

Evaluating the role of simulation-based experiential learning in improving satisfaction of finance students

Mohamed Bakoush^a

^a*Southampton Business School, University of Southampton, Highfield, Southampton, SO17 1BJ, UK.*

Abstract

This study evaluates the impact of implementing a simulation-based experiential learning method on student satisfaction. We develop a simulation-based experiential learning activity and use it in teaching a postgraduate finance course to engage students in the learning process and enable them to develop deeper understanding of the finance theories, models and concepts covered in the course. We then use a survey to collect data from students and use a Structural Equations Modelling technique to test our research hypotheses. Our results show that the simulation-based experiential learning activity can provide students with a hands-on experience of the real-world practice of finance. This helps students to engage in the learning process and become active learners who utilize deep learning strategies. Consequently, learners become more satisfied with their learning experience.

Keywords: Experiential Learning Theory; Simulations; Student Approaches to Learning; Student Satisfaction; Financial Education

1. Introduction

Finance curriculum is usually criticised for being vocational and failing to bridge the gap between finance education and the practice of finance (Cao et al., 2019). For example, studies show that traditional finance teaching methods fail to instill the required practical decision making and problem solving skills in students (Saunders, 2001). Teaching resources used with finance students including textbooks and lecture notes are also criticised for being too theoretical. Although these resources can help students to obtain sufficient knowledge, many finance students still find it difficult to learn finance concepts and even more difficult to apply them in real world situations (Vihtelic, 1996). The main reason behind this is that finance students learn abstract theories, models and concepts without an experience of how these concepts are applied in the real world (Krishnan et al., 1999). Consequently, students may not acquire the right balance of knowledge, application, and experience from their studies which limits their employability chances.

In response to these criticisms, experiential learning has emerged as an effective learning method to enable students to acquire real-world experience relevant to the practice of finance (Lew and Saville, 2021; Payne and Tanner, 2011). It allows students to engage in an experience that enables them to apply their knowledge and actively participate in the learning process (Lewis and Williams, 1994). Experiential learning has also been applied in other fields. In medical and nursing education, for example, it was used to educate students about expected real clinical situations (Hong and Kim, 2011). Experiential learning has also been proved very useful in business education including accounting (Dellaportas and Hassall, 2013) and auditing (Chiang et al., 2021) to enable students to develop deeper understanding of abstract concepts they acquire during study and to apply them to real world experiences they encounter in their professional career.

In this study, we evaluate the impact of implementing the experiential learning method on the satisfaction of finance students. Student satisfaction can be defined as a short-term attitude resulting from an evaluation of the student's educational experience as well as other institutional factors such as the facilities and services (Elliott and Healy, 2001; Elliott and Shin, 2002). This paper does not examine the effectiveness of experiential learning, which is well documented in the literature (Santini et al., 2017). Rather, it

focuses on student satisfaction as it encompasses many of the factors that the experiential learning method has the potential to enhance. In particular, [Navarro et al. \(2005\)](#) show that the teaching staff, the teaching methods and course administration are key elements to achieving student satisfaction and their subsequent loyalty. Similarly, [Douglas et al. \(2006\)](#) show that among the main factors that affect student satisfaction are the student assessment, feedback, and learning experience. Also, [\(Lai et al., 2015\)](#) highlight the significant role of skills development in enhancing student satisfaction. These factors are shown to be improved by experiential learning ([Morris, 2020](#); [Santini et al., 2017](#)). Therefore, using student satisfaction as our dependent variable enables us to capture the effectiveness of experiential learning through its influence on the various predictors of student satisfaction, especially the elements related to the student learning experience.

We use a simulation-based experiential learning activity to engage students in the learning process and enable them to develop deeper understanding of the finance theories, models and concepts covered in the course. Using simulations in learning has the potential to provide a suitable environment for students to make decisions to solve specific problems and to evaluate the outcome of their decisions. This experience helps students to develop their problem solving skills ([Farashahi and Tajeddin, 2018](#)). Several studies show that using simulation-based experiential learning in finance courses has the potential to increase student motivation and engagement ([Jankowski and Shank, 2010](#); [Weiser and Schug, 1992](#)), improve student learning ([Helliard et al., 2000](#)), enhance student learning and satisfaction ([King and Jennings, 2004](#)), boost students' perceived learning ([Wolmarans, 2005](#)), and can positively enhance students' overall knowledge and experience ([Dolvin and Pyles, 2011](#)). However, despite the effectiveness of simulations, their use in finance and investment courses is limited ([Mukherji et al., 2018](#)).

This study contributes to the literature on finance education in several ways. First, we use the Experiential Learning Theory ([Kolb, 1984](#)) to provide an effective learning method in the context of finance education. Second, we develop a simulation-based experiential learning activity that can be utilised in different finance and other related courses. Third, we evaluate the impact of this simulation-based experiential learning activity on student satisfaction to understand how this approach affects student experience. Fourth,

we use a research design based on structural equations modelling to evaluate not only whether the simulation-based experiential learning activity affects student satisfaction, but also why this effect happens. This enables faculty to learn more about the overall effectiveness of simulation-based experiential learning in finance courses.

The remainder of this paper is divided as follows. Section 2 provides the theoretical framework and hypotheses development. Section 3 discusses the methods used to test our research hypotheses. Section 4 presents the main results and discussion. Section 5 provides a conclusion.

2. Literature Review and Hypotheses Development

In this section, we provide a review of the most relevant literature and develops the research hypotheses.

2.1. Student Satisfaction

Student satisfaction is a widely debated issue in higher education mostly due to the lack of a universal method to measure student satisfaction. A wide range of literature argues that satisfaction depends on expectations and attempts to understand the formation of expectations as a means to positively influence satisfaction. [Shank et al. \(1996\)](#) show that student expectations of university services can actually exceed those of the faculty and can differ between universities. Similarly, [Patterson \(2000\)](#) study the relationship among perceived performance, disconfirmation of expectations, and satisfaction. Their results are relevant to university students as they find that this relationship is moderated by the customer's experience with the service and situational conditions. Additionally, applying the findings of [Anderson and Fornell \(2000\)](#) and [Yi \(1993\)](#) in higher education, it seems that the difficulty of evaluating the perceived quality of the education service leads to greater influence of expectations on student satisfaction.

On the other hand, another strand of literature argues that the difficulty of evaluating the quality of the educational service can effectively encourage students to focus on class environment and faculty performance and not necessarily imply that expectations will be the defining factor of satisfaction. For example, some studies show that

some students have low expectations about the education service and therefore performance becomes the most important factor in determining their satisfaction ([Hartman and Schmidt, 1995](#)). Similarly, [Halstead et al. \(1994\)](#) show that alumni satisfaction with higher education depends on the intellectual environment in which they learn and the employment preparation they receive. Other studies show that the perceived quality of education mediates the relationship between expectations and satisfaction ([Anderson and Sullivan, 1993](#); [Kristensen et al., 1999](#)). In the same vein, [Athiyaman \(1997\)](#) proposes a model of perceived service quality in higher education institutions which shows that perceptions of quality highly influence student satisfaction. As an extension to this line of thought, [Haverila et al. \(2021\)](#) provide a fairly comprehensive model of student satisfaction that incorporates both educational and noneducational services. The model shows that perceived educational service quality and value for money are the most influential for student satisfaction.

2.2. Student Approaches to Learning Theory

The student approaches to learning theory considers the effect of learning environment on the level of learning. The pioneering work on this theory by [Marton and Säljö \(1976\)](#) show that students can follow two different approaches in learning: deep and surface. Under the deep approach to learning, students actively engage with the material which improves not only their ability to understand but also their ability to apply the basic knowledge that they learn. On the other hand, students who follow a surface learning approach focus more on meeting the course requirements and therefore use low-level cognitive skills to memorize main ideas and important parts of the material. In contrast to the deep learning approach, the surface approach is relatively passive and fails to motivate students to engage in the thoughtful reflection required to enable deeper understanding of the material and successful application of the information included in this material ([Biggs, 1987](#)).

Further work on learning approaches has shown that deep and surface approaches differ based on the motivation level and the strategy involved in the learning process. In particular, motivation is related to the reasons for students to approach a specific learning task, and strategy is related to the way in which students complete this task. Obviously,

the two concepts are interrelated. Motivation can be extrinsic which encourages utilizing surface strategies and leads to surface learning or intrinsic which encourages utilizing deep strategies and enables deep learning [Biggs and Tang \(2011\)](#). When students perform an activity only to achieve a grade or meet instructor's requirements, they are extrinsically motivated. Surface learners, then, focus on meeting the minimum requirements of a task and fail to utilize high-level cognitive skills. In contrast, when students are intrinsically motivated they focus on how interesting and challenging the task is more than they focus on the demands of the assessment. These concepts of motivation and strategy were used by [Biggs \(1987\)](#) to develop a the main measure in the literature of student learning approaches using a Study Process Questionnaire.

Based on the pedagogical literature reviewed above, we propose the following hypotheses:

Hypothesis 1a: Deep approaches to learning are positively associated with student satisfaction.

Hypothesis 1b: Surface approaches to learning are negatively associated with student satisfaction.

2.3. Experiential Learning Theory

Experiential learning can be defined as "the process whereby knowledge is created through the transformation of experience" ([Kolb, 1984](#)). Experiential learning, thus, provides learners with tangible learning experiences rather than abstract knowledge ([Lai and McNaughton, 2009](#)). In his seminal work, [Kolb \(1984\)](#) developed a model consisting of four stages that represent the building blocks of experiential learning: concrete experience; reflective observation; abstract conceptualisation; and active experimentation. This model is illustrated in [Figure 1](#). The concrete experience stage is where the learner experiences an activity. The learner then reflects on this activity or experience during the reflective observation stage. Experiential learning, thus, exposes learners to tangible learning contexts rather than abstract knowledge ([Lai and McNaughton, 2009](#)). In the abstract conceptualization stage, the learner attempts to conceptualize a theory or model based on the reflective observation. This stage might also involve the learners adjusting

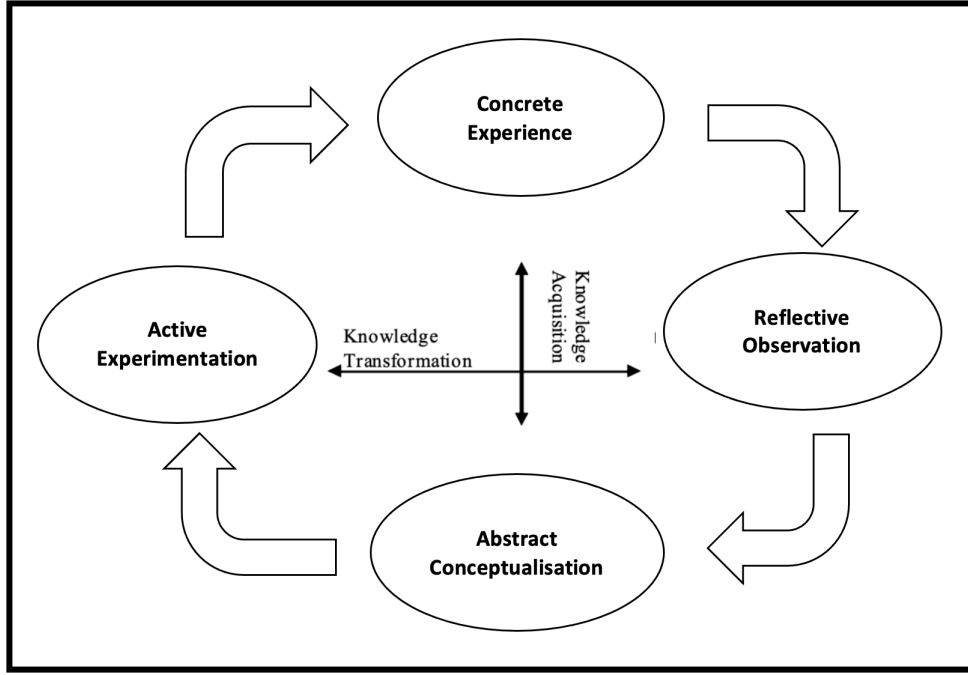


Figure 1: The Experiential Learning Cycle. Adopted from Kolb (1984).

their current conceptual understanding of theories and models based on recent understanding of the concrete experience. In the active experimentation stage, the learner tests the theory or model using data. The tests undertaken in the active experimentation stage result in a concrete experience in the next learning cycle. Kolb (1984) show that this concrete experience not only can be used to validate and test abstract concepts, but also can provide an opportunity to test the implications and validity of understanding developed during the learning process. In other words, Kolb (1984) presents the learning process as a cycle that starts from and ends at the concrete experience. This learning cycle can be repeated where each cycle involves a higher level of depth and complexity in learning (Siegel et al., 1997) and due to being a continuous process it can be seen as a spiral of cycles (Healey and Jenkins, 2000).

Based on the pedagogical literature reviewed above, we propose the following hypotheses:

Hypothesis 2a: Simulation-based experiential learning activities are positively related to a deep approach to learning.

Hypothesis 2b: Simulation-based experiential learning activities are negatively related to a surface approach to learning.

Hypothesis 3: The effect the simulation-based experiential learning activities on student satisfaction is mediated by the students' approach to learning.

3. Methods

This section discusses the details of the experiential learning activity, the survey design and measures, and the model.

3.1. The Stock Market Analysis Project

The Stock Market Analysis course was used in this study. This course provides an introduction to the modern finance theory and its applications to equity investing. The course has two main goals. The first goal is to develop students' knowledge and understanding of the main theories and methods of equity valuation. The second goal is to develop students' skills in stock portfolio management by enabling them to make investment decisions based on their understanding of the theories and methods of equity valuation. We aimed to achieve these two goals using a simulation-based experiential learning approach in which the students are actively engaged. To this end, we designed an experiential learning activity represented in a semester-long project that students need to complete using the MarketWatch Virtual Stock Exchange (VSE). This platform simulates the stock market and provides a live trading and investing experience similar to what happens in the real world, albeit with virtual money instead of real money. In this project, the students need to identify and analyse some individual stocks based on their understanding of the theories and methods of equity valuation. Then, they make the appropriate investment decisions to build and manage their own stock portfolio on the VSE. Finally, they write a report about the project to reflect on their investment decisions and the analysis that underlined these decisions. Full details of the simulation-based investment project are provide in [Appendix A](#).

We follow the four criteria proposed by [Wright-Maley \(2015\)](#) to ensure that the simulation-based investment project achieves its objectives. First, the simulation design reflects the reality of the stock market in a in a structured and limited way where

we provide specific parameters for the variables included in the simulation. Second, the investment simulation illustrates the dynamics of the stock market and reflects the significant changes in the market due to dynamic events such as news and policy makers decisions. Third, the investment simulation incorporates the students in active roles where they act as decision makers who analyse and make investment decisions related to their own stock portfolios. Finally, the investment simulation is pedagogically mediated in terms of making sure that the simulation is instructive and will help students improve their understanding of the finance theories and concepts.

3.2. Survey Design and Measures

At the end of semester, students were asked to fill an online questionnaire consisting of four sections. The questionnaire included scales for the four main variables included in the study where each scale included a number of items that were ordered randomly. All items and sections of the questionnaire are presented in Appendix 1.

Simulation-based Experiential Learning Stages Scale. The first section of the questionnaire aimed to capture students' perceptions of how well the stock market analysis project, our simulation-based experiential learning activity, included each of the four stages of the experiential learning cycle of Kolb (1984). To this end, we utilised a scale developed by Young et al. (2008) based on the literature on experiential learning (e.g., Kolb (1985)'s Learning Styles Inventory and Kember et al. (2000)'s Level of Reflective Thinking scale). The scale includes four sub-dimensions that cover concrete experience, reflective observation, abstract conceptualization, and active experimentation. In total, the scale includes 12 items divided into 3 items for each sub-dimension.

Student's Approaches to Learning Scale. The second and third sections of our questionnaire aimed to measure students' approach to learning. To this end, we utilised the two-factor Study Process Questionnaire developed by Biggs et al. (2001). The scale consists of two dimensions: Deep Approach (10-item) and Surface Approach (10-item). Each dimension is further divided into two sub-dimensions: motivation (5-item) and strategy (5-item). We modified the scale's items to consider the stock market analysis project, our simulation-based experiential learning activity.

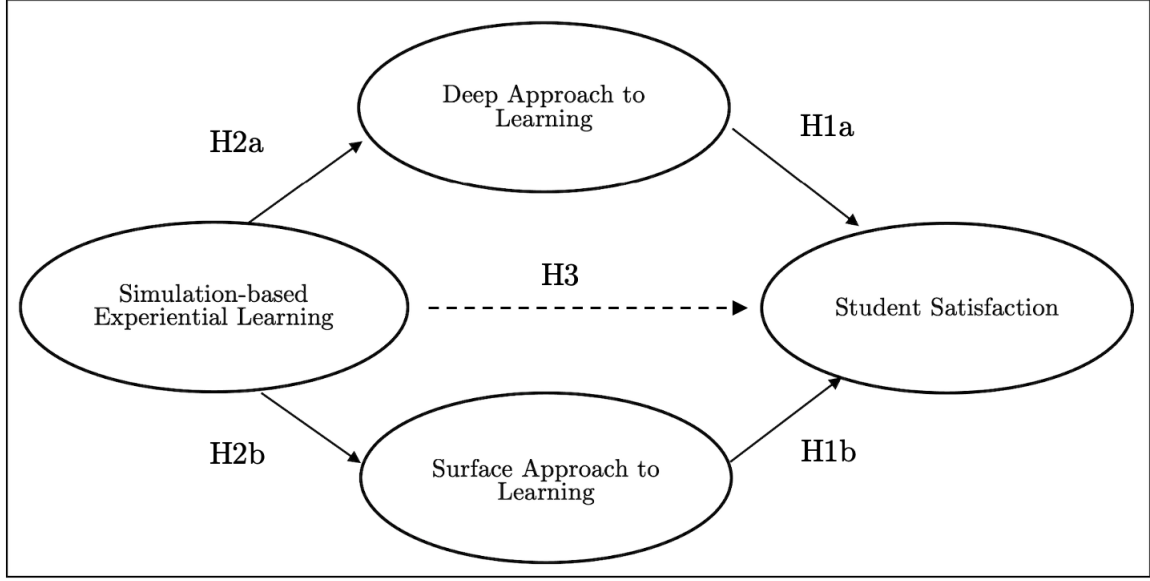


Figure 2: The conceptual model of the effect of simulation-based experiential learning on student satisfaction

Student’s Satisfaction Scale. The fourth section of our questionnaire aimed to measure student’s satisfaction. To this end, we utilise the UK’s National Student Survey (NSS) ([Office for Students, 2021](#)). The NSS is designed to collect feedback from final-year university students to measure their satisfaction with their courses of study ([Cheng and Marsh, 2010](#)). We use a modified version of the Core NSS consisting of 20 items which cover the teaching and learning (8 items), feedback and support (4 items), organisation and management (3 items), and overall satisfaction (5 items).

3.3. Model

In order to test the hypotheses proposed in this study, we build a conceptual model as illustrated in [Figure 2](#). The main independent variable in this model is the simulation-based experiential learning. The main dependent variable in this model is the student satisfaction which is modeled as a function of the student’s approaches to learning including the deep approach (Hypothesis 1a) and surface approach (Hypothesis 1b). Both deep and surface approaches are also considered dependent variables and are modeled in turn as functions of simulation-based experiential learning (Hypotheses 2a and 2b). Overall, the model effectively evaluates the indirect effect of simulation-based experiential learning on student satisfaction (Hypothesis 3).

Furthermore, to examine the proposed model and relationships, we use structural

equation modeling (SEM). Using SEM to fit our conceptual model to data has several benefits. First, SEM is suitable for complicated models that incorporate multiple dependent variables or those that use variables measured by multiple indicators as in the case of survey data (Cheon and MacKinnon, 2012). Another benefit is that SEM makes use of a measurement model to enhance the reliability of the measured constructs, and a structural model to examine the possibility of indirect interrelationships among the constructs (Cheon and MacKinnon, 2012). Also, SEM fits the model to data simultaneously to estimate the model parameters which enables us to control for and partial out other relationships that might influence the impact of simulation-based experiential learning on student satisfaction and reduces the need for controlling variables (Iacobucci, 2008).

Furthermore, in order to assess the model's goodness of fit to the data, we use four fit statistics as suggested by Kline (2015). The model chi-square and the relative chi-square to degrees of freedom ratio (CMIN) which assess the overall fit and the discrepancy between the sample and fitted covariance matrices. The chi-square p-value should be > 0.05 and the value of CMIN should be < 3 . The Root Mean Square Error of Approximation (RMSEA) is a parsimony-adjusted index. It should be < 0.08 and values closer to 0 represent a good fit. The Comparative Fit Index (CFI) compares the fit of a target model to the fit of an independent, or null, model. It should be > 0.90 . The Standardized Root Mean Square Residual (SRMR) represents the square-root of the difference between the residuals of the sample covariance matrix and the hypothesized model. It should be < 0.08 .

4. Results and Discussion

In this section, we provide the details of the study conducted and discuss the main results.

4.1. *The Sample and Data Collection*

This study utilized a survey methodology conducted by the author at a large UK university. Ethical approvals were obtained before conducting the study and the purpose of the research was explained to the students. The target population consists of 117 students studying the Stock Market Analysis course in the academic year 2020/2021. The target group consisted of 57.2% males and 42.8% females. The students were required

to undertake the stock market analysis project as described in section 3.1 above. At the end of the semester, students were asked to complete an online survey as explained in section 3.2 above. The response to the survey was voluntary and the survey was designed to maintain the anonymity of participants. The data was collected during January and February 2021. Overall, we received a total of 57 valid survey responses. Male and female students accounted for 54.4% and 45.6%, respectively. Most participants were in the 20-29 age group. We use the Cochran's formula for continuous data to determine the adequacy of the sample size [Cochran \(2007\)](#). Based on a confidence level of 95%, an acceptable margin of error of 0.05, and an estimated standard deviation in a 5-point scale of 0.83, an overall sample size of 42 was needed. As the sample included 57 responses, the sample size can be considered adequate.

4.2. Descriptive Statistics

We start with exploring the responses collected using the questionnaire. [Table 1](#) provides detailed descriptive statistics of all the items of the questionnaire. The distribution of responses shows that most respondents either agree or strongly agree (scores 4 and 5) with the majority of items. The main exception is the responses to the items of the surface approach to learning scale where more respondents either strongly disagree or disagree with the items (scores 1 and 2). This is confirmed by the mean value of responses which is higher than 4.05 with relatively low standard deviation for most items indicating strong agreement, while the mean value of the items of surface approach to learning is much lower at a relatively higher standard deviation indicating more disagreement.

To further illustrate the data collected at the scales and sub-scales levels, we provide in [Figure 3](#) a histogram of the mean responses of the items included in each one of the sub-scales. As can be seen, for most scales the responses are clustered in the agreement and strong agreement categories with the main exception being the two sub-dimensions of the surface approach to learning which are more skewed towards disagreement.

Also, [Table 2](#) provides descriptive statistics of the main scales and sub-scales based on the sum of responses of the items included in each scale and sub-scale. The main observation here is that the deep approach to learning scales have higher mean, lower standard deviation, and higher minimum values compared to the surface approach to

Item Number	Description of items	N	Response categories					Mean	Std. Dev.	α_i	H_{ij}
			1	2	3	4	5				
Experiential Learning Stages [12 items, $\alpha = 0.94$]											
Sub Dimension: Concrete Experience. [3 items, $\alpha = 0.86$]											
1	The stock market analysis project provided me with a direct practical experience to help understand the module concepts.	57	-	-	3.51%	38.60%	57.89%	4.54	0.56	0.73	0.82
2	The stock market analysis project gave me a concrete experience that helped me learn the class material.	57	-	1.75%	3.51%	42.11%	52.63%	4.45	0.65	0.8	0.76
3	The stock market analysis project presented me with a "real world" experience related to this module.	57	-	-	3.51%	50.88%	45.61%	4.42	0.56	0.86	0.73
Sub Dimension: Reflective Observation. [3 items, $\alpha = 0.79$]											
4	The stock market analysis project assisted me in thinking about what the module material really means to me.	57	-	-	12.28%	35.09%	52.63%	4.40	0.70	0.77	0.66
5	The stock market analysis project helped me relate my personal experiences to the content of this module.	57	-	1.75%	1.75%	56.14%	40.35%	4.35	0.61	0.64	0.72
6	The stock market analysis project aided me in connecting the module content with things I learned in the past.	57	-	1.75%	7.02%	49.12%	42.11%	4.31	0.68	0.73	0.62
Sub Dimension: Abstract Conceptualization. [3 items, $\alpha = 0.84$]											
7	The stock market analysis project required me to think how to correctly use the terms and concepts from this class.	57	-	-	5.26%	43.86%	50.88%	4.45	0.59	0.88	0.63
8	The stock market analysis project caused me to think how the class concepts were inter-related.	57	-	-	12.28%	42.11%	45.61%	4.33	0.69	0.68	0.8
9	The stock market analysis project made me organize the class concepts into a meaningful format.	57	-	1.75%	8.77%	36.84%	52.63%	4.40	0.72	0.76	0.73
Sub Dimension: Active Experimentation. [3 items, $\alpha = 0.85$]											
10	The stock market analysis project made it possible for me to try things out for my self.	57	-	-	5.26%	35.09%	59.65%	4.54	0.59	0.81	0.68
11	The stock market analysis project permitted me to actively test my ideas of how the module material can be applied.	57	-	1.75%	8.77%	40.35%	49.12%	4.36	0.72	0.82	0.73
12	The stock market analysis project allowed me to experiment with the module concepts in order to understand them.	57	-	-	5.26%	35.09%	59.65%	4.54	0.59	0.72	0.75
Deep Approach to Learning. [10 items, $\alpha = 0.91$]											
Sub Dimension: Deep Motivation. [5 items, $\alpha = 0.91$]											
13	The stock market analysis project gave me a feeling of deep personal satisfaction.	57	1.75%	5.26%	12.28%	47.37%	33.33%	4.05	0.91	0.89	0.72
14	The stock market analysis project helped me create questions that I wanted answered.	57	-	-	10.53%	43.86%	45.61%	4.35	0.66	0.9	0.69
15	The stock market analysis project made me work hard because I found the material interesting.	57	1.75%	-	3.51%	49.12%	45.61%	4.36	0.72	0.88	0.79
16	The stock market analysis project was at times as exciting as a good novel or movie.	57	1.75%	3.51%	12.28%	52.63%	29.82%	4.05	0.85	0.87	0.8
17	The stock market analysis project was interesting once I got into it.	57	-	-	10.53%	43.86%	45.61%	4.35	0.66	0.88	0.79
Sub Dimension: Deep Strategies. [5 items, $\alpha = 0.88$]											
18	The stock market analysis project provided me with enough work on the topic so I could form my own conclusions.	57	-	1.75%	7.02%	56.14%	35.09%	4.24	0.66	0.87	0.58
19	The stock market analysis project caused me to look at most of the suggested readings that pertained to the activity.	57	-	3.51%	57.89%	38.60%	4.35	0.55	0.86	0.64	
20	The stock market analysis project caused me to spend time relating its topics to other topics which have been discussed in different classes.	57	-	-	1.75%	61.40%	36.84%	4.35	0.51	0.84	0.72
21	The stock market analysis project allowed me to test myself on important topics until I understood them completely.	57	-	-	8.77%	50.88%	40.35%	4.31	0.63	0.85	0.65
22	The stock market analysis project's topics were interesting and I often spent extra time trying to obtain more information about them.	57	-	1.75%	7.02%	56.14%	35.09%	4.24	0.66	0.85	0.66
Surface Approach to Learning. [10 items, $\alpha = 0.96$]											
Sub Dimension: Surface Motivation. [5 items, $\alpha = 0.95$]											
23	For the stock market analysis project, it was not helpful to study topics in depth because all you needed was a passing acquaintance with topics.	57	10.53%	24.56%	15.79%	26.32%	22.81%	3.26	1.34	0.94	0.83
24	I was able to get by in the stock market analysis project by memorizing key sections rather than trying to understand them.	57	10.53%	24.56%	19.30%	22.81%	22.81%	3.22	1.33	0.94	0.81
25	For the stock market analysis project there was no point in learning material which was not likely to be on the exam.	57	17.54%	31.58%	12.28%	19.30%	19.30%	2.91	1.41	0.93	0.85
26	I did not find the stock market analysis project very interesting so I kept my work to a minimum.	57	22.81%	35.09%	10.53%	15.79%	15.79%	2.66	1.40	0.93	0.86
27	My aim for the stock market analysis project was to complete it while doing as little work as possible.	57	22.81%	26.32%	10.53%	17.54%	22.81%	2.91	1.51	0.94	0.81
Sub Dimension: Surface Strategies. [5 items, $\alpha = 0.92$]											
28	The stock market analysis project suggests the best way to pass exams is to try to remember answers to likely test questions.	57	28.07%	22.81%	17.54%	15.79%	15.79%	2.68	1.44	0.9	0.81
29	I believe that the instructor shouldn't expect me to spend significant amounts of time on the stock market analysis project if it's not on an exam.	57	26.32%	35.09%	10.53%	12.28%	15.79%	2.56	1.41	0.89	0.85
30	For the stock market analysis project, I restricted my study to what was specifically required as it was unnecessary to do anything extra.	57	22.81%	28.07%	14.04%	21.05%	14.04%	2.75	1.39	0.9	0.79
31	For the stock market analysis project, I learned things by going over and over them until I knew them by heart even if I did not understand them.	57	7.02%	8.77%	15.79%	47.37%	21.05%	3.66	1.12	0.94	0.68
32	For the stock market analysis project, I only applied what was given in class or on the module outline.	57	10.53%	19.30%	24.56%	28.07%	17.54%	3.22	1.25	0.9	0.78
Satisfaction. [20 items, $\alpha = 0.94$]											
Sub Dimension: Teaching and Learning. [8 items, $\alpha = 0.88$]											
33	The module has been intellectually stimulating.	57	-	1.75%	8.77%	45.61%	43.86%	4.31	0.71	0.86	0.54
34	The module has challenged me to achieve my best work.	57	-	1.75%	7.02%	52.63%	38.60%	4.28	0.67	0.87	0.46
35	The module has provided me with opportunities to explore ideas or concepts in depth.	57	-	-	3.51%	57.89%	38.60%	4.35	0.55	0.85	0.59
36	The module has provided me with opportunities to bring information and ideas together from different topics.	57	-	-	-	59.65%	40.35%	4.40	0.49	0.84	0.73
37	The module has provided me with opportunities to apply what I have learnt.	57	-	-	1.75%	50.88%	47.37%	4.45	0.53	0.86	0.57
38	The content of the module has been useful.	57	-	-	3.51%	56.14%	40.35%	4.36	0.55	0.87	0.43
39	The quality of instruction I receive in most of this module have been excellent.	57	-	3.51%	8.77%	54.39%	33.33%	4.17	0.73	0.88	0.44
40	The module has been effectively taught.	57	1.75%	-	10.53%	56.14%	31.58%	4.15	0.75	0.86	0.57
Sub Dimension: Feedback and Support. [4 items, $\alpha = 0.83$]											
41	Assessment methods employed in this module require an in-depth understanding of the module content.	57	-	3.51%	8.77%	56.14%	31.58%	4.15	0.72	0.8	0.62
42	The criteria used in marking have been clear in advance.	57	-	1.75%	5.26%	54.39%	38.60%	4.29	0.65	0.79	0.61
43	I have received sufficient advice and guidance in relation to this module.	57	-	8.77%	52.63%	38.60%	4.29	0.62	0.81	0.56	
44	Feedback on my work has been timely.	57	-	-	3.51%	42.11%	54.39%	4.50	0.57	0.73	0.8
Sub Dimension: Organisation and Management. [3 items, $\alpha = 0.78$]											
45	The learning outcomes of this module have been clear	57	-	-	3.51%	56.14%	40.35%	4.36	0.55	0.64	0.66
46	The module has been well organised and has been running smoothly.	57	-	-	10.53%	50.88%	38.60%	4.28	0.64	0.73	0.57
47	The workload on this module has been manageable	57	-	-	8.77%	54.39%	36.84%	4.28	0.61	0.75	0.56
Sub Dimension: Overall Satisfaction. [5 items, $\alpha = 0.85$]											
48	As a result of this module, I believe that I have improved my career prospects.	57	-	-	7.02%	54.39%	38.60%	4.31	0.60	0.83	0.62
49	The value-added that I have got from this module is very high.	57	-	7.02%	12.28%	54.39%	26.32%	4.00	0.82	0.87	0.49
50	Overall, I am satisfied with the quality of the module.	57	-	1.75%	5.26%	47.37%	45.61%	4.36	0.67	0.8	0.69
51	All in all, if I had to do it over again, I would enrol on this module.	57	-	5.26%	3.51%	33.33%	57.89%	4.43	0.80	0.81	0.65
52	I am highly likely to recommend this module to a friend or a colleague.	57	-	1.75%	7.02%	28.07%	63.16%	4.52	0.70	0.78	0.77

Table 1: Descriptive Statistics.

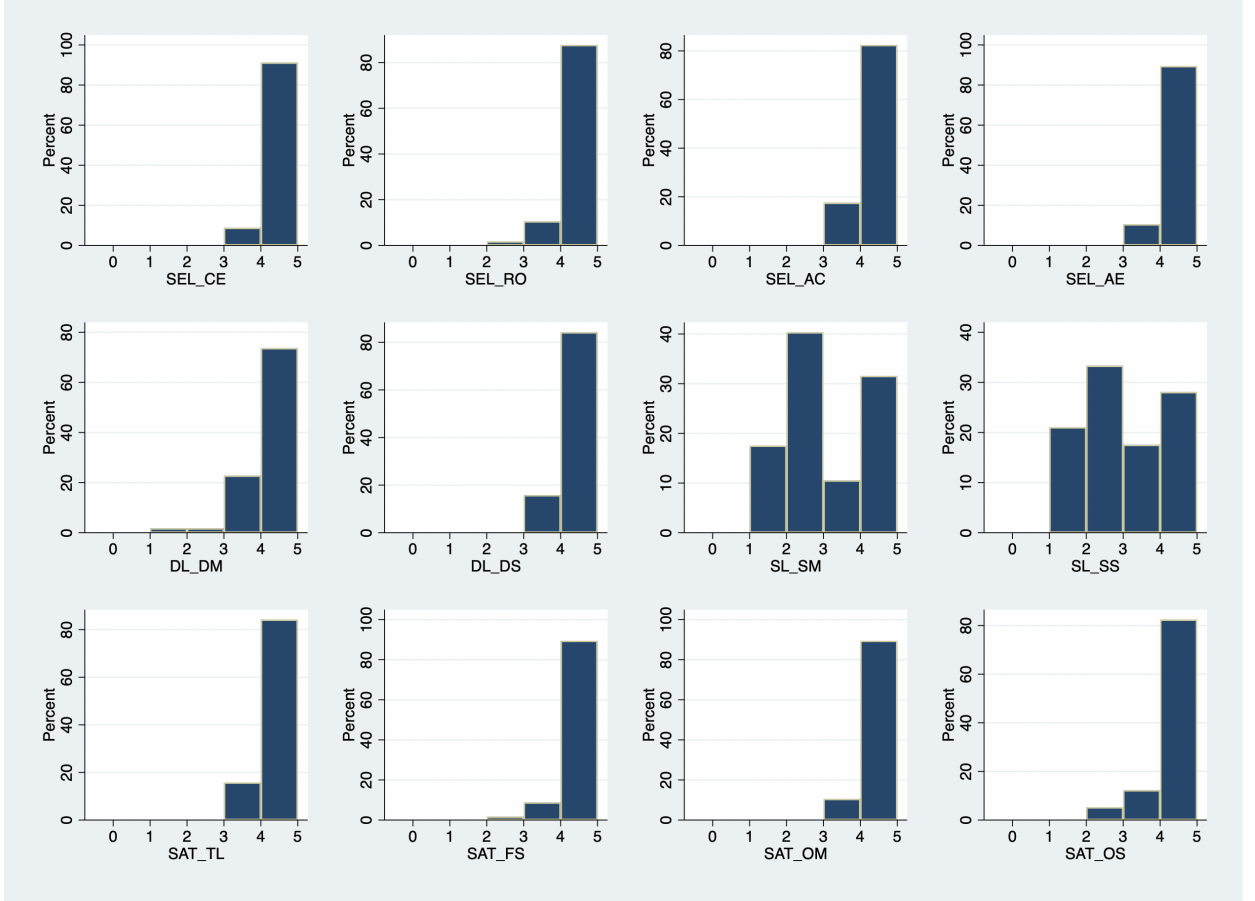


Figure 3: Descriptive Statistics: Histogram of the mean responses of the items included in each one of the sub-scales. $N = 57$.

learning scales. This indicates that respondents believe that simulation-based experiential learning could encourage the deep approach to learning and discourage the surface approach to learning.

Finally, we present in [Table 3](#) a correlation matrix between the main and sub-scales. This matrix shows that the correlation coefficients between the sub-scales of the surface approach to learning and other scales are very low and are not statistically significant. We can also infer from this matrix an initial indication of the strong association between simulation-based experiential learning and both the deep approach to learning and student satisfaction.

	Items	Obs	Mean	Std. Dev.	Min	Max
Experiential Learning Stages						
Concrete Experience	3	57	13.42	1.58	10	15
Reflective Observation	3	57	13.07	1.68	7	15
Abstract Conceptualization	3	57	13.19	1.77	9	15
Active Experimentation	3	57	13.46	1.68	10	15
Deep Approach to Learning						
Deep Motivation	5	57	21.18	3.27	9	25
Deep Strategies	5	57	21.51	2.48	16	25
Surface Approach to Learning						
Surface Motivation	5	57	14.98	6.39	5	25
Surface Strategies	5	57	14.89	5.83	5	25
Student Satisfaction						
Teaching and Learning	8	57	34.51	3.64	28	40
Feedback and Support	4	57	17.26	2.08	11	20
Organisation and Management	3	57	12.93	1.52	9	15
Overall Satisfaction	5	57	21.44	2.84	12	25

Table 2: Descriptive Statistics of the main scales and sub-scales based on the sum of responses of the items included in each scale and sub-scale.

	CE	RO	AC	AE	DM	DS	SM	SS	TL	FS	OM	OS
Concrete Experience	1											
Reflective Observation	0.74*	1										
Abstract Conceptualization	0.69*	0.79*	1									
Active Experimentation	0.74*	0.64*	0.76*	1								
Deep Motivation	0.55*	0.75*	0.69*	0.65*	1							
Deep Strategies	0.59*	0.68*	0.71*	0.62*	0.59*	1						
Surface Motivation	0.04	0.09	0.05	0.06	0.05	0.27	1					
Surface Strategies	0.09	0.10	0.05	0.01	0.05	0.2	0.89*	1				
Teaching and Learning	0.60*	0.59*	0.73*	0.63*	0.60*	0.74*	0.03	0.02	1			
Feedback and Support	0.54*	0.53*	0.68*	0.50*	0.52*	0.65*	0.01	0.03	0.79*	1		
Organisation & Management	0.61*	0.62*	0.68*	0.50*	0.52*	0.75*	0.21	0.15	0.73*	0.82*	1	
Overall Satisfaction	0.50*	0.54*	0.58*	0.44*	0.49*	0.62*	0.11	0.04	0.70*	0.74*	0.72*	1

Table 3: Correlation Matrix. All correlation coefficients with a * are significant at the $p = 0.01$ level.

4.3. Validity and Reliability of Measures

The next step in our analysis is to check the validity and reliability of the questionnaire and the variables constructed based on this questionnaire. Table 4 reports Cronbach's alpha as a measure of internal consistency and Loevinger's H coefficient as a measure of scalability (Gliem and Gliem, 2003). As can be seen, the values of alpha for all sub-scales are higher than 0.7 indicating higher consistency between the items and the scales consisting of these items. In addition the values of H coefficient are higher than 0.5 for all scales and sub-scales. These values of alpha and H indicate a high level of reliability in the questionnaire responses and increases our confidence that the questionnaire provides consistent measures of the variables constructed to test our research hypotheses.

	Items	Cronbach's alpha	Loevinger's H coefficient
Experiential Learning Stages	12	0.94	0.64
Concrete Experience	3	0.86	0.77
Reflective Observation	3	0.79	0.66
Abstract Conceptualization	3	0.84	0.72
Active Experimentation	3	0.85	0.72
Deep Approach to Learning	10	0.91	0.59
Deep Motivation	5	0.91	0.76
Deep Strategies	5	0.88	0.65
Surface Approach to Learning	10	0.96	0.78
Surface Motivation	5	0.95	0.83
Surface Strategies	5	0.92	0.79
Student Satisfaction	20	0.94	0.53
Teaching and Learning	8	0.88	0.53
Feedback and Support	4	0.83	0.64
Organisation and Management	3	0.78	0.59
Overall Satisfaction	5	0.85	0.64

Table 4: Validity and Reliability: Measures of internal consistency (alpha) and scalability (H) of the main measurement scales and their components. N = 57.

Further, [Figure 4](#) illustrates the convergence and divergence validity of the main scales. In particular, it shows the correlations between the items and the scores of the four main scales: simulation-based experiential learning, deep learning, surface learning, and student satisfaction. This helps to test whether the items are correlated enough with the dimension they theoretically belong to, and whether they are more correlated with their own dimension than with other dimensions. Overall, it is clear that all the correlations between the items and their dimension are significantly higher than the 0.4 threshold indicating high degree of convergence. It also appears that all items are more correlated with their own dimension than with other dimensions indicating high degree of divergence. This indicates a high level of validity in the variables constructed to test our research hypotheses. We also provide similar measures of convergence and divergence validity of the 12 sub-scales we use in our analysis. In particular, [Figures 5-8](#) illustrate the convergence and divergence validity of the sub-scales of simulation-based experiential learning, deep learning, surface learning, and student satisfaction, respectively. Based on the correlations between the items and their sub-dimensions, we can confidently conclude that there is a high level of validity in the sub-variables constructed to test our research hypotheses.

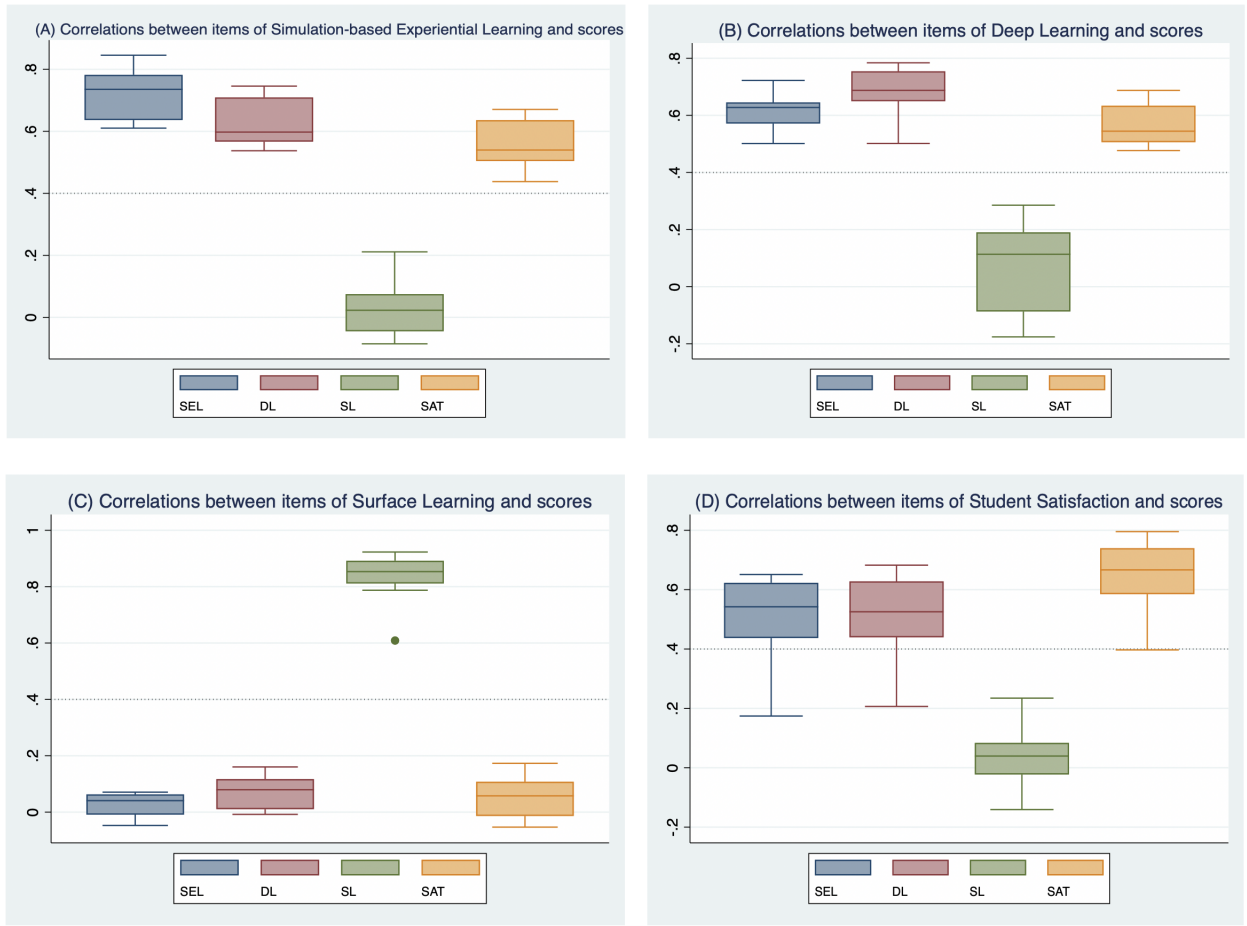


Figure 4: Convergence and Divergence: The correlations between the items and the scores of the four main scales: simulation-based experiential learning, deep learning, surface learning, and student satisfaction.



Figure 5: Convergence and Divergence: The correlations between the items and the scores of the subscales of simulation-based experiential learning.

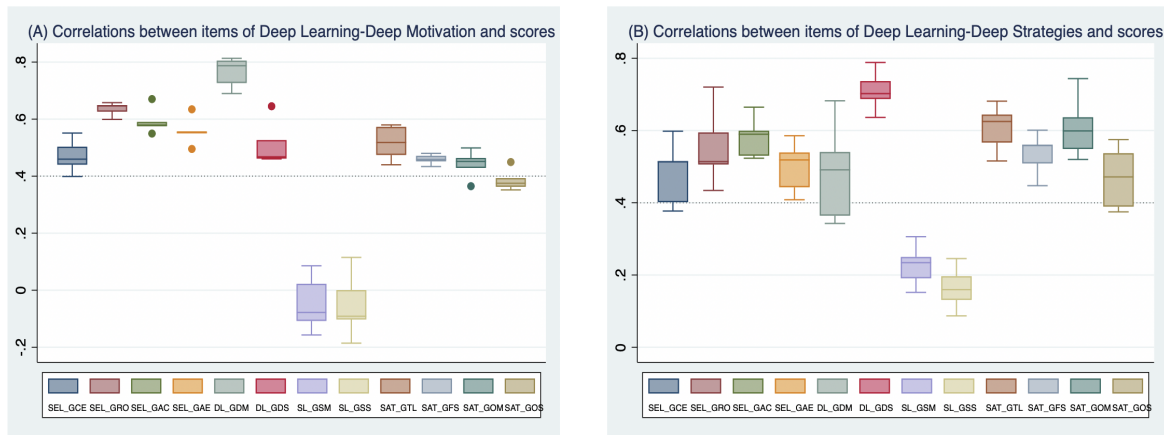


Figure 6: Convergence and Divergence: The correlations between the items and the scores of the subscales of deep learning.

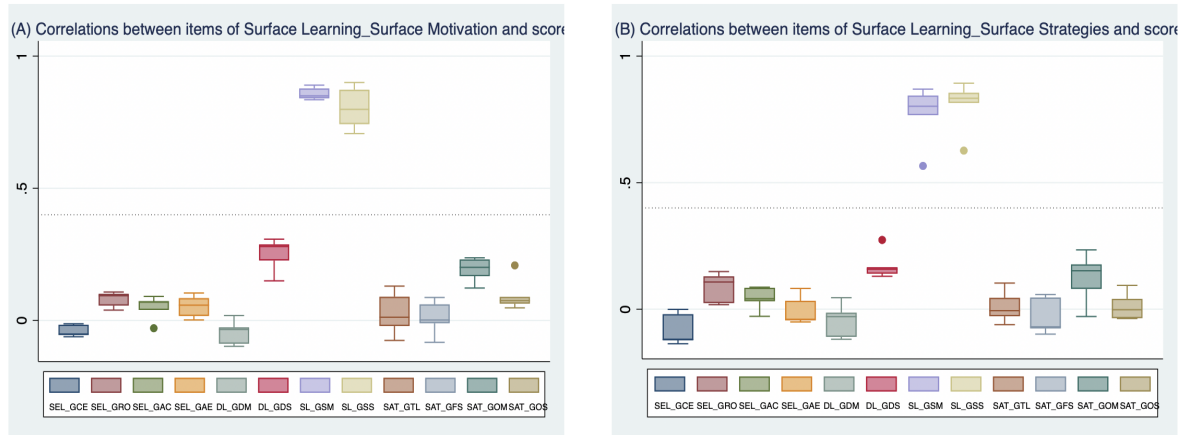


Figure 7: Convergence and Divergence: The correlations between the items and the scores of the sub-scales of surface learning.



Figure 8: Convergence and Divergence: The correlations between the items and the scores of the sub-scales of student satisfaction

4.4. Confirmatory Factor Analysis

Following the tests of validity and reliability above, we run an initial confirmatory factor analysis to examine the degree to which the supposed structure of the questionnaire fits the data including the number of scales/sub-scales and the clustering of items (Brown and Moore, 2012). We first fit a five-factor confirmatory factor model to data to check the validity of the five main scales used in the analysis. Based on the cutoff criteria suggested by Hu and Bentler (1999), the results show an adequate fit for the model with a comparative fit index (CFI) of 0.99, a chi-square χ^2 minimum ratio of 0.001, and a root mean square error of approximation (RMSEA) of 0.001. We then fit a twelve-factor confirmatory factor model to data to check the validity of the twelve sub-scales used in the analysis. The results also show an adequate fit for the model with a CFI of 0.98, a χ^2 minimum ratio of 0.001, and a RMSEA of 0.002. Overall, the results show that the supposed structure fits the data adequately well indicating a high level of validity in the constructs used to test our research hypotheses.

4.5. Main Results

We use structural equation modeling to test our research hypotheses as shown by the conceptual model in Figure 2. The model's parameters were estimated using the maximum likelihood method. The adequacy of the model fit is assessed based on the criteria suggested by Schermelleh-Engel et al. (2003) who recommend that a ratio of chi-square to degrees of freedom (χ^2/df) between 0 and 2, comparative fit index (CFI) above 0.97, and a standardized root mean squared residuals (SRMSR) less than 0.05 indicate a good fit of the model to data. The estimated model is shown in Figure 9. All the parameters are standardised. The significance of all coefficient estimates displayed on the model solution is measured at the $p = 0.05$ level. Table 5 provides the details of the path coefficients and significance in the model. The estimated goodness of fit indices are $(\chi^2/df) = 1.86$, CFI = 0.987, and SRMSR = 0.043. This indicates that the supposed model fits the adequately well. Also, R^2 for the Student Satisfaction as a function of deep and surface approaches to learning and simulation-based experiential learning is 0.83 indicating that a significant percent of the variance in student satisfaction is being explained by the changes in the independent variables.

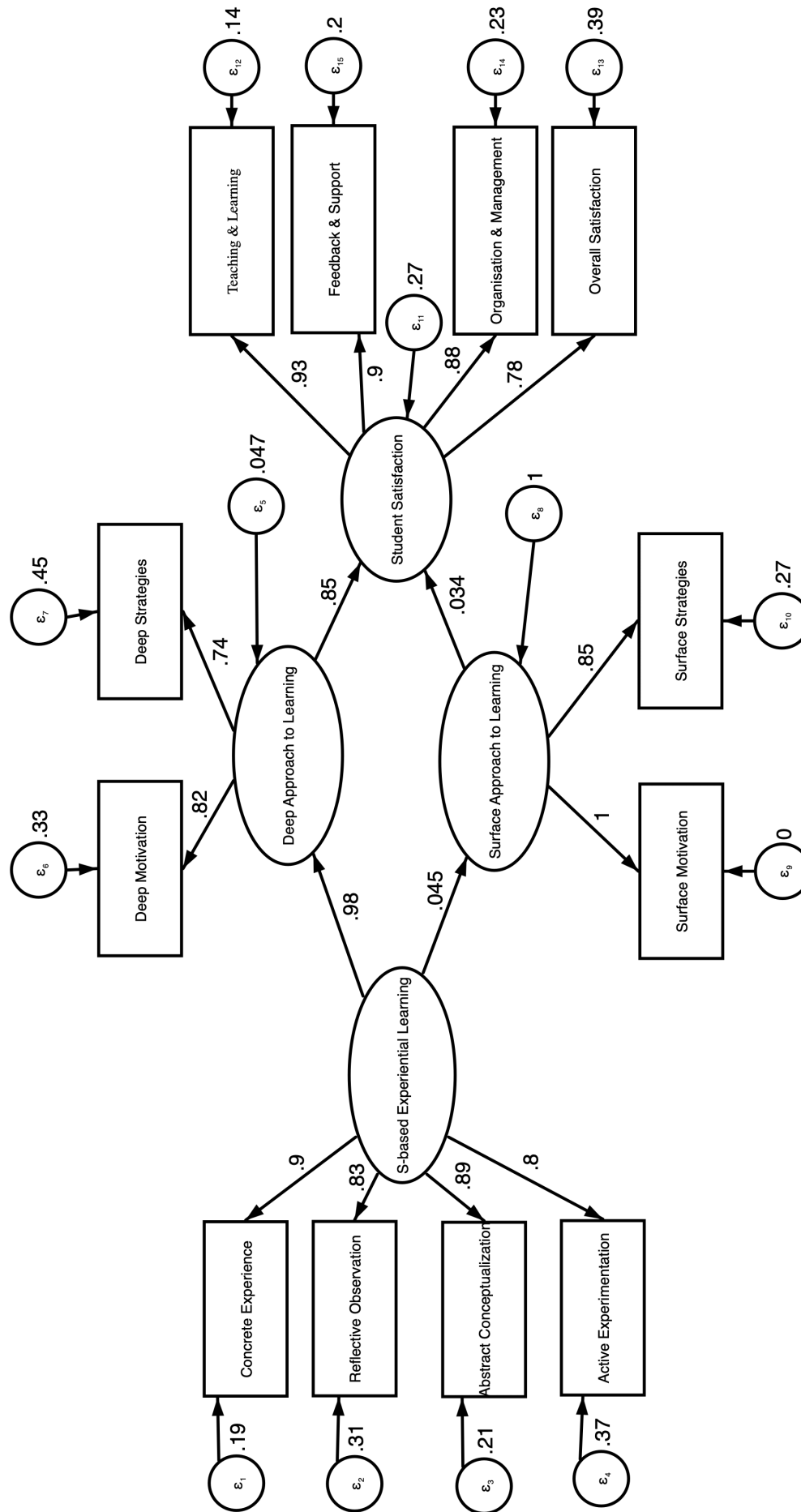


Figure 9: Estimated Structural Equation Model (SEM) of the effect of simulation-based experiential learning on student satisfaction. All coefficients are standardised. $N = 57$. Significance is based on $p=0.05$.

Path	Relationship	Path Coefficient
1	Concrete Experience –> Simulation-based Experiential Learning	0.9***
2	Reflective Observation –> Simulation-based Experiential Learning	0.83***
3	Abstract Conceptualisation –> Simulation-based Experiential Learning	0.89***
4	Active Experimentation –> Simulation-based Experiential Learning	0.9***
5	Deep Motivation –> Deep Approach to Learning	0.82***
6	Deep Strategies –> Deep Approach to Learning	0.74***
7	Surface Motivation –> Surface Approach to Learning	1***
8	Surface Strategies –> Surface Approach to Learning	0.85***
9	Teaching Learning –> Student Satisfaction	0.93***
10	Feedback Support –> Student Satisfaction	0.9***
11	Organisation Management –> Student Satisfaction	0.88***
12	Overall Satisfaction –> Student Satisfaction	0.78**
13	Deep Approach to Learning –> Student Satisfaction	0.85***
14	Surface Approach to Learning –> Student Satisfaction	0.034 ^{n.s.}
15	Simulation-based Experiential Learning –> Deep Approach to Learning	0.98***
16	Simulation-based Experiential Learning –> Surface Approach to Learning	0.045 ^{n.s.}

** significant at 0.05 level, *** significant at 0.01 level., n.s. = non-significant.

Table 5: Path coefficients and significance in the structural equation model of student satisfaction.

The coefficient of the path between the deep approach to learning and student satisfaction is 0.85 indicating that students who find the simulation-based experiential learning activities intrinsically motivating and rely on deeper learning strategies appear to have a more positive learning experience and are more satisfied. For example, around 89% of respondents report that the the stock market analysis project helped them to create questions that they wanted answered, while 95% report that the project made them work hard because they found the material interesting. Also, about 96% of the respondents agree that the the stock market analysis project encouraged them to look at most of the suggested readings that pertained to the activity, while about 91% of them find the project’s topics were interesting and they often spent extra time trying to obtain more information about them. Overall, this supports Hypothesis 1a that deep approaches to learning are positively associated with student satisfaction.

Furthermore, the coefficient of the path between the surface approach to learning and student satisfaction is 0.034 and is not significant. This indicates that students who complete the simulation-based experiential learning activities only with surface motivation and rely on memorization or other low level surface learning strategies are less satisfied and have a relatively negative learning experience. For instance, only 32% of respondents report that they did not find the stock market analysis project very interesting so they kept their work to a minimum, while only 39% of respondents report that there was no

point in learning material which was not likely to be on the exam. In addition, only 32% of respondents find that the stock market analysis project suggests the best way to pass exams is to try to remember answers to likely test questions, while only 35% of them report that they restricted their study to what was specifically required as it was unnecessary to do anything extra. Overall, this supports Hypothesis 1b which states that surface approaches to learning are negatively associated with student satisfaction.

In addition, the high and significant coefficients on the four stages of simulation-based experiential learning indicate a greater completion of all four learning stages. For example, out of all respondents, about 96% report that the stock market analysis project provided them with a direct practical experience to help understand the course concepts, 96% report that the project helped them relate their personal experiences to the content of the course, 88% report that the market analysis project caused them to think how the class concepts were inter-related, and 95% find that the stock market analysis project allowed them to experiment with the course concepts in order to understand them. We expect this positive experience to lead to higher student satisfaction. Indeed, the coefficient of the path between the simulation-based experiential learning and the deep approach to learning is significantly positive ($=0.98$) which suggests that experiential learning activities that incorporate the four stages of the experiential learning cycle stimulate intrinsic motivation and encourage students to use deep learning strategies and higher cognitive skills. This leads to higher student satisfaction and provides support to Hypothesis 2a which states that simulation-based experiential learning activities are positively related to a deep approach to learning. On the other hand, the coefficient of the path between the simulation-based experiential learning and the surface approach to learning ($=0.045$) is not significant. This supports Hypothesis 2b which states that simulation-based experiential learning activities are negatively related to a surface approach to learning.

The results related to Hypotheses 2a and 2b highlight the importance of designing the experiential learning activity. In particular, if the experiential learning activity is not designed well, it can motivate students to do the minimum requirements to accomplish a task. Students could then be less satisfied about learning and teaching which negatively affects the overall student satisfaction. This is consistent with the findings of [Bacon](#)

and Stewart (2006) on the importance of the project design in the experiential learning process to enhance student learning and to also ensure that the experience is educative. Fortunately, our simulation-based stock market project does not suffer from this poor design issue. The results show that on average out of all the survey respondents, 96% agree on the effectiveness of the concrete experience stage, 92% agree on the effectiveness of the reflective observation stage, 96% agree on the effectiveness of the abstract conceptualisation stage, and 96% agree on the effectiveness of the active experimentation stage. Thus, our experiential learning activity was designed well. However, it is also worth noting that this observation is not only related to finance courses as it equally applies to any course that implements an experiential learning approach. Bacon and Stewart (2006), for instance, conclude that projects can be a hit-or-miss method of learning and the experience may not always be educative.

Finally, we follow the method suggested by Baron and Kenny (1986) to test Hypothesis 3 which states that the effect of the simulation-based experiential learning activities on student satisfaction is mediated by the student approach to learning. According to Baron and Kenny (1986), three conditions need to be met to establish a mediated effect: there should be a significant relationship between the independent variable (simulation-based experiential learning) and the mediators (deep and surface approaches), there should be a significant relationship between the mediators (deep and surface approaches) and the dependent variable (student satisfaction), and there should not be a significant relationship between the independent variable (simulation-based experiential learning) and the dependent variable (student satisfaction). Two of these three conditions are met as shown by the significant coefficients displayed in Figure 9. To test the third condition, we estimate another version of the model in Figure 9 after adding a direct path between (simulation-based experiential learning and student satisfaction). The results show that the direct path is insignificant with a coefficient of 0.09 and $p = 0.17$. Therefore, these results support Hypothesis 3 that the effect of the simulation-based experiential learning activities on student satisfaction is mediated by the student approach to learning.

4.6. Discussion

This study provides empirical evidence on the effect of simulation-based experiential learning activities on finance students' satisfaction. The study provides three main

findings. First, students with higher perceived satisfaction are mostly intrinsically motivated and use deep learning strategies to improve their understanding of finance theories and concepts. Second, surface approaches to learning including surface motivation and surface strategies, where students seek to complete a task for the sake of meeting some requirements and as a result fall short of utilising higher cognitive skills, fail to enhance student satisfaction. These findings are consistent with the results of [Young et al. \(2008\)](#) who evaluate experiential learning activities with a focus on students' perceived learning and [Zhai et al. \(2017\)](#) who show that student satisfaction is positively associated with perceived quality and perceived value of learning. Third, simulation-based experiential learning activities can enhance student experience and satisfaction. This is also consistent with previous studies that report a positive impact of experiential learning on student satisfaction (e.g. [Daly, 2001](#); [Zhai et al., 2017](#)). In particular, the students feel they learn more and in a more effective way. They also believe that the concrete experience they are involved in would enhance their employability. Students also feel they are part of a learning community where they interact with each other and the faculty which contributes to improving their satisfaction.

The findings of this study also show evidence to support the effectiveness of simulation-based experiential learning and its appropriateness for student assessment. Nevertheless, the effectiveness of this method depends on its impact on the students' approach to learning. The success of this method will highly depend on the degree to which it stimulates deep motivation and learning strategies. Our findings here are in line the previous findings of [Bacon and Stewart \(2006\)](#) on the importance of "developing a pedagogy that requires deep learning early and often". Understanding the effect of the simulation-based experiential learning on the learning process is key to understanding why many high performing students might not be fully satisfied with the learning process. This suggests that simulation-based experiential learning activities should be carefully designed and assessed to make sure that the expected outcomes are achieved. Therefore, it is clear that designing simulation-based experiential learning activities that explicitly incorporate all the four stages of the learning cycle ([Kolb, 1984](#)), and creating experiences that intrinsically motivate students ([Young et al., 2008](#)), is vital to stimulate students to utilise deep learning strategies that relies on high cognitive skills and meaningful learning that could

ultimately improve student satisfaction.

5. Conclusion

This study shows that simulation-based experiential learning activities can provide students with a hands-on experience of the real-world practice of finance. This helps students to engage in the learning process and become active learners who utilize deep learning strategies. Consequently, as shown by the results of this study, learners become more satisfied with their learning experience. These findings are consistent with those of [Farashahi and Tajeddin \(2018\)](#) on the effectiveness of simulations in finance education. Our findings are also consistent with previous findings on the impact of simulation-based experiential learning on student motivation and engagement ([Jankowski and Shank, 2010](#); [Weiser and Schug, 1992](#)), students' perceived learning ([Wolmarans, 2005](#)), and student satisfaction ([King and Jennings, 2004](#)).

Our findings contribute to the financial education literature by providing an example of using a simulation-based experiential learning activity to improve overall student experience and in particular student satisfaction. Nevertheless, a main limitation of this study is that it uses data collected from postgraduate students from one university. The learning experience of those students may differ from the learning experience of other finance students enrolled at other universities. Future research might be needed to evaluate the effect of implementing simulation-based experiential learning using data from different universities.

References

- Anderson, E.W., Fornell, C., 2000. Foundations of the american customer satisfaction index. *Total Quality Management* 11, 869–882.
- Anderson, E.W., Sullivan, M.W., 1993. The antecedents and consequences of customer satisfaction for firms. *Marketing Science* 12, 125–143.
- Athiyaman, A., 1997. Linking student satisfaction and service quality perceptions: the case of university education. *European Journal of Marketing* .
- Bacon, D.R., Stewart, K.A., 2006. How fast do students forget what they learn in consumer behavior? a longitudinal study. *Journal of Marketing Education* 28, 181–192.
- Baron, R.M., Kenny, D.A., 1986. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51, 1173.
- Biggs, J., Kember, D., Leung, D.Y., 2001. The revised two-factor study process questionnaire: R-spq-2f. *British Journal of Educational Psychology* 71, 133–149.
- Biggs, J., Tang, C., 2011. Teaching for quality learning at university. McGraw-hill education (UK).
- Biggs, J.B., 1987. Student Approaches to Learning and Studying. Research Monograph. ERIC.
- Brown, T.A., Moore, M.T., 2012. Confirmatory factor analysis. *Handbook of structural equation modeling* , 361–379.
- Cao, L., Fender, R., Stammers, R., Urwin, R., 2019. Investment professional of the future. CFA Institute .
- Cheng, J.H., Marsh, H.W., 2010. National student survey: are differences between universities and courses reliable and meaningful? *Oxford Review of Education* 36, 693–712.
- Cheon, J., MacKinnon, D., 2012. Mediation/indirect effects in structural equation modelling. *Handbook of Structural Equation Modelling* .
- Chiang, C., Wells, P.K., Xu, G., 2021. How does experiential learning encourage active learning in auditing education? *Journal of Accounting Education* 54, 100713.
- Cochran, W.G., 2007. Sampling techniques. John Wiley & Sons.
- Daly, S.P., 2001. Student-operated internet businesses: True experiential learning in entrepreneurship and retail management. *Journal of Marketing Education* 23, 204–215.
- Dellaportas, S., Hassall, T., 2013. Experiential learning in accounting education: A prison visit. *The British Accounting Review* 45, 24–36.
- Dolvin, S.D., Pyles, M.K., 2011. The influence of simulation performance on student interest. *Journal of Economics and Economic Education Research* 12, 35.
- Douglas, J., Douglas, A., Barnes, B., 2006. Measuring student satisfaction at a uk university. *Quality assurance in education* .

- Elliott, K.M., Healy, M.A., 2001. Key factors influencing student satisfaction related to recruitment and retention. *Journal of marketing for higher education* 10, 1–11.
- Elliott, K.M., Shin, D., 2002. Student satisfaction: An alternative approach to assessing this important concept. *Journal of Higher Education policy and management* 24, 197–209.
- Farashahi, M., Tajeddin, M., 2018. Effectiveness of teaching methods in business education: A comparison study on the learning outcomes of lectures, case studies and simulations. *The International Journal of Management Education* 16, 131–142.
- Gliem, J.A., Gliem, R.R., 2003. Calculating, interpreting, and reporting cronbach's alpha reliability coefficient for likert-type scales, Midwest Research-to-Practice Conference in Adult, Continuing, and Community
- Halstead, D., Hartman, D., Schmidt, S.L., 1994. Multisource effects on the satisfaction formation process. *Journal of the Academy of Marketing Science* 22, 114–129.
- Hartman, D.E., Schmidt, S.L., 1995. Understanding student/alumni satisfaction from a consumer's perspective: The effects of institutional performance and program outcomes. *Research in Higher Education* 36, 197–217.
- Haverila, M., Haverila, K., McLaughlin, C., Arora, M., 2021. Towards a comprehensive student satisfaction model. *The International Journal of Management Education* 19, 100558.
- Healey, M., Jenkins, A., 2000. Kolb's experiential learning theory and its application in geography in higher education. *Journal of geography* 99, 185–195.
- Helliar, C.V., Michaelson, R., Power, D., Sinclair, C., 2000. Using a portfolio management game (finesse) to teach finance. *Accounting Education* 9, 37–51.
- Hong, S.J., Kim, H.S., 2011. Development and effects of a comprehensive web-based nursing process for nursing students. *Journal of Korean Academy of Fundamentals of Nursing* 18, 497–505.
- Hu, L.t., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal* 6, 1–55.
- Iacobucci, D., 2008. *Mediation analysis*. 156, Sage.
- Jankowski, J., Shank, T., 2010. A comparison of online stock trading simulators for teaching investments. *Journal of Financial Education* , 105–119.
- Kember, D., Leung, D.Y., Jones, A., Loke, A.Y., McKay, J., Sinclair, K., Tse, H., Webb, C., Yuet Wong, F.K., Wong, M., et al., 2000. Development of a questionnaire to measure the level of reflective thinking. *Assessment & Evaluation in Higher Education* 25, 381–395.
- King, D.R., Jennings, W.W., 2004. The impact of augmenting traditional instruction with technology-based experiential exercise. *Journal of Financial Education* , 9–25.
- Kline, R.B., 2015. *Principles and practice of structural equation modeling*. Guilford publications.
- Kolb, D., 1985. *Learning style inventory*, revised edition. Boston: McBer .

- Kolb, D.A., 1984. *Experiential learning: Experience as the source of learning and development*. FT press.
- Krishnan, V.S., Bathala, C.T., Bhattacharya, T., Ritchey, R., 1999. Teaching the introductory finance course: What can we learn from student perceptions and expectations. *Financial Practice and Education* 9, 70–82.
- Kristensen, K., Martensen, A., Gronholdt, L., 1999. Measuring the impact of buying behaviour on customer satisfaction. *Total Quality Management* 10, 602–614.
- Lai, M., Lau, S., Mohamad Yusof, N., Chew, K., 2015. Assessing antecedents and consequences of student satisfaction in higher education: evidence from malaysia. *Journal of Marketing for Higher Education* 25, 45–69.
- Lai, M.K., McNaughton, S., 2009. Raising student achievement in poor communities through evidence-based conversations, in: *Professional learning conversations: Challenges in using evidence for improvement*. Springer, pp. 13–27.
- Lew, C., Saville, A., 2021. Game-based learning: Teaching principles of economics and investment finance through monopoly. *The International Journal of Management Education* 19, 100567.
- Lewis, L.H., Williams, C.J., 1994. *Experiential learning: Past and present*. *New Directions for Adult and Continuing Education* 1994, 5–16.
- Marton, F., Säljö, R., 1976. On qualitative differences in learning—ii outcome as a function of the learner’s conception of the task. *British Journal of Educational Psychology* 46, 115–127.
- Morris, T.H., 2020. Experiential learning—a systematic review and revision of kolb’s model. *Interactive Learning Environments* 28, 1064–1077.
- Mukherji, S., Etta-Nkwelle, M., Streeter, D.W., 2018. Active learning with a trading simulation. *Journal of Financial Education* 44, 100–126.
- Navarro, M.M., Iglesias, M.P., Torres, P.R., 2005. A new management element for universities: satisfaction with the offered courses. *International Journal of educational management* .
- Office for Students, 2021. National Student Survey (NSS). Office for Students (OfS). URL: <https://www.officeforstudents.org.uk/media/703530d2-1c8f-48fc-a62d-23b278b8b799/nss-2021-core-questionnaire-optional-banks.pdf>.
- Patterson, P.G., 2000. A contingency approach to modeling satisfaction with management consulting services. *Journal of Service Research* 3, 138–153.
- Payne, J.D., Tanner, G., 2011. Experiential learning and finance: A hands-on-approach to financial modeling. *Journal of Financial Education* , 82–100.
- Santini, F.d.O., Ladeira, W.J., Sampaio, C.H., da Silva Costa, G., 2017. Student satisfaction in higher education: A meta-analytic study. *Journal of Marketing for Higher Education* 27, 1–18.
- Saunders, K.T., 2001. Teaching methods and assessment techniques for the undergraduate introductory finance course: A national survey. *Journal of Applied Finance* 11.

- Schermelleh-Engel, K., Moosbrugger, H., Müller, H., et al., 2003. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online* 8, 23–74.
- Shank, M.D., Walker, M., Hayes, T., 1996. Understanding professional service expectations: do we know what our students expect in a quality education? *Journal of Professional Services Marketing* 13, 71–89.
- Siegel, P.H., Omer, K., Agrawal, S.P., 1997. Video simulation of an audit: an experiment in experiential learning theory. *Accounting Education* 6, 217–230.
- Vihtelic, J.L., 1996. Personal finance: An alternative approach to teaching undergraduate finance. *Financial Services Review* 5, 119–131.
- Weiser, L.A., Schug, M.C., 1992. Financial market simulations: Motivating learning and performance. *The Social Studies* 83, 244–247.
- Wolmarans, H.P., 2005. Business simulations in financial management courses: Are they valuable to learners? *Meditari: Research Journal of the School of Accounting Sciences* 13, 121–133.
- Wright-Maley, C., 2015. Beyond the “babel problem”: Defining simulations for the social studies. *The Journal of Social Studies Research* 39, 63–77.
- Yi, Y., 1993. The determinants of consumer satisfaction: the moderating role of ambiguity. *Advances in Consumer Research* .
- Young, M.R., Caudill, E.M., Murphy, J.W., 2008. Evaluating experiential learning activities. *Journal for Advancement of Marketing Education* 13, 28–40.
- Zhai, X., Gu, J., Liu, H., Liang, J.C., Tsai, C.C., 2017. An experiential learning perspective on students’ satisfaction model in a flipped classroom context. *Journal of Educational Technology & Society* 20, 198–210.

Appendix A. The simulation-based experiential learning activity

This appendix provides the details of the simulation-based experiential learning activity on which this study is built.

In this simulation-based investment project, it is assumed that you act as a portfolio manager. You should help your client achieve their investment objectives. Please read the sections below carefully for details on the rules and constraints that you should follow to manage your client's portfolio, the investment plan and deadlines, the criteria for performance evaluation, and the details of the required report on your investment project.

A.1. Project Overview and Objectives

Assume that you work as a portfolio manager at New York Asset Management Group PLC. One of your clients has entrusted you with \$100,000 to invest in the U.S. stock market. Your client expects you to invest her money prudently to help achieve her investment objectives. At the end of the trading period, if your client is satisfied with your performance managing her portfolio, she will extend her business with you, otherwise, she will move her business to another portfolio managers. You will be able to construct and manage your client's simulated portfolio live on the "*MarketWatch Virtual Stock Exchange (VSE)*" website. This will give you access to a simulated investment account where you can invest using virtual money and no real money will be involved.

A.2. Investment Policy Statement (IPS)

Following a meeting with your client you have agreed an investment policy statement with her in which you assessed her risk tolerance to be average. You also agreed that the appropriate benchmark of the portfolio should be the Dow Jones Industrial Average Index (DJI). The return objective is set equal to the holding period return on the benchmark + 1%. The investment horizon is six weeks. The client has no specific liquidity, regulatory or tax constraints.

A.3. Simulated Portfolio Management Rules and Constraints

You should follow the following rules and constraints:

- Capital available for investment is \$100,000.

- You must construct and manage your portfolio live on the “MarketWatch Virtual Stock Exchange” website.
- You must invest in stocks only. Investing in ETFs or Funds is not allowed.
- The portfolio must only consist of stocks traded in the US stock market and included in the Dow Jones Industrial Average Index (DJI).
- The portfolio must include exactly 10 stocks.
- Minimum initial position in any stock is 5% of the portfolio total value.
- Maximum initial position in any stock is 25% of the portfolio total value.
- Cash must not exceed 10% of your portfolio at any time.
- Short selling is not allowed, and margin trading is allowed.
- You must make at least 10 buy and/or sell orders.
- You must use each type of the market, limit, and stop orders at least once.
- Transaction cost is \$10 per transaction.
- Debt interest rate for leverage is 5%. Interest earned on cash is 1%.
- No fund withdrawals or additions are allowed during the investment period.

A.4. Investment Plan and Deadlines

You should follow the following investment schedule:

- Registration Period [1 week]

The investment project will be completed on “MarketWatch Virtual Stock Exchange” website. Registration opens four weeks before trading begins. To set up your account, go to: <https://www.marketwatch.com/game>

- Preparation Period [3 weeks]

You should complete the following tasks during the preparation period:

- Getting Started. Please read "MarketWatch VSE Student User Guide" to familiarize yourself with the platform and get guidance on how to manage your portfolio before trading begins. You can also watch the introductory tutorial videos to get information about basics of trading and managing your portfolio on the MarketWatch VSE.
 - Security Selection. You need to identify the stocks to be included in your simulated stock portfolio.
 - Portfolio Management Strategy. You need to figure out a strategy (active vs passive) that you can follow to manage your simulated stock portfolio.
- Investment Period [6 weeks]

You should complete the following tasks during the investment period:

- Portfolio Optimization. You will need to optimize your portfolio allocation to identify the optimal allocation to the stocks that will be included in your portfolio.
 - Portfolio Construction. Once your portfolio becomes live and trading starts on the MarketWatch VSE, follow the portfolio management rules and constraints to build your portfolio.
 - Portfolio Rebalancing. You might need to rebalance your portfolio. Follow the portfolio management rules and constraints to rebalance your portfolio.
 - Trading requirements. You will need to meet the requirements of the "Minimum Trading Activity" assignment on the MarketWatch VSE.
- Performance Evaluation Period [2 weeks]

You should prepare a full performance evaluation of your simulated stock portfolio including performance measurement, performance attribution, and performance appraisal.

A.5. Investment Project Report

You are required to write a report about your simulation-based investment project that covers the following five parts:

- **Macroeconomic and Financial Conditions:** Discuss the underlying economic and financial conditions that affected your decisions while building and managing your simulated stock portfolio.
- **Security Selection:** Discuss the theories, methods, techniques, and models that you have used in the security selection for your simulated stock portfolio.
- **Portfolio Construction:** Discuss the optimization methods and techniques that you have followed to construct your simulated stock portfolio.
- **Portfolio Management:** Discuss the approaches, methods, and techniques that you have followed to manage, execute, trade, and rebalance your simulated stock portfolio.
- **Performance Evaluation:** Evaluate and reflect on the performance of your simulated stock portfolio.