Exploration of a general education programme in accounting oriented toward skills training and quality promotion for engineering students

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ABSTRACT: Skills training and quality promotion oriented toward a general education programme in finance and accounting for engineering students in China should help them to grasp basic financial and accounting knowledge, as well as skills beneficial to their future professional careers and, hence, adaption to the changing nature of a modern society. The development of such a programme requires thorough analysis on how to design and implement basic concepts and ideas in finance and accounting, as well as a demonstration of their use in engineering practice, with particular emphasis on knowledge acquisition, skills training and development. Finally, the developmental process should emphasise quality and include specific implementation solutions in terms of teaching method reform, teaching content selection and teaching module innovation.

INTRODUCTION

With the rapid development of information technology, people are encountering an increasing number of problems about managing money, such as buying houses and cars, getting a mortgage, capital lending, financial investment and annuity assurance. Hence, elective courses on general education concerning finance and accounting could contribute to the financial and accountancy knowledge that engineering students have, and help them to adapt to the development of modern society.

Elective courses of general education, such as finance and accounting, offered to engineering students in China are a means of teaching the engineering students about the whole accounting treatment process, and how to determine the performance of an organisation and identify potential risks, as revealed by the accounting data. The finance and accounting elective courses should be structured to help engineering students judge whether an enterprise is profitable, similar to the way they would use personal financial statements in their daily lives.

LITERATURE REVIEW

Accounting and Finance Courses in Western Countries

Corporate financial accounting courses originated at the beginning of the last century. Based on financial statements and other relevant information, these courses cover the systematic analysis of the operating results and financial situation of an organisation and how this changes over time. For example, an initial financial statement analysis can be used by a bank to determine a customer's solvency and as a reference to the customer's credit worthiness.

Given the expansion of social fund-raising, non-bank lenders and equity investors, investors are expected to acquire and master more comprehensive financial information about financial structures and shareholder returns policy to ensure their capital security and return.

Gradually, teaching in Western countries combined finance with accounting, and the course contents were improved and updated frequently, along with the changes in economic activities of enterprises. This breaks the normal pattern that holds finance and accounting as separate entities.

Quality Issues

The quality of teaching has increasingly become a focus for academic teachers and researchers. For example, a case study examining the factors that influence the learning of engineering major undergraduates indicates that teaching

quality is the most important one that affects the undergraduates' study [1]. Also, an innovative teaching module with updated teaching content could contribute greatly to the improvement of teaching quality. This would make an accounting elective course more acceptable to engineering undergraduates [2].

Current Chinese Research

The main purpose of elective courses of general education, that is of finance and accountancy, in China, is to enhance the overall quality of undergraduates by teaching them how to evaluate the development and operation of an enterprise at both a micro- and macro-level. This enables effective measures to be taken to improve the management of an enterprise [3]. The change of teaching content in Chinese elective courses on finance and accounting has developed through the following stages.

The first stage was from the 1980s to the 1990s. During this period, drawing on the experience of Western accounting practice, the content focused on an economic analysis that included accounting, methods of analysis, and commercial and industrial enterprises' economic activities [3]. Since the 1990s, the concept of general accounting appears. The contents of financial analysis include the basic principle of corporate finance and accounting statement analysis [4]. The practical teaching has gradually highlighted simulations, as well as financial statement compilation and index system analysis. During the third stage (since the beginning of the 21st Century), accounting is still a subject with strong characteristics of theory, practice and skills. Accounting courses emphasise that theory must be closely combined with practical content. Content should be guided by the job market and aimed at producing employable graduates. By combining case studies with discussion, and stimulating independent thinking at school, accounting courses should highlight the importance of skills training and strengthen the application of case teaching, as well as the use of multimedia and other modern teaching methods. Especially for the engineering undergraduates not majoring in accounting, the establishment of a practical teaching mode could greatly help the students to apply accounting theory to their practical work and enhance their understanding of accounting theory. Practical teaching is one of the most important aspects of engineering education [5].

THE FRAMEWORK OF ACCOUNTING EDUCATION FOR ENGINEERING STUDENTS

The construction of financial and accounting education should pay attention to the students' skills training through improvements in the teaching process. The teaching can be strengthened by the use of case studies, self-study and various other teaching methods, so as to build a teaching model of an application-oriented finance and accounting elective course.

Teaching Methods

The focus should be on systematic modular teaching, with a large number of accounting practicals, case studies and classroom discussion. This should help to develop a student's ability to think independently, as well as to analyse and problem-solve.

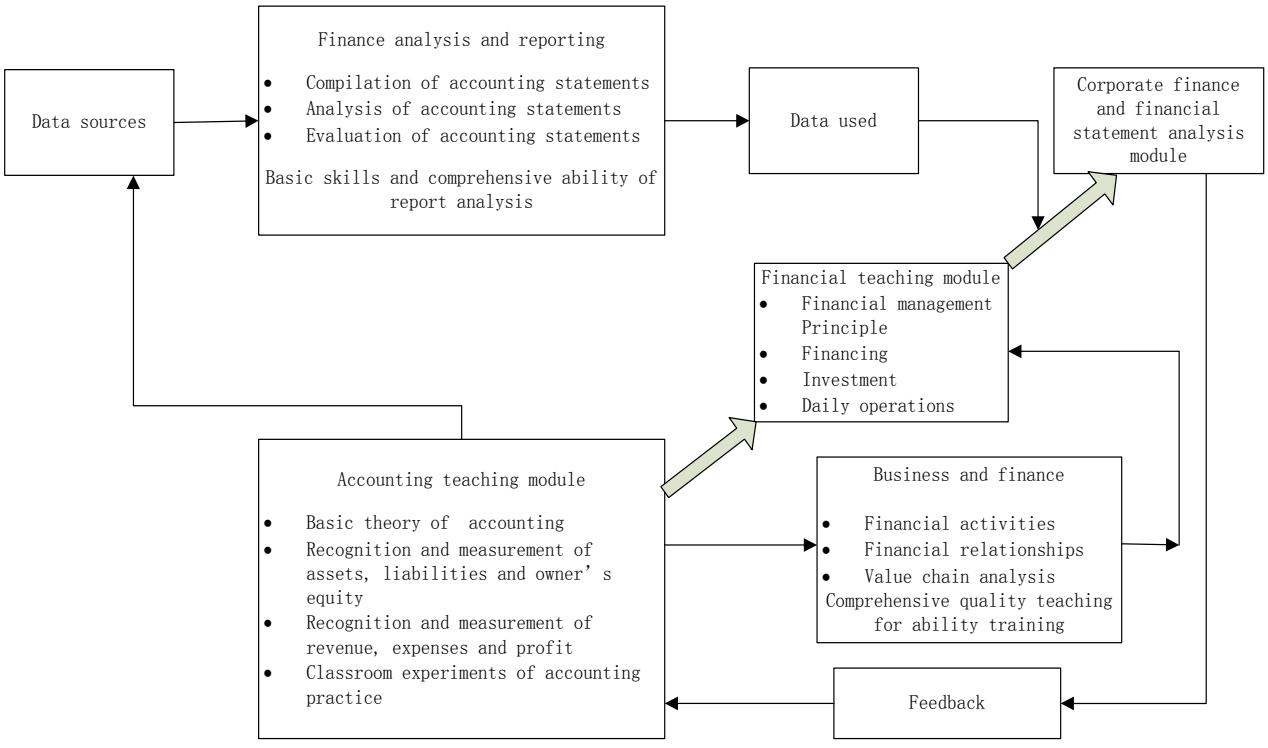

Figure 1: Diagram of modular course teaching.

The Design of Teaching Modules

The modules taught in the finance and accounting courses are: fundamental accounting, corporate finance and financial statement analysis. Centred on economic activities, the first part explains basic accounting and accounting data. The second part teaches the methods of corporate finance. The third part focuses on the special role that the financial statement analysis plays in business management.

The curriculum should be highly integrated. Each student undertakes the business accounting and processing work, with the help of teachers and classmates. The *field operation* experiment teaching takes place in the school.

The financial and accounting course modular teaching structure is shown in Figure 1.

Fair Value Accounting Standards

The implementation of fair value accounting standards in China in July 2014 standardised the definition of fair value and clarified the classes of fair value. Furthermore, it put forward the concept of a measurement unit and made specific requirements for the disclosure of the relevant information about the measurement of fair value.

Then, the fair value of the enterprise's net assets can be evaluated, for example, when a takeover happens. The most direct method involves evaluating the enterprise's assets and liabilities, but it is very difficult for general shareholders to understand and accept it. Therefore, it is crucial that students understand this concept. One can evaluate the fair value of net assets as:

$$FV_i = BV_i \times \frac{FV_i / \sum_{h \in I} FV_h}{BV_i / \sum_{h \in I} BV_h} \times \frac{\sum_{h \in I} FV_h}{\sum_{h \in I} BV_h} = BV_i \times \delta_i \times \varepsilon_i \tag{1}$$

In the formula, FV_i is the enterprise *i's* fair value of net assets. BV_i is the enterprise *i's* book value of net assets:

$$\delta_i = \frac{FV_i / \sum_{heI} FV_h}{BV_i / \sum_{heI} BV_h} \tag{2}$$

This is called the error coefficient, which is calculated by the ratio of enterprise *i's* fair value of net assets with the industry *I's* fair value of net assets divided by the ratio of enterprise *i's* book value of net assets with the industry *I's* book value of net assets.

$$\varepsilon_i = \frac{\sum_{heI} FV_h}{\sum_{heI} BV_h} \tag{3}$$

This is the ratio of the industry's fair value of net assets and its book value of net assets for enterprise *i*. This ratio is called the *industry public account rate*.

Assuming that the enterprise's fair value of net assets is similar to the industry's fair value of net assets, then, the error coefficient will approximate to 1. The fair value of enterprises *i* mainly depends on the industry public account rate, which is macro data. In an efficient capital market, the stock price is equal to its value. It can be represented as:

$$\varepsilon_i = \frac{\sum FV_i}{\sum BV_i} = \frac{\sum P_i}{\sum BV_i}. \tag{4}$$

Using this derivation, the student can understand the method of determining the fair value of net assets in an efficient market.

The Teaching Methods

The practical teaching of accounting is centred on the six major accounting elements. Financial cases mainly come from well-known Chinese listed companies. These cases will be assigned to students by teachers in advance or collected by

the students themselves. By gradually improving the teaching method, the curriculum scope also will be gradually increased. Also, modern educational technology would be used widely [6].

IMPLEMENTATION PLANS FOR AN ACCOUNTING GENERAL EDUCATION COURSE FOR ENGINEERING STUDENTS

Planning Guidelines

Traditional teaching concepts and approaches should be changed. The teaching should be organised such as to avoid being too theoretical and rather should be focused on a few ideas and be aimed at simplifying the material. The system should be such as to include class discussion and to focus on overcoming obstacles that arise from students' preconceptions. Directed research and class discussion will encourage students' self-development. Teachers should recommend appropriate reference books and the top students then can self-study after school hours to acquire a wide range of in-depth knowledge.

The system should be such as to strengthen practical teaching using case studies and should place the students at the centre of the teaching. The course content should reflect the practical needs of finance and accountancy. Exercises should involve discussion of realistic, specific accounting problems, such as the newly promulgated fair value measurement accounting standard.

As a result of these approaches, the student's knowledge, analytical and accounting measurement abilities will be broadened. Teachers should organise preparatory work for case studies so as to strengthen students' analytical abilities. The content then will develop knowledge of accounting using practical problems covering bookkeeping and the compilation of accounting statements.

Reform of the Traditional Course Examination System

The examination of theory should be by a closed book examination. In addition to theory, the students should also be examined on their understanding of professional knowledge and their ability to apply that knowledge.

Teachers should use a diverse range of evaluation methods and pay attention to evaluating practical ability. The evaluations should encourage thinking rather than the regurgitation of memorised facts. The examination should be part of a continuing learning process. All of this can inhibit cramming, rote learning and even plagiarism.

Pertinence, Orientation and Details of the Teaching Content

Pertinence of the Teaching Content

The teaching content should not aim to be *comprehensive* for non-accounting major students, such as engineering students. Teachers should develop students' practical and analytic ability. The intent is for students to understand basic accounting and financial theory and the framework within which they operate. Students should learn how to read financial statements and comprehend their implications for the operation of a company and its financial activities.

Orientation of the Teaching Content

The curriculum content should support employability in industry. The content will include the preparation of accounts and bookkeeping, reimbursement and the capturing of financial information. Hence, the course will be practical and relevant for students after graduation. The course should be updated to reflect changes in the accounting and finance profession.

Nature of the Teaching

So as to improve students' grasp of the teaching content, the elements to be covered would include accounting standards, operational practice and case analyses. In classical situations, the teaching relies mainly on classroom presence, supplemented by classroom discussion. By networking to garner information, teachers should keep the content up-to-date. This can have the effect of increasing the students' enthusiasm for autonomous learning.

Intensify Entity Teaching

Most of the engineering students who study the elective accounting course have graduated from middle school and have no knowledge of accounting. Therefore, this must be solved during teaching by using *entity* teaching, i.e. by introducing accounting entities, such as accounting certificates (including original documents, recording voucher); account books (e.g. journal account, general ledger, detail ledger); and accounting statements (e.g. balance sheet, profit statement, cash flow). This deepens the knowledge of the concepts and methods of accounting.

Teachers should avoid just imparting knowledge without cognitive resonance. The teaching is supplemented by autonomous learning outside the class; thus, producing a good teaching model under the circumstances of limited time to cover the material in class.

Design of the Teaching System

Engineering students need to have an accurate understanding and grasp of accounting language. They need to master the skills of *how to use accounting*, instead of *how to do accounting*.

Increase of the Level of Case Teaching

Before class, teachers should plan case teaching and choose a recent case study. It should be a real business case and students should undertake extensive preparation before class. The teaching should create many opportunities for interaction between teachers and students, both in and out of the class. Students should be encouraged to investigate and consult texts to acquire information and understand issues from different point of view. Finally, the teacher is expected support the teaching through comments and summaries.

Use of School Networks to Assist Teaching

In order to allow students to preview and review course material, teachers should upload the class courseware and related learning materials to the teaching Web site in advance of a class. In addition, on-line question and answers can help students to learn and master the teaching content. Teachers can also upload topics for independent study. Hence, the network is used to expand student knowledge.

Improvements of Textbooks and Handouts

Accounting education should pay attention to accounting practice and what will interest students. Research indicates the most acceptable training for students. Teachers select case studies, such as to avoid beginners losing interest as a result of too much jargon and professional terminology. The set exercise should emphasise quality rather than quantity in cultivating students' abilities.

CONCLUSIONS

Basic knowledge and skills of finance and accounting is critical for engineering students upon entering their professional life. These can be developed through courses where basic theories, concepts and principles of accounting and finance are taught in undergraduate elective courses especially designed for engineering students.

In this article is described such an undergraduate course programme that requires a thorough analysis on how to design and implement the basic concepts and ideas in finance and accounting. Also their use is described in engineering practice, with particular emphasis on knowledge acquisition, skills training and development, as well as quality promotion.

ACKNOWLEDGEMENT

This article is a periodic research outcome of the education of Jiangsu Province *12th Five-Year Plan* Planning Issues (D/2013/01/007); the 2013 National Undergraduate Innovative Experiment Program (201310290055) and the Education Reform and Construction Issues of China University of Mining and Technology (2014YB34) Higher Education Research Project (JG13069).

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