

The Preliminary Investigation into the Self-Efficacy of students taking an Accounting and Finance course in Undergraduate Engineering Degree Programmes

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Introduction

“The ultimate goal of the educational system is to shift to the individual the burden of pursuing his own education [1].” In the year 1995, Bandura suggested school should go beyond teaching intellectual skills, instead of to develop learners’ self-beliefs and self-regulatory capabilities towards lifelong learning [2].

This paper represents how we experiment fashionable innovations above into engineering education.

Martinec took keynotes at the Second World Conference on Continuing Engineering Education was held in Paris, France on April 6-8, 1983, Lord Flowers said that there is a majority of engineers should develop managerial skills; in general increasing need to understand the interaction of design with quality control, commercial and product planning, organization and finances, industrial relations, and marketing [3]. Even today, there are various concepts and directions of management education for engineers still discussing.

This paper presents an initial investigations how an educator pursues satisfying ultimate self-education goal teaching accounting and finance course in engineering undergraduate program. The observations into 64 engineering undergraduates’ behaviors during nine weeks should be able to give our engineering educators a fresh insight.

Purpose of Study

This paper represents two research questions:

- Can self-efficacy (SE) be measured in domain of accounting and finance?
- Does any pedagogic effectiveness occur in learners’ SE during accounting and finance educational intervention?

The first research question requires developing a scale to measure accounting and finance self-efficacy (AFSE). The second research question requires using measures which we done at the first research question, to

test any possible pedagogy impacts in accounting and finance course.

Self-Efficacy

In the year 1977, Bandura hypothesized the perceived self-efficacy affects choice of activities, effort expenditure, and persistence [4]. “Early self-efficacy research was conducted by Bandura and his colleagues in therapeutic contexts, and trained individuals to cope with feared situations [5].” Until 1997, Bandura redefined self-efficacy as “Beliefs in one’s capabilities to organize and execute the course of action required to produce given attainments [6].”

Nowadays, self-efficacy plays a very important role in different actual situations as a general adaptive pattern. Especially, it is a key factor in stressful life transitions. And also it is a valuable predictor for higher education innovation in the future. That is why we using self-efficacy.

Conceptual Framework

Based on the literature reviews, an item pool is build up. 34 background information items and 55 SE measures items (10 point-likert scales, from 0 to 10) are selected for questionnaire. Also the SE model (Fig1) in accounting and finance is created.

Method

Four stages are applied into the studies.

Stage one aims to establish research pyramid. A literature review is an essential pre-request. According to literature review, an item pool is build up for construction of a statistical model to be included in the questionnaire.

Stage two objects to complete full survey. Pre-treatment is applied, such as explore practical factors apart of literature review. Contacting educators for incoming year pilot survey during class. Moreover, test-retest

questionnaires with small group (20 to 50 samples) in order to determine length, wording, understandable, items' variability, scale validity and reliability.

Stage three aims to investigate results and revise measures. Demography, descriptive statistics, validity and reliability become core analysis approach using PASW (Predictive Analytics SoftWare). Also SEM (Structure Equation Modeling) is applied through correlation testing and model fitness using the Amos software package.

Stage four concludes summarizing vital outcomes and testing hypotheses. It also involves discussing and purposing possible future development.

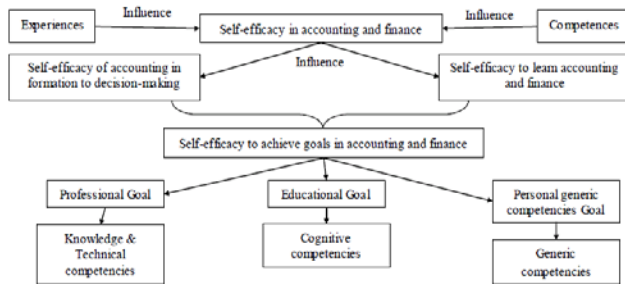


Fig. 1. Self-efficacy model in accounting and finance

Result

Descriptive Statistics. Participates: University of York Electronics Department 3rd undergraduates and Physics Department 3rd year undergraduates. 64 students in total been surveyed during two conservative academic years 2008 (27, 42.2%) and 2009 (37, 57.8%).

Samples Characteristics. 60.9% questionnaires merged pre-post. 56 (94.9%) male students, only 3 (5.1%) female students. They are between age 20 to 27 and year 21 at most. 66.7% are White-British out of 9 different ethnicities. 69.5% are English out of 11 different nationalities. Degree majors are different but all engineering base such as electronics, media, communication, computer, music, radio, nanotechnology, and also physics.

Reliability and Validity Measures. The Cronbach's Alpha is used for measuring of scale reliability. Table 1 below shows Cronbach's alpha values of individual measures sectors.

Table 1. Cronbach's Alpha of each measures sector

| Sector (Number of items) | Cronbach's Alpha |
|--------------------------|------------------|
| GSE (5) | .817 |
| CSE (10) | .840 |
| AFSEGC (10) | .869 |
| AFSECC (10) | .939 |
| AFSEKTC (12) | .965 |
| AFSEKTCP (8) | .950 |

where GSE – General Self-efficacy; CSE – Computer Self-efficacy; AFSEGC – Accounting and Finance Self-efficacy Generic Competences; AFSECC – Accounting and Finance Self-efficacy Cognitive Competence; AFSEKTC – Accounting and Finance Self-efficacy Knowledge and Technical Competence with Theoretical point of view; AFSEKTCP – Accounting and Finance Self-efficacy Knowledge and Technical Competence with Practical point of view.

To validate measures, factor analysis is applied using PASW. Not only all sectors significantly contribute to one factor, but also satisfy individuals.

Empirical Result. General: after 9 weeks course (two one-hour lectures each week), level of SE significantly changed (Table 2 shows below).

Table 2. Pre-Post Means and Standard Deviation (SD) in Self-efficacy (SE) (0-Null; 5-Moderate; 10-Total)

| Sectors | Pre Mean (SD) | Post Mean (SD) |
|----------|---------------|----------------|
| GSE | 7.48 (1.11) | 7.71 (1.35) |
| CSE | 8.92 (0.99) | 8.84 (1.39) |
| AFSEGC | 7.11 (1.17) | 7.54 (1.42) |
| AFSECC | 4.43 (1.82) | 7.09 (1.63) |
| AFSEKTC | 3.98 (2.08) | 6.78 (1.77) |
| AFSEKTCP | 4.36 (2.16) | 6.81 (1.92) |

Table 1 above shows level of AFSE is definitely increasing during this engineering educational intervention. GSE and CSE are not impacted significantly. Therefore, we only investigate AFSE essentially in this paper.

Past module. There are five students undertook (pre-mean=6.13, SD=0.43; post-mean=6.87, SD=2.76) modules involved aspect of accounting and finance before. Initially (at the beginning of the course) these advantages students perform higher level of AFSE than students who did not (pre-mean=4.84, SD=1.57; post-mean=6.97, SD=1.07), but after 9 weeks, they stay the same level.

Role model (include father, mother, other relatives within family, academic supervisor or teacher, manager or supervisor in industry, peer or friend, colleague or classmate): Whenever students who know somebody (role model) has a job involves or has been involved in aspect of accounting and finance (pre-mean=5.00, SD=1.50; post-mean=7.05, SD=1.55), are approximately the same level of AFSE with students who have not got any (pre-mean=4.91, SD=1.60; post-mean=6.87, SD=.72).

Students who have role model, shows role modeling does weak impacts into their AFSE ($r=.14$, $p=.56$) at the beginning of the course. Also, father ($r=.21$, $p=.43$), mother ($r=.25$, $p=.35$), other relative in family ($r=.22$, $p=.43$), manager or supervisor in industry ($r=.23$, $p=.41$), peer or friend ($r=.17$, $p=.51$) and colleague or classmate ($r=.26$, $p=.41$), plays less important role influences students' AFSE. However, academic supervisor or teacher as role model becomes weighted position ($r=.33$, $p=.33$).

After 9 weeks, peer or friend ($r=.06$, $p=.88$) become weaker. Colleague or classmate keeps same appearance ($r=.17$, $p=.79$) as used to. On the other hand, students does talk to classmate (mean=2.5**scale from 1 (null) to 5 (frequent)*, $p=.00$) frequently demonstrates heavier effects ($r=.94$, $p=.36$) than talk to peer or friend (mean=3.15, $p=.00$) ($r=.32$, $p=.21$). Students' perceptions of how teacher/lecturers to be a good role model (mean=3.92**scale from 1 (null) to 5 (total)*, $p=.00$), shows thin effects ($r=.25$, $p=.31$), though students talk to teacher/lecturers frequently (mean=2.73, $p=.00$) become quite important ($r=.39$, $p=.05$). Students' perceptions whether teacher/lecturers easy to talk to (mean=5, $p=.00$) illustrates no impacts ($r=.04$, $p=.27$). However, if teacher/lecturers uses a lot of their personal experience

examples of accounting and finance during interaction of teaching (mean=3.83, $p=.00$), students behave really keen on ($r=.60$, $p=.00$).

Society or Club. There are eleven students joined society or club activities that had involved aspect of accounting and finance before they take this course (pre-mean=4.92, $SD=1.20$; post-mean=7.60, $SD=0.57$), represents not advantages comparing with students who never joined (pre-mean=4.95, $SD=1.62$; post-mean=6.80, $SD=1.28$). In addition, eight students take these activities during 9 weeks academic term time (pre-mean=4.88, $SD=1.36$; post-mean=6.43, $SD=1.82$), shows strong level of AFSE as well (pre-mean=4.83, $SD=1.48$; post-mean=6.96, $SD=1.15$).

Work experience. Majority of students (45, 70.31%) undertook work before. They reveals higher level (pre-mean=5.11, $SD=1.42$; post-mean=6.98, $SD=1.23$) of AFSE than students did not (pre-mean=4.41, $SD=1.86$; post-mean=6.92, $SD=1.19$).

Students whether undertook working experiences before, clearly unfolds their tough AFSE ($r=.93$, $p=.09$). In addition, students who worked a gap year before university shows quite hardy positive impacts into their AFSE ($r=.42$, $p=.53$), comparing with summer working experience ($r=.11$, $p=.82$). On the other hand, gap year during the academic year ($r=.69$, $p=.33$), and part time work ($r=.36$, $p=.46$), placement work ($r=.25$, $p=.89$) directs unexpected negative influence.

Occupation intention. Six students are going to take a job that involves accounting and finance in future confirmatively before course starts. They manifests courageous level of AFSE (pre-mean=5.72, $SD=1.73$; post-mean=7.65, $SD=.96$). Meanwhile, seven disclaim-ants (pre-mean=4.35, $SD=1.19$; post-mean=7.16, $SD=1.54$) and forty-four disputable students (pre-mean=4.81, $SD=1.46$; post-mean=6.87, $SD=1.18$), their weakness continual reveals: students occupational intents perform indispensable role ($r=.34$, $p=.35$) within life-learning.

At the end of course, due to four students convinced themselves with placement intents (pre-mean=5.30, $SD=1.15$; post-mean=7.23, $SD=.51$), as steady as twenty-seven students refusal of consent (pre-mean=4.66, $SD=1.47$; post-mean=6.74, $SD=1.44$) and thirteen controversial students (pre-mean=5.02, $SD=1.53$; post-mean=7.02, $SD=1.15$). Coincidentally, only four students certain their job intents (pre-mean=5.05, $SD=2.46$; post-mean=7.67, $SD=.72$), unfolds vigorous AFSE beyond seven declined students (pre-mean=5.13, $SD=1.16$; post-mean=6.68, $SD=1.81$) and thirty-three uncertain students (pre-mean=4.74, $SD=1.39$; post-mean=6.81, $SD=1.22$). Simultaneously, twenty-four students been influenced into their occupational intents by taken this course (pre-mean=5.02, $SD=1.45$; post-mean=6.58, $SD=1.38$), as well as sixteen students reject this view (pre-mean=4.67, $SD=1.54$; post-mean=7.26, $SD=1.15$). Occupational intents certainly causes students' AFSE ($r=.27$, $p=.35$), and they all confirm this course contents unexpected benefits towards occupational intents ($r=.56$, $p=.15$). Placement intents ($r=.13$, $p=.68$), and course impacts into these intents ($r=.26$, $p=.85$), indicates impotent features.

Study hours. Forty students estimate their total study hours working on accounting and finance course

excluding attending lectures (between 0 to 35 hours, mean=8.19, $SD=9.39$). But it does not correlate to students' AFSE at all ($r=.00$, $p=.94$).

Discussion

In general, 64 engineering students' AFSE enhances after 9 weeks educational intervention. AFSEKTC level rises significantly (mean=2.8). Meanwhile, AFSEKTCP level keep high contributions (mean=2.45) as well as AFSECC (mean=2.66). Surprisingly AFSEGC figures direct unexpected outcomes (mean=.43), likewise, GSE (mean=.23) proves they both are reasonable outcomes. CSE rewards illustrates engineering students never afraid computer at all.

Students studied before shows no any advantage at all. Even though they are more passion at the beginning, stay at the same end with students who lack previous knowledge at starting point.

Role model demonstrates academic supervisor or teacher play very important part during students' life-long learning. Especially, educators should try their best applies personal experience examples of accounting and finance in educational interventions. At the same time, students should be encouraged talk to their teachers frequently as well as classmate, even friend or peer also will strengthen them.

By this investigation, society or club seems not a helpful activity or intervention to enhance students' enthusiasms for learning.

Working experience uniquely performs vital mediator of powered learners' motivation though life long learning. However, not any types of working experience would be able to beneficially wealth learners' inners. We should select strategically our compatible ambiances. A gap year before university becomes most popular recommendation to engineering students here.

Intentional learners more likely will satisfy their approaches into studies. Because they know what they are looking for and how they get it efficiently; they will resist until task finish even a non-stop obstacle occur. Therefore, learners who are going to take job or placement related to accounting and finance, more or less illustrates higher level of AFSE. Undoubtedly, these 64 undergraduates have been drove successfully toward an accounting and finance job.

Conclusions

This paper only shows preliminary explorations of a part of three years PhD research project. The 64 samples are using in this paper, engineering undergraduate s just out of 770 whole PhD project population. Besides BEng and MEng students show in this paper, also MBA, MA, MSC, BA and BSc across business, management, economics and engineering department contribute by five different universities within UK.

Comparing different backgrounds of students; investigating unexpected outcomes; adapting potential forces; make up for each other's deficiencies and learn from each. Life-long learning is not a dream.

Acknowledgments

There are too many people to thank individuals. Students who studied accounting and finance course in electronics department university of York during year 2007 (trail questionnaire), year 2008 and 2009 (completed questionnaire). I really appreciated their assistances. Mr Tony Ward (this course's lecturer) has been allowed me to survey his students and occupied lecture time through three years. In addition, he has helped me consistently for my PhD research.

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Received 2010 04 30

J. Gao, A. E. Ward. The Preliminary Investigation into the Self-Efficacy of students taking an Accounting and Finance course in Undergraduate Engineering Degree Programmes // Electronics and Electrical Engineering. – Kaunas: Technologija, 2010. – No. 6(102). – P. 7–10.

An investigation into the effectiveness of teaching accounting and finance to engineering students at the University of York, England is presented. It uses data collected from students in two consecutive academic years, 2008 and 2009. The work is part of a three-year PhD research project that aims to initially establish and validate a scale measurement for self-efficacy in accounting and finance taught as part of University degree programmes. The PhD Research project then uses this measure to investigate the effectiveness of different teaching methods and student engagement activities to develop a better understanding of how educators can build self-efficacy in their student. Pre- and Post- delivery questionnaires were used to collect data for a 9-week duration course. A student identifier was used to link pre- and post- questionnaires to the same student and of the 64 completed questionnaires received, 39 (60.9%) could be matched. In addition to asking questions that would support the development of the self-efficacy scale, questions were also asked about the student's general background, past study experience, work experience, engagement with activities (society, club or business related competition), career intention and exposure to role models. These additional questions provide the data to explore what it is that affects the students accounting and finance self-efficacy and how it develops during the course. This paper presents the background to the project, a brief review of relevant literature, the methodology and results obtained so far. It concludes with initial comments on implications for educators in this area, including a number of options for engineering educators, not only in teaching an accounting and finance course, but also in general life-long learning for engineering undergraduates. Ill. 1, bibl. 6, tabl. 2 (in English; abstracts in English, Russian and Lithuanian).

Ю. Гао, А. Е. Вард. Исследование эффективности обучения финансам студентов инженерного профиля в Йоркском университете // Электроника и электротехника. – Каунас: Технология, 2010. – № 6(102). – С. 7–10.

Описываются исследования эффективности инженерного профиля студентов в Великобритании. Приводятся данные, полученные в 2008–2009 г.г. Изучено влияние студентов до поступления в университет и их общественная деятельность на разных этапах студий. Особое внимание уделено уровню успеваемости в процессе обучения по выбору будущей карьеры. Ил. 1, библи. 6, табл. 2 (на английском языке; рефераты на английском, русском и литовском яз.).

J. Gao, A. E. Ward. Inžinerinės krypties bakalaurantų buhalterijos ir finansų mokymo efektyvumo tyrimas // Elektronika ir elektrotechnika. – Kaunas: Technologija, 2010. – Nr. 6(102). – P. 7–10.

Straipsnyje aprašomas inžinerijos krypties studentų buhalterijos ir finansų mokymo efektyvumo tyrimas, atliktas Jorko universitete, Anglijoje. Duomenys surinkti per dvejus akademinius metus (2008 ir 2009). Buvo pateikti klausimynai prieš klausant devynių savaičių trukmės kursą ir jį išklačius. Apklausų rezultatams palyginti buvo taikomi identifikacijos metodai. Taip pat buvo pateikta klausimų apie studento praeitį: studijų patirtį, darbo patirtį, išitraukimą į visuomeninę veiklą (sajungas, klubus), planuojamą karjerą ir sektinų asmenybių buvimą. Šie papildomi klausimai suteikė duomenų, kas veikia tiriamus studentų gebėjimus ir kaip šie gebėjimai keičiasi kurso studijų metu. Il. 1, bibl. 6, lent. 2 (anglų kalba; santraukos anglų, rusų ir lietuvių k.).