A hypothesis testing $H_0 : \mu \leq 3$ showed that PolyU participants rated this item significantly higher than the "neutral = 3" value. Apparently, HKIEd respondents rated Question 2 much higher than their PolyU counterparts and the "neutral = 3" value.

Another item where HKIEd and PolyU participants disagreed upon is found in Question 6 in the 2nd domain. A similar analysis as in the case of Question 2 was conducted for Question 6. Again, PolyU participants rated this item significantly higher than the "neutral = 3" value while HKIEd participants perceived OAG as a system that was even more user-friendly. That led to their "disagreement". One point should be noted is that HKIEd and PolyU participants *did not* disagree on the stability and reliability of OAG. That means, they simultaneously perceived that OAG was a less reliable and stable system. Since it is a prototype system and used by the students for the first time, further enhancement on reliability is expected in next version of the system.

All items in the 3rd domain reported non-uniformity. Similarly, the non-consensus originated from the fact that HKIEd participants "*agreed*" much more than their PolyU counterparts on these 5 items. It must be stressed that PolyU participants ranked all these 5 items significantly higher than the "neutral = 3" value. The case is similar for the remaining 3 items (Questions 14, 15, and 18 in the 4th domain).

5. Conclusions

We believe that E-Commerce is best learned by "playing" with it under a simulated environment (Ngai 2004). OAG has been designed as a simulation game providing a group based student-centred learning environment for students to learn online auction. From the results of student evaluations of the system, we have found that it is an effective learning system. One of the findings which is worth noting is that students from HKIEd differ mostly from their PolyU fellows in the sense that they possess much more pedagogy-rich knowledge. Having survived in the pedagogical evaluation of HKIEd participants, OAG proves itself to be effective both system-wise and pedagogically. As a matter of fact, HKIEd participants tended to rate OAG higher in a number of areas. Given their better knowledge in teaching skills, the higher ratings from HKIEd participants have sustained strongly OAG's pedagogical value.

Since OAG is only built for teaching and learning a particular area of E-Commerce – online auction, the results of this study may not be easily generalized to other learning domains of E-Commerce. Nevertheless, it demonstrates that simulation approach which is a form of active learning strategy receives undisputable recognition from undergraduate business major students. Systems like OAG that adopt simulation learning strategy deserve further attention from IS educators and teaching material developers.

6. Acknowledgements

| | HKIEd | | PolyU | | $H_0 : \mu_1 - \mu_2 = 0$ |
	Mean	S.D.	Mean	S.D.	$H_1 : \mu_1 - \mu_2 \neq 0$
This assignment can gain hands-on experience in					
1. auction/bidding strategy	4.1	0.57	3.78	0.78	*Do not reject H_0*
2. optimization concept	4	0	3.47	0.76	*Reject H_0*
3. enhancing your understanding or knowledge of online auction	4.2	0.63	3.94	0.73	*Do not reject H_0*
The system (E-bank, Online Auction Game) is					
4. easy to use	4.3	0.48	3.90	0.67	*Do not reject H_0*
5. easy to learn to use it	4.1	0.57	3.98	0.65	*Do not reject H_0*
6. user friendly	4.1	0.32	3.55	0.78	*Reject H_0*
7. stable and reliable	3.3	1.06	3.22	0.94	*Do not reject H_0*
8. simulated in a *real online auction* environment	3.7	0.67	3.02	1.05	*Do not reject H_0*
Using OAG is					
9. fun	4.5	0.53	3.59	1.04	*Reject H_0*
10. pleasant	4.2	0.42	3.41	0.94	*Reject H_0*
11. exciting	4.8	0.42	3.76	1.01	*Reject H_0*
12. pleasurable	4.1	0.57	3.39	0.96	*Reject H_0*
13. enjoyable	4.5	0.53	3.29	1.08	*Reject H_0*
Overall, the Assignment is					
14. more interesting than just traditional textbook learning	4.6	0.52	3.96	0.87	*Reject H_0*
15. more exciting than just traditional textbook learning	4.6	0.52	4.06	0.76	*Reject H_0*
16. more innovating than just traditional textbook learning	4.4	0.52	4.20	0.63	*Do not reject H_0*
17. helping me understand more about online auction	4.1	0.88	3.96	0.80	*Do not reject H_0*
18. worth doing for this subject	4.4	0.52	3.69	0.97	*Reject H_0*

Table 1: Evaluation and Comparative Results Between HKIEd and PolyU Participants

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