Trading Simulation - An Experiential Learning Tool

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Abstract

The students can learn critical thinking skills by seeing profits and losses based on their analysis, in the (simulated) financial markets. For experiential learning, making use of financial markets makes students realise that there is a lot to learn regardless of the fact that they are already becoming aware of the things that take place in financial markets.

The rationale for conducting a study to determine the investment behavior of students in the stock market using trading simulation software can be based on several important factors and goals. In the present study, 'edinvest.in' has been employed in order to affect the online trading stock market simulation.

It was observed that the serious or educated investors are likely to get better returns through stock trading and the speculative investors are exposed to a relatively higher degree of risk compared to their educated counterparts. Simulation software like 'InvestEd' can be very helpful in not only educating students on the risks involved in stock trading but also training them on how to get maximum return from online trading.

Introduction

When it comes to the pedagogical finance literature, experiential learning has been considered extremely beneficial. It is believed that students tend to learn in a better way if they are actively participating in the learning process. In trading, applying theoretical concepts to empirical experiences helps in getting better learning experiences for students (Meltzer, 2021). According to Jacobs et al. (2004), students can learn critical thinking skills by seeing profits and losses based on their analysis, in the (simulated) financial markets. For experiential learning, making use of financial markets makes students realize that there is a lot to learn regardless of the fact that they are already becoming aware of the things that take place in financial markets

(Pierce, 2022). When students are trying out finance positions for their career, awareness and such skills come to good use. Trading simulations generally provide a 'low stakes' environment because no real money is involved and is at risk. This makes it easier to explore the effect of emotions on trading decisions (Noreen, 2022).

Kolb's (1984) circular model of experiential learning has one tension whereby it can be seen that neither abstract instruction nor experiential learning works for all learning scenarios. According to Kolb, a combination of both lecture-based learning and experiential learning is the best approach that helps in maximizing student learning. As per Heath & Heath (2007), there are six factors which can make an idea 'stick' in our minds. One of these factors that make a concept stick is Kolb's standard of 'concreteness'. Classroom lectures and readings allow students to get more information but 'hands-on' projects provide them with real world application scenarios that make the concept stick to their minds. The concept of financial markets, trading and investments can be learned in a better way by providing in-class instruction as well as trading simulation. For example, the students may feel better about understanding their earnings than just reading the provided instructions. Simulations allow learning to come to life which makes students who are passive learners turn into active explorers.

This study explores the use of trading simulations among the senior secondary school students as a part of examining their investment behavior and their knowledge about investment in the market. The study examines whether their investment behavior is based on analysis of the market or they are just speculating. The analysis is done on the basis of 'Trading Notes' they shared while transacting and also on the basis of the final report they submitted at the end of the competition. The next section explains the rationale behind conducting this research.

1.   Rationale of the Study

The rationale for conducting a study to determine the investment behavior of students in the stock market using trading simulation software can be based on several important factors and goals. These goals could be to study the relevance of this study in terms of educational purpose or also to determine the investment behaviour of the student by conducting 'Behavioral Finance Research'. This study could also help in studying the 'Market Participation Interest' of the students. The other rationale for conducting a study on students' investment behavior using trading simulation software is to improve financial literacy, assess risk management, enhance education about the subject, inform policies, protect investors, and support students' long-term financial health. This research has chosen to focus on two aspects i.e., education purpose and behavioral finance purpose.

2.   Educational Purpose of Trading Simulation

This study has been conducted with the primary educational objective of adding more to the financial literacy of students by allowing them to learn investing through stock market simulation software. Chulkov and Wang (2020) believe that financial literacy is not just about theoretical knowledge; but also about the practical knowledge of the concept of finance, risk management strategies, and an understanding of the working of financial markets. By using such simulations, it becomes easy to bridge the gap between traditional methods of learning and real-world experience. This allows students to analyze the financial markets, make informed investments, and observe the results of their analysis and decisions in a risk-free environment (Pierce, 2022). Students can easily learn from their mistakes and build their decision-making skills. It also allows them to build resilience, which is a great asset in financial context as well as general life context (Meltzer, 2021).

Investing requires accessing and managing risk, which can be understood by students through stock market simulations. Students can learn and explore various risk management strategies, like making diverse portfolios, adjusting their assets and setting stop-loss limits (Dedi et al., 2022). Students get better practical knowledge by observing how their strategies affect their income in the financial markets. Simulations tend to allow students to learn critical thinking and analyze economic indicators, company performance data, and market trends while deciding where to invest. This expands their skillset and benefits them in various ways (Chulkov & Wang, 2020).

Gómez-Martínez et al. (2016) wrote that investing comes with strong emotions of fear and greed. By using simulations, students can have a safe space for experiencing such strong emotions and controlling them in a risk-free manner. They can develop the required emotional intelligence and manage their investments with emotional control. Mukherji et al. (2018) also noted that the use of stock market simulations for educational purposes is not a one-time endeavours as it allows continuous learning. Students can easily change their investment strategies with time and improve their skills. This can also help them in gaining more interest in finance.

Summarizing the discussion, it can be said that studying the investment behavior of students by using trading simulation software allows students to gain more insights on financial literacy, enhance their decision-making skills, and prepares them for financial challenges in the real world. It not only fosters emotional intelligence, but also promotes continuous improvement through a data-driven curriculum.

2.1. Behavioral Finance Purpose of Trading Simulation

An important dimension of studying the investment behavior of students through the use of trading simulations is Behavioral finance research. It studies the relationship between psychology and financial decision-making, and also highlights the way students and other individuals perceive, interpret, and respond to the financial market data (Torga et al., 2017). In a simulated trading environment, it becomes easy for the researchers to observe the influence of behavioral biases like overconfidence, loss aversion, and herding behavior, on the investment choices of students. According to Loerwald & Stemmann (2016), this helps in exploring the cognitive and emotional factors that affect decision-making of students and helps in understanding the investor sentiment and sentiment-driven trading.

The benefits of behavioral finance research with regard to simulations helps in understanding how students affect the simulated market volatility, and deal with unforeseen events, along the lines of ever-changing market conditions. It also helps the researchers in understanding student behavior patterns such as their emotional triggers while making financial actions. It brings up various psychological mechanisms which come with the investment decisions (Fieger, 2017).

Behavioral finance research can be integrated in the study for drawing out valuable insights about how students engage with market simulations. By using this knowledge, targeted interventions can be developed and educational materials can be enhanced to help students learn about behavioral biases for making better investment choices (Pompian, 2016). Loerwald and Stemmann (2016) mention that behavioral finance research contributes to the field of behavioral finance by providing insights about the student demographic. It helps us in understanding the student behavior in a better way. It can be said that behavioral finance research in the context of trading simulations provides the link between human psychology and financial decisions which offers information about behavioral biases and the investment choices of students.

3. Literature Review

3.1. E-learning and Experiential Learning

E-learning is a popular concept which is going around in schools and institutions all over the world. It is because E- learning allows students to get easy access to information and knowledge. It also supports a unique learning environment which is highly cost effective (Mukherji et al., 2018). Telecommunication technology has developed a lot in the past few years which is why mobile based e-learning has enables students to learn in an environment where the issue with observing scenarios and objects doesn't prevail (Noreen, 2022).

Before the introduction of a new curriculum, many teachers got used to teaching lower level knowledge. According to Somayeh (2016), IT can be integrated with teaching in order to change the learning environment into a technically sophisticated resource pool. Moreover, Johnson and Brown (2017) believe that by making

use of digital technology, students can learn from anywhere and get access to their learning material at any point of time.

Confucius was a very well-known Chinese educator who stated that "what I hear, I forget; what I see, I remember; and what I do, I know", which can be considered as the first interpretation of experiential learning (You, 2020). E-learning efforts can be enhanced with the assistance of teachers for improving the autonomy of a learner and understanding multimedia content. This can help students in developing problem-solving skills. Activity-theory proposes that people build their knowledge within the social realms and in order to develop cognitive or meta-cognitive skills, it is important for teachers to come up and help students by providing them with subtopics, organizing diverse information, and formulating their perspective (Annabi, 2019).

The financial management courses in the past few years have solely focused on textbook content which limits the student understanding of various theories and contexts. Stock market trading is a dynamic concept (Lim & Rubasundram, 2018). According to Caprara and Caprara (2022), in a visual learning environment, online scenarios can be shown to the learners in order to help them learn in a better way. It also gives them access to many learning resources which can be accessed at any time or location. Students are also encouraged to learn practical operational experience in stock trading in order to enhance their overall knowledge. A Virtual stock trading (VST) system is developed by the author to provide students with a learning environment that teaches practical stock trading experiences. VST e-learning systems are developed with the aim of creating a web-based on-board environment for studies which is available at any time of the day.

An e-learning system was recently adopted for the prediction markets which has been seen as a tool to provide a rich environment for active learning (REAL) to the students (Buckley et al., 2011). In a prediction market, assets are traded in a liquid market and their value depends on a future event which is highly uncertain. Buckley et al. (2011) states that REAL is developed on the basis of constructivist learning theory, which has various features. It also considers that knowledge is an ever-evolving learning process, and learning is the product of social interaction. REAL has five main characteristics- providing authentic learning contexts, promoting learners' responsibility and initiative, utilizing authentic assessment strategies, supporting generative learning activities, and facilitating collaborative learning (Buckley et al., 2011). Moreover, Stock market can be used as a prediction as it is a pedagogical tool in financial education.

According to Moffitt et al. (2010), students believe that trading simulations can help in enhancing their overall learning experience. A few researchers suggest that experiential learning using spreadsheet models helps in expanding analytical opportunities for the students. Alonzi et al. (2000) studied the student feedback on trading simulations, when it comes to the price discovery process of the future markets. The self-assessed learning effectiveness rate was found to be 4.37 on a 5-point Likert scale.

As per Smith and Gibbs (2020), educators must be encouraged to make use of trading simulations as they help students in understanding the relationship between financial market movements and current events. Angel (1994) generally makes use of the Broker's Game for the introductory class on finance. This way, students actively take part in the price discovery process to fill customer orders which gives more information to them about the trading concept. Elan and Sanderson (1991) make use of a simulation which progresses to the three college semesters and allows students to understand portfolio construction in a progressive manner.

On the other hand, a few finance educators do not use simulations because they feel that any poor performance in the simulation can decrease the interest of students in finance and investments. Dolvin and Pyles (2011) take care of this issue by a test survey which collects pre-simulation and post-simulation responses. These surveys are conducted to compare student interest with performance. The results of these surveys show that student interest levels in investing do not correlate with their trading simulation performance. This also means that interest levels among students can be improved by good as well as bad benchmark-relative performance. It is important for students to learn from their success as well as their failures.

King and Jennings (2004) tried to study the impact of trading simulation on traditional lecture-style classrooms. They wanted to test whether the learning of financial concepts with a lecture-only class is better than a class that includes trading simulation. It was found that both lecture-style class and class with trading simulation increased the learning levels of students. However, the class which uses trading simulation has a higher learning level than the traditional lecture-only class. According to Clinebell and Clinebell (1995), about 241 educators at business schools (amounting to a total of 241 educators) make use of investment simulations for teaching finance to students. Another survey was conducted by McClatchey and Kuhlemeyer (2000) on business schools. They found out that about 38% of the survey participants make use of StockTrak as the trading simulation for their finance class, which is the highest among other trading simulation vendors.

3.2. Stock Trading Behavior

When it comes to the trading behaviors of institutional and individual stock investors, a difference can be seen. The former investors are generally seen as informed investors who have complete knowledge for making informed investments, while the latter investors are deemed as uninformed traders. Paramita et al. (2018) believes that individual traders have trading patterns which can have cognitive errors as they include psychological biases. Such biases make investors buy stocks which have performed well, acquire additional shares of the stocks they already own, buy previously owned stocks if their price fell below the last sold price, and purchase stocks which bring their attention (Smith & Gibbs, 2020).

Moreover, Individual investors tend to behave with a disposition effect where they buy stocks after prices have decreased and sell them when the prices increase. They also behave with over-confidence, as well as misunderstanding of their past returns. They generally underestimate risks that come with active stock trading. Therefore, they do not make rational trading decisions. Effects which are induced by negative emotions can

help investors in making rational trading decisions which can help them in generating higher trading profits (Elfahmi & Solikin, 2020).

A significant role is played by mass media when it comes to disseminating financial or stock trading information. This affects the stock price and also changes the investment decisions of investors. Generally, individual investors buy stocks which have gained a log of media attention (Strycharz et al., 2018). They rely on mass media and news about the market without investigating in a deeper manner before making trading decisions. They don't have accurate and full information about stocks which is why they make wrong investments based on psychological biases. This can lead to huge financial losses in the future.

3.3. Uses of Stock Market Simulations in Education

On a global level, Financial illiteracy is a huge issue. Many young people and adults generally face financial problems because they are not aware of financial concepts. They are not willing to invest in the stock market due to lack of information and they end up in financial debt as they are unable to manage wealth (Dolvin & Pyles, 2011). People are more likely to make informed financial decisions if they are financially educated. They must have the required financial knowledge before entering into any financial contracts. Financial education alone is not sufficient for helping people in making informed financial decisions. They must be provided with tools which allow them to change their behaviors (Smith & Gibbs, 2020).

Fieger (2017) notices that people believe that stock market investments are just like gambling if it is only guided by mass media or luck. This can become a financial disaster for people in the worst-case scenario. Most of the individual investors lack the financial knowledge to make informed financial decisions in the stock market. They use public media for gaining information which is incomplete. They invest in stocks which have gained attention on the news (Torga et al., 2017).

Chulkov and Wang (2020) believe that stock prices are highly affected by rational and irrational factors. When the market price of any stock goes below its intrinsic value, its price is expected to rise. This makes investors more interested in buying such stocks. Therefore, it is important to provide proper financial training to students in order to help them become informed investors. Without having proper information and knowledge about the stocks and financial markets, investors can make irrational investments that can cause losses. This is why investors must have financial analysis abilities. This helps them in making wise investments in profitable stocks. Noreen (2022) reported that investors who have been investing for a long while generally have learned through experience. They tend to react less to the media events and make more rational financial decisions. Students can be provided with more information by using a virtual stock trading system, especially for stock trading knowledge. It will improve the investing skills of students through a virtual environment, before entering the real-world stock market investments (Meltzer, 2021).

Noreen (2022) believes that the present online stock trading systems do not provide a virtual environment because they are commercially oriented. These systems are not appropriate for providing students with financial management education. A few investment companies organise various competitions with virtual trading operation which are generally outcome-based. They do not provide feedback information to the participants which doesn't allow them to learn from their mistakes and improve their skills. Such systems are also not appropriate for providing financial management education to the students.

In order to attract the attention of students and cater to their curiosity of studying financial management, a web-based virtual stock trading (VST) system has been designed. It provides a virtual environment which allows students to learn from real-time stock trading. It allows students to enhance their trading capabilities and make informed investment decisions (Mukherji et al., 2018). All the participants were provided with a free stock trading account. Students can analyse financial ratios of stocks before trading them, after they become more familiar with the VST system. This can help them in making profits from their investment without taking real time financial risks. This VST system can be used to study the trading behaviors of investors and also identify financial issues that they may face.

4. Methodology

4.1. edinvest.in

In the present study, edinvest.in has been employed in order to affect the online trading stock market simulation. InvestEd is a stock market simulator which is web-based, and supports all types of cryptocurrencies along with equities trading options which are available on Indian and U.S. major exchanges. The InvestEd service provides various private groups and educators and private groups with a virtual structure to develop 'private trading games'. These games are created to promote an environment of formal learning and overall assessment. It also helps various private groups in customizing a few parameters of trading which can allow them to meet the group objectives.

InvestEd is a very helpful platform, specifically for high schoolers. It allows them to invest in more than one asset and have better access to the markets. Investment is a great habit and it is important because it generates high returns as well as allows people to deal with financial uncertainties such as inflation that can decrease the money value over time. An average high school student generally finds it hard to navigate through the complexity of financial markets. Investing and trading in financial markets requires experience and understanding, which is why InvestEd allows high school students to trade all cryptocurrencies and equities by making use of virtual cash. This platform is the only platform that has such a feature. It also enables the users to check whether they have the financial skills and interest. It also adds a learning quality for the high schoolers where they can learn from their mistakes without the risk of losing their money. Most students who fall in the teenage group generally lack the money to invest in the stock market. This issue doesn't arise while using InvestEd as it allows the users to gain hands-on trading and investing experience with different assets, without an actual risk of debt or loss.

The set of InvestEd's trading rules for this study are mentioned below:

- Every team or individual student gets US$100,000 in play money during the beginning.

- Students can use the play money to buy shares of different corporations and trade their preferred stock in US and Indian exchanges.

- There's no trade limit for any student.

- 20-minute delayed feed with 20-minute delayed trading.

- All trades are done on the basis of the market price.

- Teams are required to have a diverse stock portfolio which should include at least one stock from as many sectors as the team strength in numbers. Sold stock must be replaced with new stock. The sectors of both stocks must be different.

InvestEd uses its software to make sure that everybody complies with the rules. Generally, a lay investor is highly familiar with equity investments. Here the investor is a student who doesn't have much experience in business or finance. Therefore, in the present study, trading is limited to long positions in publicly traded equities. One of the main objectives of the present study is to encourage students to participate in stock market simulation to a level where it becomes easy to measure the learning effects. Two trading parameters have been added outside of the program in order to make sure that students are actively participating and increasing their learning potential.

The two parameters are mentioned below:

1. The user is obliged to add one comment about the trade he/she made, giving the reason behind buying/selling of that particular stock; and,
2. Every week, there should be at least one trading transaction.

The team at InvestEd makes sure that users comply with their rules from time to time. The users also get warning emails in case they don't follow the rules.

InvestEd also sends emails to the participating students which include extensive investment learning resources. These emails also contain various links to tutorials and blogs related to investment and investment dictionary links, which includes buzzwords. All the resources mentioned in the email are related to investment terms like stocks, bonds, active trading, and mutual funds.

4.2. Stock Trading Game Methodology

The Student Eligibility: The teams can only have members who are either currently in the same high school and haven't achieved their degree before the competition begins on May 1st, 2023.

Team Composition: Individual students as well as groups (minimum 2 students, maximum 4 students) from the start of the competition are allowed to participate. One student can only be a part of one team and the teams cannot have any communication with the competition client. If they doc they will be disqualified.

Team Names: Students can choose creative team names on their own, avoiding offensive and vulgar terms. If such names are identified by the team at InvestEd, they will be disqualified.

Trading Notes: All teams must add a trading note which will contain the purpose and role of the trade in the overall investment strategy, with each trade.

Investment Options: In the competition, teams can buy and sell stocks and crypto from many exchanges (both domestic and international).

Mandatory Trade: In order to move forward in the competition, all teams will have to trade at least one financial asset by 4:00 p.m. (Indian stock market closing time) on May 1st, 2023.

Code of Conduct: It is required for the teams and individuals to interact appropriately with all the members of the competition and respectfully, be it in-person, or on any social platform. InvestEd doesn't tolerate inappropriate behavior and the teams will be disqualified if found behaving in an unacceptable manner.

4.3. Judging Criteria

The following criteria will be used to assess the participants-

a. **Investment Strategy**: Participants are required to submit a report at the end of the competition, which should include creative investment thesis related to their mid-term and long-term investment thinking. The students/teams must have a diverse portfolio with corporations from different sectors. Ashneer's (client from the case study) goals must be considered before developing investment strategy in order to show how the student/ team will win him over.

b. **Final Portfolio Value**: The portfolio of participants must be profitable with a good ROI percentage.

c. **Portfolio Analysis**: The report must also contain the strategies used for portfolio management, along with the concepts and tools. It should also include quantitative and qualitative analysis.

d. **Articulation of Competition Experience**: The report must also contain explanations from each member of the team or individual student, regarding their decision-making process in the competition and their learning outcomes.

e. **Creativity and Presentation**: Presentation of the report will also be judged by considering the narrative and visuals. Students must use creativity to present their report in a unique manner. Students must consider these 5 criteria during the process of preparing the report.

6. Recommended Resources

i. New to investing: https://www.investopedia.com/slide-show/learn-how-to-invest/

ii. To research a specific instrument (i.e., stock, bond, etc.):

a. http://finance.google.com

b. http://finance.yahoo.com

c. http://www.nasdaq.com

7. Results

The purpose of this study is to determine the investment behavior of the students in the stock market through the use of trading simulation software called InvestEd. The students were asked to trade at least once each week and give reason behind their said buy and/or sell transaction. Based on the returns generated and the comments shared by the students, this section of the report discusses the overall investment behavior displayed by the students. It also needs to be noted here that out of the many students who participated in this experiment, only 13 submitted their final report on the investment which reflects the student's lack of awareness or sensitivity towards the risks involved in stock trading.

Lim & Rubasundram (2018) observed that many of the financial management courses remain less-effective because of their focus on textbook content rather than imparting them with the practical skills. According to them, there is an urgent need to educate students on not only how stock markets operate but also sensitize them on the risks involved and ways to counter them. The fact that only 13 students submitted their final report signifies that not all the students were serious about their role in this experiment. While some of the students behaved casually, there were others who participated responsibly and submitted both their comments and the final report. It can be interpreted that students were either not much interested in understanding stock market investment or were not aware of how to approach the investment. According to You (2020) simulation training improves both student's interest and understanding of the subject being trained on. This can also be indicative of the fact that the students need to be educated on how to make investments and transact in the stock market.

The comments of 71 participants were obtained. After carefully studying the responses, it was observed that the students can broadly be divided into two categories namely casual (or unaware) investors or speculators and serious investors.

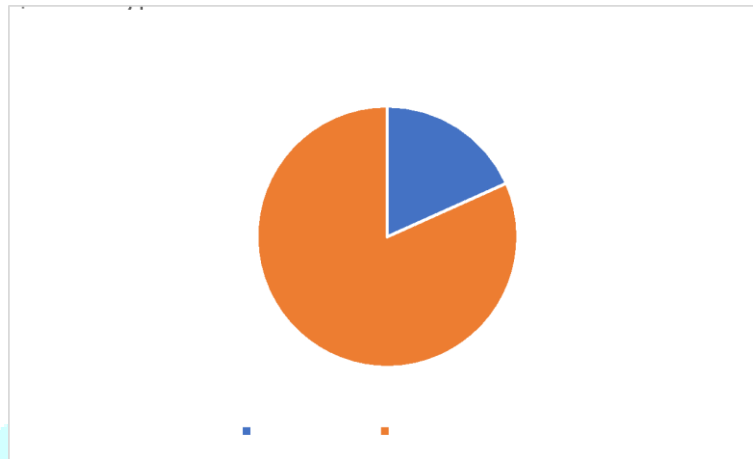| Investor Type	Number of Participants
Speculators	13
Educated Investors	58

Table 1: Distribution of participants as Investor Type

Figure 1: Distribution of participants as Investor Type.

For instance, many of the participating students marked ambiguous responses like 'llllllllllllllllllllllllllll', 'ooooooooooooooooooooooo' or 'nnikefcninfunfujndfjsd' etc. for their respective transactions. It can be interpreted that the students were either not interested in sharing their reasons or were not transacted using financial logics while making their investments. It is also worth mentioning here that the students who made speculative transaction (based on ambiguous response) were consistent in all of their transactions irrespective of the outcomes of their respective transactions.

At the same time, there were students who gave justified logics behind their buy or sell transactions. For instance, one of the respondents buying shares of Reliance Industries Ltd. mentioned the reason as 'repetition. gaining good, wont risk it though'. Similarly, another respondent bought Apple Inc. shares mentioning that 'The tech giant's size and wide range of products and services give it an advantage over smaller companies that aren't as diversified. And that's especially true in tough economic times. Apple also has plenty of cash to outlast a downturn in the business cycle, and can use that cash to take market share'. These were serious buyers who based their buying or selling transactions on strong logics indicating the fact that they were not only aware of how to make a financial investment but also did their study on the company's background and stock market performance.

Comparing the results of the final return on investment with those of the comments posted by the participating respondents, it was evident that the students who invested based on financial logics (serious investors) received better returns compared to their speculative counterparts (ambiguous responses). For instance, the returns of the speculative respondents ranged from -8.31% to 2.9%. On the contrary, the serious investors made much higher profits ranging from 2.34% to as high as 22.08%.

Returns	Numbers
less than 0	21
0-5	20
5-10	8
more than 10	13

Table 2: Distribution of return on investment among participants
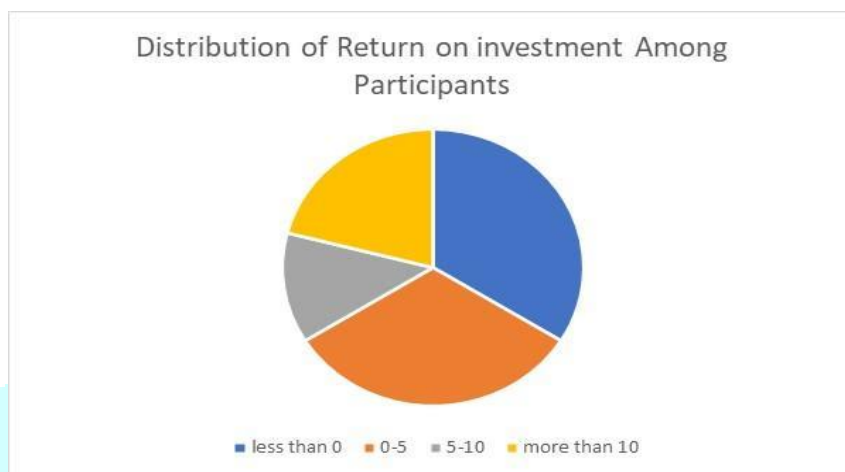

Figure 2: Distribution of the return on investment among participants.

These findings were clear indication of the fact that the speculative trading without considering the financial logic is largely dangerous in the frequent stock market trading. At the same time, the careful or serious investors who take due consideration of the stock market behaviour, stock performance and apply financial logics are likely to receive better returns. It can also be interpreted from these findings that the serious investors in the stock market are likely to face lower risk probably because of their awareness of how stocks operate and perform in a stock market.

This author also gained personally from this activity in terms on how the stock market operate, how to evaluate stock performance and how to decide upon when to buy or sell any given stock. Although the author is not an active stock trader, the activity has certainly increased the confidence in stock trading, the online systems and how to use them.

7.1. Summary

Some of the important findings of this research are as follows:

a. Serious or educated investors are likely to get better returns through stock trading.

b. Speculative investors are exposed to relatively higher degree of risk compared to their educated counterparts.

c. Simulation software like InvestEd can be very helpful in not only educating students on the risks involved in stock trading but also train them on how to get maximum return from online trading.

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