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Evaluation of stock trading performance of students using a web-based virtual stock trading system

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ABSTRACT

Most investors lack financial knowledge and information for trading in the stock market. The objective of this study was to enhance the motivation and learning efficiency for students attending a course in financial management. A web-based virtual stock trading (VST) system, embedded with provided functions for financial ratio analysis, was designed to simulate a stock trading environment. Through learning with objective financial analyses, the state of learners' minds is expected not to be affected by news or market fluctuations, which in turn nurtures the students as rational investors. Students were recruited from two universities located in central Taiwan for this study. They were given a virtual budget at the beginning of the semester for online virtual trading. The stock trading behavior, such as risk aversion and disposition effect, was explored through students' trading histories. Furthermore, the learning outcome was evaluated with analysis of trading performance based on five indicators, including returns on budget, stock's trading amount turnover, profit margin of stock trading amount, average budget utilization rate, and returns on average investment amount. Finally, perceived usefulness and behavior intention of the VST system were surveyed using a questionnaire instrument based on the extended technical acceptance model (TAM). The analytic results support risk aversion theory in that students tended to sell high-priced stocks in short periods with a holding day of 4.03 ± 4.93($N = 32$) because of its great price fluctuation even if its price was rising during the study period. In contrast, the holding days of high-priced stocks were significantly shorter than the stocks (t-test, $p < 0.01$) with lower prices (10.70 ± 11.92, $N = 1136$). At the end of the semester, questionnaires were disseminated to the 136 participating students, a total of 103 questionnaires were received with a response rate of 75.74%. The Cronbach's Alpha value was as high as 0.88, indicating that the questionnaire achieved high reliability. It shows that perceived usefulness (4.39 ± 0.53) and behavior intention (4.31 ± 0.50) are significantly higher than the neutral value (3) at a level of 0.001 using one-sample t-test, showing that the VST system is useful and the students are willing to further adopt the system and recommend it to other users. After analyses of the received questionnaires with structural equation model (SEM), TAM was verified regarding the adoption of VST as a tool for financial management education. In conclusion,

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the proposed VST system is useful in financial management education, specific in stock trading, to provide students with knowledge and experience to profit from the stock market through active learning in a virtual trading environment.

1. Introduction

Financial illiteracy is widely found in working adults and young people of many countries around the world, even in the developed countries [1–3]. It is believed that people with deficient financial literacy are more prone to have financial problems with debts, as well as less likely to invest in the stock market, make retirement planning, and effectively accumulate and manage wealth [3]. Financial education is promised in enabling people more informed in making wise financial decisions. Before they start engaging in financial contracts or making financial decisions, it is more beneficial to provide people with sufficient financial knowledge [3]. However, financial education alone may not be sufficient, instead, it is more important to provide them the tools to change their behaviors [1].

For people engaged in financial investment, investing in stocks is similar to gambling if guided only by mass media or so-called luck, potentially resulting in personal financial disaster if tank stocks or penny stocks are purchased. Most individual investors are uninformed investors who lack financial knowledge and information on the stock market. They acquire stock market information mainly from public media where investors' attention is attracted by news and suspicious profitable stocks recommended by experts [4]. Stock price is strongly affected by either rational or irrational factors. If the market price of a stock is lower than its intrinsic value, the price is expected to rise, which in turn entices investors to buy it. Thus, how to train students to become rational investors is highly essential and is the main objective of this study. Without objective information, investors generally make irrational investments and are prone to lose profit. Hence, to enhance financial analysis abilities and make wise investments in potentially profitable stocks is crucial for general individual investors. It was reported that investors with longer history of stock trading having accumulated more experience through learning will have a more rational attitude and are less overreacted to unexpected news events [5]. A virtual stock trading system is expected to be able to provide financial education, especially the domain knowledge of stock trading, through a virtual environment to enhance students' skills and experiences in performing wise stock investments before participating in real-world stock markets.

Current online stock trading systems are mostly commercially oriented, which do not provide virtual environment and are not appropriate for financial management education. Although several competitions provided with virtual trading operation are held each year by particular investment companies, they are mostly outcome-based without providing feedback information to the participants to improve their trading skills. These systems are not appropriate for financial management education either. The virtual stock trading system proposed in this study provides a tool for financial ratio analysis of individual stocks to assist students to select potentially profitable stocks and a tool for investment performance evaluation to support instructors to understand learning outcomes of students as well as to correct their investment concepts.

To attract students' attentions and stimulate their curiosities in studying financial management and related knowledge, we designed a web-based virtual stock trading (VST) system to provide a virtual environment to simulate real-time stock trading with active learning, tools to perform financial ratio analyses, and functions to evaluate investment performance. It is useful to develop capabilities for students to make rational investments. All participating students were provided with a free account to make virtual stock trading in a real-time manner with real-time information released and offered by the Taiwanese Stock Exchange, GreTai Securities Market OTC (over-the-counter), and related counter stocks. After becoming familiar with the VST system, students are expected to be capable of analyzing financial ratios of individual candidate stocks before trading, which in turn can make profits from the investment, or at least avoid risks. The VST system has been demonstrated to be a useful platform to study trading behaviors of individual investors and other financial issues.

The remainder of this paper is organized as follows. In Section 2, related papers regarding stock trading behavior, online stock trading system, and progress in e-learning are reviewed. System design and implementation are described in Section 3. The virtual stock trading system as an effective learning tool is presented in Section 4. Section 5 demonstrates system evaluation with technology acceptance model. Finally, a brief discussion and conclusion is made in Section 6.

2. Literature review

2.1. Stock trading behavior

The trading behaviors of institutional and individual stock investors are different in that the former investors are deemed as informed investors, while the latter investors are generally viewed as noise or uninformed traders. Individual traders show some trading patterns, which might be induced by psychological biases, resulting in making cognitive errors [6]. Psychological biases are manifested in that investors tend to buy stocks they have been performed well, acquire additional shares of a stock they have already owned, purchase stocks they previously owned if the price fell below the last sold price, and buy stocks which bring their attention [6].