

Using Information and Communication Technology (ICT) to Teach Business Finance Concepts: the Case of FinGame Online

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ABSTRACT

The aim of this paper is to discuss the advantages and disadvantages of using Information and Communication Technology (ICT) applications to improve students' competency in business skills. The motivation for this paper stems from the fact that many graduates lack the ability to apply and use in practice business concepts that have been taught in class. This paper suggests that a game and simulation teaching tool such as FinGame Online will be useful for: (a) students to learn more effectively about business models; (b) instructors to teach more efficiently using visual and hands-on experience technique; and (c) computer science students and instructors to combine the learning experiences of programming and understanding business concepts. This paper hopes to contribute to the development of the Business and Information and Communication Technology curriculums in higher education institutions.

Keywords: Business, Information and Communication Technology, curriculum, games, simulation

1. INTRODUCTION

Information and Communication Technology (ICT) is an increasingly powerful tool for participating in global markets [13]. Within the business framework, ICT applications should help an organization improve information and knowledge management within the firm, and to increase the efficiency of business transactions [12]. Within the educational context, UNESCO (2002) suggests that the curriculum for teaching ICT should not stand alone, but rather, to be embedded within core courses and programs. This is because technology is best learned within the context of applications, activities, projects, and problems that replicate real-life situations [14]. Within the context of information literacy, a report from the National Research Council, examines the role of Information Technology (IT) in everyday lives and recommends *fluency with information technology* as an educational goal that comprises (a) skills to use information technology; (b) foundational concepts that underpin technology; and (c) intellectual capabilities, the ability to employ IT in complex situation and to encapsulate higher-level thinking when using technology. Computer games and simulations are an attractive approach in this context of acquiring knowledge, as they are non-threatening, engaging and forgiving.¹ This paper aims to provide a case study of FinGame Online 4.0 as an example of a 'curriculum within a

curriculum' program study, which uses the core subjects of Corporate Finance as a base.

2. LITERATURE REVIEW

Traditional computer-based technologies have evolved into complex and sophisticated tools, ranging from standard office applications (word processing, spreadsheets, desktop publishing, etc.) to specialist applications such as Computer Aided Design (CAD), accounting software, and Customer Relations Management (CRM). Additionally, networking and digital communication technologies have also been expanding more rapidly to provide facilities for information to be communicated digitally in the blink of an eye.

The use of basic ICT applications such as word processing, spreadsheet, and communication software (email) have been considered valuable to help develop student language and communication skills [11]. Special ICT applications, such as simulations and modeling, have also been proven useful to enhance students learning in science and math [9]. To teach business concepts, more complicated and comprehensive digital applications such as computerized games [2], game theories [3], [15], websites [8], and simulations engine [4], [5], [7] have also been found of service.

Various business skills, which are considered important for graduates to be successful in their career, are amongst Strategic Management, Operational, Finance,

¹ See [16] <http://www.insead.edu/CALT/Encyclopedia/Education/Advances/games.html>

Organizational, Problem-Solving, and Self-Management skills [5], [8], [12]. ICT programs, which can sophisticatedly and dynamically combine the learning experiences of those business skills as well as students' specific technical skills, are particularly useful, as they replicate the real-life multidimensional situations in business [3], [4], [15].

An example of such ICT applications is the CRAC Metal Box Business Game [2], which is designed to teach engineering students problem solving and transferable skills in business, such as how to deliver cost-effective and viable solutions, and to manage a project of one-product manufacturing within a multi-dimensional organization. Focusing on more than a single product manufacturing, the Business Simulation of the Worldwide Information Systems Equipment (WISE) also aims to provide students with general business experiences and operational decision making practices in a complex organization [6]. Whilst generalist programs like CRAC and WISE may be used by any majors, some programs were built for specific audiences such as the Project Management Simulation Engine, which was structured for computer science students to learn project management skills from business management perspective. To help business students or novice managers better learn and apply the concepts of corporate finance in reality, FinGame Online was designed with an assumption that its users have prior knowledge of finance, accounting, economics, production, marketing, and management.

3. FINGAME ONLINE

FinGame (FG) Online was introduced for the first time (version 1.0) by Brooks in 1992 in an attempt to help its users develop and enhance practical skills in financial management, financial accounting statement analysis, and general decision making in business [1].



Figure 1. Cover Manual of FinGame Online 4.0

As is defined in any simulations or games software, FG also has a specific task for its players; that is, to assume the role of a financial manager who has to efficiently acquire and invest funds to maximize the wealth of the business' owners' (shareholders'). An explanation of the flow in corporate financial management may be needed to assure common understanding (see figure 2).

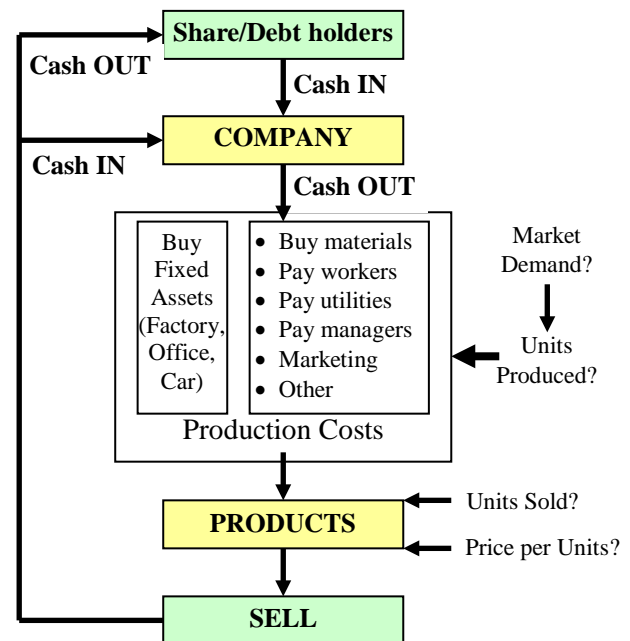


Figure 2. Simplified Flow in Corporate Financial Management

As depicted in figure 2, FG begins the game by giving all students the same set up of financial positions of a new cash-poor company. The learning objective of this outline is to show that creating a new company needs funds (capital), which is usually obtained from outside resources such as investors (shareholders) or lenders (debt holders). These funds are then used to buy fixed assets (e.g. factories, offices, machineries, vehicles) and current assets (e.g. materials), and pay workers and other marketing and discretionary expenses, for the new company to produce a product. The results of selling the products are called revenue, which has to be deducted from all expenses (operating and financing) in order to calculate profit. The after-tax profit may then be reinvested back into the company's operations (retained earnings) or distributed to the shareholders (dividends).

In order to maximize the learning experience of multifaceted real-life corporate financial management, FG allows up to 25 periods of operations, which facilitates the outcomes assessment measure of wealth accumulation that was generated from decision made in period 1 to the end of the game-period.

In each period and simultaneously carried-forward, FG allows typical corporate finance problems, which are related to the financing, operation, and investing activities of the company, to occur (figure 3).

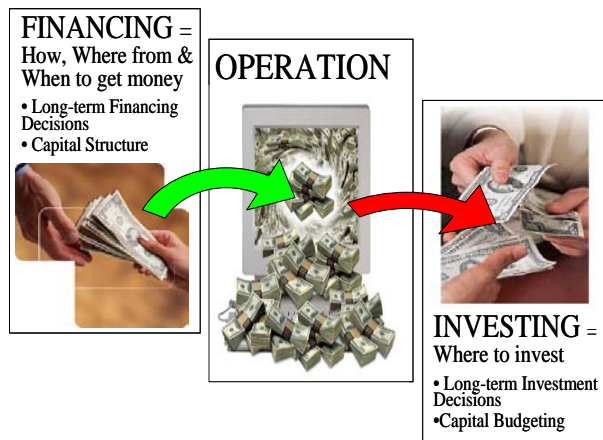


Figure 3. Basic Problems in Corporate Financial Management

Depending on students' experiences and prior knowledge (e.g. executive, graduate, or undergraduate students), instructors may control the types of decision that these students can make in order to maximize their shareholders' value. For example, one item that strongly influences the financing decision of a company is the level of interest rate. Typical frame of mind of a novice business person will be to acquire as little debts as possible. In real world, having a business without any debts may mean having to miss profitable growth opportunities. For example, if a company starts to receive increasing orders for its products, the company may want to invest in new machinery to meet the sales demand. If the company uses all cash-in-hand to buy the machine, it may not have enough money to pay workers and other expenses, and buy additional raw materials. If the company does not have readily-available cash-rich fallen angel (an investor who is ready to invest money to start-up companies), then the only way the company can grab the growth opportunity is by borrowing money. The decision to borrow money for a short-term period as opposed to a long-term one is not at all simple. This is because, in the case of short term loans, the company chooses has to pay off the loan within 1-year, which adds to the 'costs' that the company will have to incur, which in turn will reduce its short-term profit. If the company chooses the long-term borrowing, it can spread the interest payments over a 2- to 15-year period, lowering its yearly expenses, but not without its own cost. Supposedly the company's product demand is decreasing, which in turn generates less revenues / sales, long-term burden like this can force the company into bankruptcy.

The example above was only made to one aspect in the corporate financial management. In reality, the three main problems of corporate finance, *financing*, *operation*, and *investing*, are intertwined, multifaceted and highly influential towards the future financial positions of the company. For example, the implication of buying or renting machinery as part of the long-term investment of the company, as opposed to outsourcing productions, coincides with the decision to borrow money for short-term or long-term or none.

Only a simulation can enhance and optimize the experiences of students in learning corporate financial management. FG has a feature which allows instructors to have full control over various changes of the determinants and level of 'management' that students can do, which may influence the financial performance of a company. The determinants, which may replicate real-life experiences, include tax, interest and inflation rates, material costs per unit manufactured, and occurrences of extraordinary events (e.g. fire, strike, lottery winning, war, or grants). Level of students' power of decision-making may also be increased once students gain more financial management skills and need more complex challenges. More specifically, the list of possible decisions that FG users can make is as follows [1, pp.4]:

1. Units to be produced
2. Unit price of product
3. Purchase of demand and price forecast
4. Plant capacity purchased
5. Machine capacity purchased
6. Capital budgeting project A
7. Capital budgeting project B
8. Decision on labor strike settlement
9. Short-term investment
10. Risk of short-term investment
11. Discount terms on receivables
12. Advertising expense
13. Short-term loan
14. Two-year term loan
15. Three-year term loan
16. Long-term debt
17. Preferred stock
18. Common stock
19. Tender price for repurchase
20. Dividend on common stock
21. Possible strike settlement

At the end of each period, students are then required to submit a financial statement, which depicts all changes they make that influence a company's financial position. The objective of this statement requirement is to enhance students' ability to communicate their results and decisions. Additionally, to maintain

students' interests and excitement in doing the simulation, lectures, classroom discussions, and supplementary readings should also be organized throughout the course (Brooks [1, pp.24]).

So far, it can be concluded that with specialized and sophisticated ICT applications, FG may have enhanced students' learning experiences to develop and improve practical skills in financial management, financial accounting statement analysis, and general decision making in business.

The simplicity and transparency of FG also allows students to concentrate on the 'results' of their decisions, rather than on the 'appearance' of their report. After students log-on to their accounts (figure 4), students will be taken to the next screen (the decision screen, figure 5).



Figure 4. Login Screen

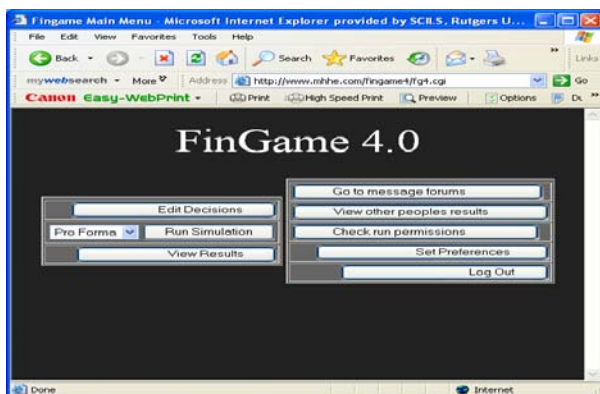


Figure 5. Decision Screen

Students can then make possible decisions that may enhance their company's performance, as allowed by the instructors (see figure 6 for the combination of 3 screenshots if instructors allow 'all' possible decisions to be made by students). Students can enter the data requested in figure 6, and press the 'Submit' button. Students will then be taken back to the Main Menu (figure 5).



Figure 6. Student Decision Screen (combination of 3 screenshots, assuming students are allowed to make all possible decisions)

If students are not sure about the impact of their decisions, they may choose the 'Pro Forma' feature, which is positioned next to the 'Run Simulation' button. A pro-forma statement is then produced, once the students hit the 'View Result' button in the Main Menu.

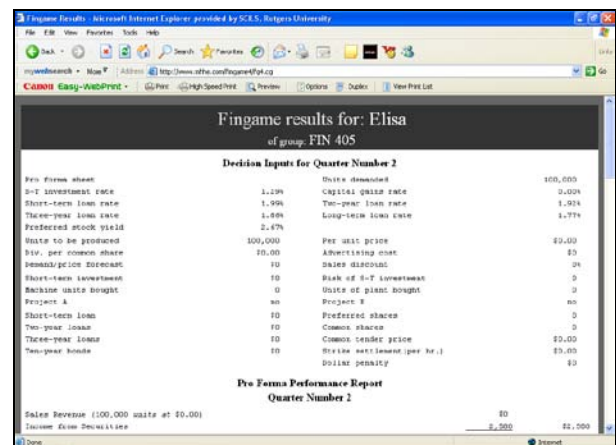


Figure 7. Pro Forma Result Screen

If students are not happy with the results shown in the Pro Forma Screen, they can go back to the Main Menu and change their decision (press the 'Edit Decision' button in the main menu, to go back to the Decision screen depicted in figure 6). The decision-making

process may be replicated until instructors run the actual simulation as part of the requirement for the final report.

A potential drawback of FG is its restriction to be played online, by accessing the game's homepage. This imposes the constraint that the students need to have Internet access and a reliable connection (The advantage, on the other hand, is that the game can be played from any networked computer, rather than having to install it on a certain machine.) Although Brooks (2004) anticipated this potential problem by providing spreadsheet templates for students to prepare pro-forma statements using paper, the complex and multifaceted implications of one decision may not be optimized without the simulation feature.

4. CONCLUSIONS AND FURTHER WORK

Competency-based curriculum in the Indonesian education system encourages schools and universities to develop their own curriculum based on the competencies they want their students to achieve. The approach of using a 'curriculum within a curriculum' course module for teaching ICT applications within a core program may improve students' fluency with IT (technical skills, understanding of concepts, intellectual capabilities in using technology) as well as transferable business skills necessary for their real world experience.

In advanced computer science programs, instructors may design their course to require students to develop a simulation or game as their term project. Not only will the students learn the technical skills necessary to build a software or system, but they will also acquire transferable skills in business such as learn how to manage their time to produce a successful project with other students (strategic, organizational, and self-management skills). If these students are given a certain (simulated) budget to replicate the real-life experience of limited financial resources, they will also learn financial management skills, such as how to creatively seek the best financing options and deliver the most cost-effective products.

For students in business schools, simulations and games such as FG may be used to help the students get ready for their internship or industrial placement. Especially for finance and accounting-major graduates, such games will help improve the probability of success in the financial decision making process of a real company.

What is necessary in order to prove such games successful in achieving their pedagogical objectives, is an experimental methodology for evaluating the

learning outcomes of curricula that incorporate such games, in comparison with traditional curricula. Such a methodology is the objective of our future work.

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