AC 2012-4701: AN EVALUATION OF TEACHING METHODS USED IN TEACHING CONSTRUCTION PROJECT MANAGEMENT

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Before working in academia, Ximing Ruan had accumulated 10 years' experience in IT and construction industries. The roles Ruan took cover a variety of functions including marketing, customer services, project management, and general management. Ruan's academic career started with a M.B.A. in business school and a Ph.D. in built environment school at Northumbria University, before working as a lecturer at in the Business School at Robert Gordon University. Working at the Business Management Department, Ruan teaches a range of subjects in business management, with special focus on project management. Ruan's research interests lie in knowledge management, social network analysis, procurement systems, organizational coordination, and supply chain management. As a committee member on APM (Association for Project Management) Aberdeen Chapter, Ruan actively contributes to organizing local APM events. The liaisons with local companies provided Ruan with opportunities to capture the trends and needs for further research.

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An Evaluation of Teaching Methods used in Teaching Construction Project Management: Case United Kingdom

Abstract

The Higher Education sector in the United Kingdom is currently experiencing a proliferation of construction project management courses that offer training under various criteria, teaching styles and outcomes. However, the efficacy of such courses on the practice of construction project management remains undetermined. Though, from the reviewed literature, it has been suggested that a properly designed construction project management curriculum is essential and will not only result in well-prepared construction project management students but a competent construction workforce. The research aimed to explore construction project management students' perception of the effectiveness of different teaching methods in helping them acquire professional construction project management skills. The study examined teaching techniques that are passive-like/active-like and their influence of developing the desired construction project management skills. A combination of strategies was used, namely survey, questionnaire and interviews. The evidence from this study suggests that, construction project management students have a strong preference for and against active-like and passive-like teaching methods according to their capability and familiarity. In relation to active-like teaching methods, the survey results showed that construction project management students highly rated class discussions/group discussions.

Introduction

According to the *National Association of Secondary School Principals* (NASSP) [1], learning styles are categorised as affective, cognitive and psychological behaviours that designate how individuals perceive, interact and respond to the learning environment. Learning can be defined as the attainment of or depending on your theoretical viewpoint, the construction of knowledge [2]. Results of work by Pask *et al.* [3] suggested that most learners have a favoured learning style but some may modify them according to the task. Those who adjust are described as having a 'flexible' learning style. In the United Kingdom, Higher Education learning takes place in a number of ways. Institutions proffer a variety of teaching methods from traditional lectures to small interactive discussion groups as well as individual tutorials. Teaching methods differ as a function of the module being taught, the different assessment criteria and the preferences of the educators who may give emphasis to practical, theoretical or mixed approaches [4]. For example, knowledge is frequently associated with having the right data, such as, accurate answers to exam questions. Simply, telling learners something does not signify they will learn or comprehend multi-faceted theoretical or social phenomena. Educators cannot presuppose that learners will be able to transfer knowledge to a new learning situation [2]. Evidence shows that little research has been done on learners' preferences towards different teaching methods, let alone what determines these preferences [4] .

Initial research suggested that the learner is sometimes viewed as an "empty vessel" waiting to be crammed with little or no account given to his/her previous experiences [5]. More recently

Chamorro-Premuzi *et al.*[4] affirmed that it has always been believed that if there is a "fit" between the learner's preferred teaching style and method of instruction, the outcome would be happier and more academically successful learners, although research often fails to sustain this theory[6] . As observed from the reviewed literature, one of the main problems in associating the magnitude of data to successful learning is that knowledge is augmenting at an exponential rate[7, 5]. If teaching concentrates merely on content and opportunities to develop meta-cognitive strategies are limited, alumni will experience significant difficulty keeping up-to-date with their respective disciplines[5]. Whilst joining in with the debate, Kolb[8] saw learning as a cyclical process comprising of a series of experiences with cognitive additions: abstract conceptualization, active simulations, concrete experience and reflective observation.

The entry point to the circular process is not essential as learning transpires when the cycle is completed[8]. These four elements provide the foundation for teaching Construction Project Management in the United Kingdom. For example, the existing Construction Project Management Master's programme at Robert Gordon University has been operating for about five years, graduating masters' students in Construction Project Management with MBA degrees as well as, more recently, with corporate certificates. A good construction project management programme should have a balance of three learning domains: knowledge, skill and personal development. It is usually agreed that these domains are delivered by a combination of both teaching and learning. The last domain 'personal development' is non-existent in many higher education curriculums, although some courses that aim at personal awareness are becoming increasingly available in the form of executive development programmes[9]. Higher Education in the United Kingdom has become part of a global shift in a new way of generating and utilising knowledge. This contemporary way is centred on solving problems and is susceptible to students needs. It strives for both quality and quantity[10].

This research investigated students' perceptions of the effectiveness of different teaching methods that help them acquire professional construction project management skills. The specific objectives developed to achieve the aim of the research were to:

- identify which teaching method(s) is/are more effective for promoting learning for project management students;
- identify which teaching method(s) the students perceive as helping them learn most in acquiring professional project management skills;
- propose an effective approach for teaching construction project management at master's level; and
- explore adequately learning methods.

The next section reviews relevant literature on learning styles. This is followed by an outline of the research method and a discussion of the results with reference of the opinion and attitudes of construction project management students.

Background: synopsis of learning styles

From the reviewed literature, it emerged that the definition of *"learning styles"* varies extensively depending on the viewpoint of the researchers. While early researchers, such as, Kolb[8], concentrated on learning styles as a manifestation of how deliberation is processed, current researchers have extended the field to encompass the psychological and affective dimensions that effect learning. Burd *et al.*[11] noted that individual learning styles are developed as an outcome of heredity, experience and modern environment. James and Gardner[12] showed that a nucleus concept of learning styles is "*How individuals react to their learning environment*". As Dunn[13] stated, *"Learning style is a biologically and developmentally determined set of personal characteristics that make the identical instruction effective for some students and ineffective for others".* It has been argued that while students are usually strong in one learning style, they will exhibit multiple learning styles depending on age, gender, personality, culture and environment[14]. Results reported here, suggest that when students are aware of their learning styles, they choose the instructional format that appeals to them and compensate formats that are conducive to their learning styles. A notable feature of this is that learning is often presented in this dualism of either student-centred learning or teacher-centred learning. The next sections will present important theories on learning styles, that is: Kolb learning theory, Gregorc's mind styles and multi-dimensional learning styles.

Kolb's learning sequence

Kolb[15] developed a model of the learning cycle to exemplify how practice is decoded into concepts, which in turn, are used as guides in the choice of new experiences. Learning is a four-stage process beginning with: concrete experience, reflective observation, abstract conceptualisation and active experimentation[15]. Learners need to develop aptitudes that match the phases of the learning cycle. For learning to transpire, the student must submit to new experiences and reflect on them. This leads to the formation of theories or concepts that are used to make subsequently well-informed decisions. Cognitive developments take place along two dimensions[15]. The first places concrete experience at one end of the dimension and abstract conceptualization at the other whilst the second places active experimentation and reflective observation at opposite ends. This indicates four discrete learning styles: inventive students are opposite to rational students and methodical students are opposite to self-motivated students.

Gregorc's mind styles

Studies by Kolb[15] and Gregorc[16] presented parallel perspectives on learning. Individuals learn through certain mind styles, which include concrete, abstract, sequential and random[16]. As a result, one could suggest that concrete project management students react well to a pre-arranged, sensible and conventional learning setting in which they can be physically implicated. Abstract project management students perform best in a setting that is rational and systematic. They focus on amalgamating information to fabricate new concepts and theories. Random project management students favour sociable and imaginative learning experiences. They think holistically and can take dissimilar quantities of data and form them into a global

concept. Sequential project management students need specific information accessible in a structured, step-at-a-time format[17, 18].

Multi-dimensional learning styles

As established from reviewed literature, Kolb[15] and Gregorc[16] examined learning styles according to cognitive dimensions, whilst other authors, such as, James and Gardner[12] highlighted that learning styles also include perceptual and affective modalities. The ways individuals act in response to the overall learning setting make up the students learning style[15]. In a second study, James and Blank[19] defined learning styles as a "*Complex manner in which and the conditions under which, students most proficiently and most efficiently observe, process, store, and recall what they are attempting to learn*". Consequently, perceptual, cognitive and emotional features all play a role in an individual's learning style.

A notable exception is that the cognitive element of learning styles replicates how thought is processed and is characterized by Kolb's[15] and Gregorc's[16] frameworks. Affective forms reflect the emotional element of learning seen in student activities, such as, preferring to learn autonomously or in a group. The affective modality is apparent in the way in which students utilize their sentiments to make sense of erudition experiences. Other research focusing on multidimensional features, suggested that environmental, emotional, sociological, physiological and psychological factors influence erudition[13]. Psychological features reflect the way that students' process data (global versus logical and impetuous versus contemplative) and hemisphericity (right brained or left-brained). Sociological features are predilections for learning alone versus group learning and working in a variety of classroom environments[13].

A number of researchers have also examined learning styles as preferred behaviours or requirements under which erudition occurs as well as how data is processed. Results presented by Sarasin[17] showed that students with cognitive learning preferences learn best when data is obtainable in a rational, chronological format whereas perceptual scholars view concepts holistically. Competitive individuals need to learn material better than their counterparts do in order to receive awareness and appreciation[20]. Collaborative students share information and work with other students; avoidant students are not very interested in learning and will not contribute in class debates; participant students are active in class discussions; dependent students depend on influence and show minimal intellectual curiosity; and independent students work alone and establish the scope of their own learning.

A final study by Felder and Solomon[21] revealed that active students perform best in settings where they can experiment and learn by doing; whilst reflective students need to think about the data they receive and time to examine it. The above analysis confirms there are a number of reports that have examined learning theories. There is, however, a dearth of information about teaching techniques that are passive-like/active-like and their influence on developing the desired project management skills. In exploring the attitudes and experiences of project

management students the study identified, teaching methods the students perceive as helping them learn most in acquiring professional project management skills.

Comparison of learning practices identified

From the reviewed literature a number of broad conclusions can be drawn. These conclusions give a suitable context for the research's aim and objectives. The reviewed literature highlighted that students are usually strong in one learning mode; however, they will exhibit numerous styles or a mixture depending on class settings, ethos, and traits and gender. For example, some authors have suggested that Asian and Western students hold different pedagogical preferences[22].

Interestingly, the authors further noted that Chinese students expect the educator to guide and provide learning points. The picture these studies present reveals that culturally some students prefer greater control and personal accountability in the learning process, whereas some rely on the educator to provide structure. A growing practice in curriculum design globally is writing learning outcomes/objectives that focus on what learners will be able to achieve, rather than on the content being covered by the educator [23]. This practice is an illustration of the move towards student-centred learning in course design and it helps to shift the prominence onto the student as opposed to a coverage model by the educator.

From the above, one could suggest that learning styles are typified as cognitive, affective and psychological behaviours that designate how students perceive, interact with and respond to learning settings. The way educators edify should match the way students learn. The concern of lecturers should be the individual's style of erudition. The objective is to comprehend from a heterogeneous mix of individual learning styles the group-learning mode so that educators can best modify their teaching styles to facilitate student group learning. The symbolic and the behavioural domain environments require passive like tutor behaviour and the reflective and affective ones require active like behaviour. Students whose interests are behavioural oriented, for example, project management and psychology are likely to possess concrete experience and reflective observation learning abilities. Developing the techniques necessary to teach and learn effectively requires an understanding of learning styles and best to address them in a class setting. Successful teaching and learning depends on all students possessing the attitudes necessary to succeed in a class setting.

Project management offers a methodical methodology to manage organizational change /or delivery of products and services[24, 25]. In many cases, project management provides the best substitute or exceptional way to get business done. Teaching and learning project management has become an influential tool for both educators and learners to master knowledge, skills and attitudes. By placing the emphasis on both the learner and teacher, learning project management becomes a dynamic, interactive process of doing rather than only listening. Therefore, an investigation into project management students' perceptions of the effectiveness of different teaching methods seems to be a worthwhile area for further research.

Method

A primary review was performed to examine specific research problems that relate to teaching techniques that are passive-like/active-like and their influence of developing the project management skills. A literature review of a variety of teaching modes, such as, Kolb learning styles, Gregorc's mind styles and multi-dimensional learning styles was undertaken. From the start, a research problem was defined, thus determining the direction of the fieldwork. This is in line with the purpose of literature control. The primary aim of the study was to investigate students' perceptions of the effectiveness of different teaching methods in helping them acquire professional project management skills. The methodology was concerned with uncovering not only the causes but also the effects of the different teaching styles upon students engaged in studying project management, therefore, both qualitative and quantitative research techniques were adopted for this study. The use of both research methods was useful, as they address the complexity, demands and extreme constraints of learning settings, which project management students face. The triangulation ensured that issues germane to the experiences and attitudes towards different sets of teaching methods were adequately explored.

Eight teaching methods often used by coordinators in the Construction School to deliver construction project management modules were identified. Of the eight, four were active-like and four passive-like. The active-like techniques are case studies, individual research projects, team projects and class/online discussions. The passive-like are lectures by module coordinators, guest lecturers, classroom presentations by students and construction project management videos that are shown in class. In addition, a survey questionnaire asking project management students to rate each teaching method on a Likert-like scale, ranging from *very important* (VI), *fairly important* (FI), *slightly important* (SI) *to not important* (NI) was prepared. The validity and reliability of the data are influenced by the design of the questionnaire. The questionnaire was designed with due attention being paid to the areas of: questionnaire focus, questionnaire phraseology, form of response, question sequence, overall presentation and the introduction for the respondents. The questionnaire is demanding on a participant's time and if it is felt that completing the questionnaire is an unreasonable use of valuable time it might have a negative effect on both the completeness and accuracy of the findings. To overcome this problem, questions were constructed using simple phraseology and this was achieved by carrying out a pilot study with six senior module coordinators. The questionnaire comprised two main areas: active-like and passive-like teaching methods.

One hundred survey questionnaires were distributed to construction project management students and fifty-six were returned giving a response rate of fifty-six percent. By using an exploratory case study approach, quantitative data was gathered in order to highlight some key phenomena about students' views towards teaching methods. These phenomena were then explored qualitatively in more depth using focus group interviews in order to gain insights into the way these students experienced different teaching methods. The students were made aware that participation was voluntary. Within this context, the researcher continually emphasized that the study had a primary focus with the findings being part of an

accumulative body of knowledge about how best to promote learning for construction project management students in the Construction School. At the start of the discussion, participants were advised to read and to sign a statement of consent. The statement of consent briefly highlighted the purpose of the research project and then explained that the focus group interviews would take the form of a structured discussion. The consent form also assured the participants of complete anonymity during the research process.

Two focus group interviews were conducted with construction project management students. The participants' responses to the questionnaire highlighted key themes of interest, which were utilised as the basis for constructing semi-structured focus group interview schedules. The study sample was randomly selected from the MSc Construction Project Management's full time cohort of 2009/10. Twenty students took part in the focus group interviews. The use of focus group interviews allowed the researcher to elaborate points, which were unclear to participants. It also enabled the researcher to clarify the meaning of questions and the opportunity to introduce the research topic and motivate the respondents to provide honest answers. Additionally, it provided the opportunity to explore some other issues and allowed the researcher to classify (or at least) clarify the responses to such questions into useful categories during the course of the interviews. The two focus group interviews provided rich data, which proved to be more than sufficient for this research. A form of descriptive analysis was then utilized from which the preliminary analytical statements surfaced via an initial analysis of the survey questionnaire.

By using NUDIST NVivo^{TM} software, connections were made and at the same time exploration of patterns, concerning categories and variables was ascertained. This allowed data to be coded under conceptual categories that could be retrieved in order to produce learning styles predilections. Verification took place after the interpretation of data by showing the findings to the main participants of this study. Validation took place after the verification process. This involved presenting the findings to a different group of students who were not involved in the study. Rigour was achieved by focusing on verification and validation. This was accomplished by the responsiveness of the researcher during the fieldwork, methodological coherence, sampling, data analysis and thinking theoretically. The findings are presented below under sub-headings drawn from the analysis. They are outlined under sub-sections (see below). Where it is appropriate, descriptive quotes are drawn from focus group interviewees to illustrate common responses.

Research findings

This section will present the qualitative and quantitative findings obtained from the participants that relate to the teaching methods utilised by the Construction School. As previously mentioned in the methodology section, eight categories emerged, which are presented in Table 1 and 2. These categories are case studies, individual research projects, team projects, class discussions and lectures by module coordinators, guest lecturers, classroom presentations and videos shown in class.

Active-like teaching methods

The findings indicate that, the factor regarded as the most important is *'class discussions'*, with a percentage score of 91. This is closely followed by '*case studies'*, '*team projects'* and '*individual research projects'*, with percentage scores of 82, 79 and 32 respectively (*see Table 1*).

Table 1: Active-like teaching methods

Teaching methods	No. of Responses	Very Important	Fairly Important	Slightly Important	Not Important
Active Like		**VI (%)**	**FI (%)**	**SI (%)**	**NI (%)**
Case studies	56	46 **(82%)**	6 **(11%)**	4 **(7%)**	0
Individual research projects	56	18 **(32%)**	10 **(18%)**	28 **(50%)**	0
Team project (group work)	56	44 **(79%)**	7 **(13%)**	5 **(9%)**	0
Class discussions	56	51 **(91%)**	5 **(9%)**	0	0

Overall, participants considered this group of teaching methods as very important. The variation in levels of importance expressed by students was very striking. The students did not rate individual research projects very high in importance. During the focus group interviews students expressed mixed feelings about individual research projects. Participants suggested that, to make this is a good learning experience it is important that students be given an opportunity to carry out both primary and secondary research. On the other hand, several students remarked that the class discussions/team project (group work) of the course offered them a chance to learn to work in project teams and this helped them to develop a skill that would be beneficial in a real life project environment. One of the students' suggested,

> *"The key to class team project (group work) is making sure that you pick individuals who have the ability of working in a team and also have the ability to adapt and work with a diverse group of students"*

From the above, one could suggest that, one of the disadvantage of class discussions/team project (group work) is the unpredictability in student motivation. Most students reported satisfaction with class discussions/team project (group work). It was also emphasized by participants that class discussions help students examine, evaluate and share knowledge about project management. One of the students noted,

> "*They provide an atmosphere for students to create new ideas, view from different perspectives and improve their communication and expression skills"*

However, it is essential to highlight that a number of the participants are from overseas studying in the United Kingdom. The reviewed literature showed, for example, that Asian and Western students have different educational predilections. Hofstede[26] proposed a typology consisting of four cultural dimensions by which society can be categorized. Building on these categories, Rodrigues *et al.*[27] noted that students from high power distance, collectivistic and strong uncertainty avoidance societies favour passive-like teaching methods whilst students from small power distance, individualistic and weak uncertainty avoidance societies prefer the

active-like teaching methods. One could therefore, claim that the findings in this category may thus be prejudiced by the students' culture.

Passive-like teaching methods

In this category, participants considered 'lectures' by module coordinators as very important. As illustrated in Table 2, fifty-three (95 percent) out of fifty-six participants agreed that lectures are a forthright way to pass on knowledge to individuals quickly.

Table 2: Passive-like teaching methods

Teaching methods	No. Of Responses	Very Important	Fairly Important	Slightly Important	Not Important
Passive-Like		**VI (%)**	**FI (%)**	**SI (%)**	**NI (%)**
Lectures by module coordinators	56	53 **(95%)**	3 **(5.3%)**	0	0
Guest lecturers	56	47 **(84%)**	5 **(9%)**	4 **(7%)**	0
Classroom presentations	56	45 **(80)**	5 **(9%)**	6 **(11%)**	0
Videos shown in class	56	49 **(88%)**	4 **(7%)**	3 **(5.3%)**	0

Three senior module coordinators noted that logistically, a lecture is often easier to create than other modes of instruction. During the focus group discussion, the participants believed that students who are weak in note-taking skills would have trouble understanding what they should remember from lectures. It is vital to note that some students can find lectures boring causing them to lose interest. From the participants there was a consensus that, some students had lectures by enigmatic educators whilst others experienced lectures by less captivating educators. Participants further suggested that in traditional lectures, the majority of class time is devoted to the educator's delivery of data whilst interactive lectures do maximize student engagement with module materials and facilitates learning. Interestingly, 88 percent of participants considered 'video shown in class', 'guest lectures' and 'classroom presentations' as quite important. This is reflected in the ranking criteria, based on percentage scores.

As suggested by the students, video lectures allow classroom exposure of more multi-faceted and exigent subject material that is more interesting to many students. A number of students agreed, video lectures extra time to individuals who cannot entirely comprehend construction project management material through the classroom lectures and support materials, such as, textbooks. A statistically significant 88 percent of students asserted that the videos helped them comprehend course information. There was universal acknowledgement from ten participants that guest lecturers provide students with substitute viewpoints, opinions and personal experiences that can fortify the teachings of module coordinators. During the discussions, participants further agreed that guest lecturers provide proficiency in selected project management areas, which module coordinators may have limited knowledge. One could therefore suggest that, if you provide the guest lecturer with a clear understanding of the module and all project activities described in the course, the guest may propose new ideas that one had not previously conceived.

Conversely, it is vital to note that a number of our construction project management students have grown up in considerably different educational and value systems. It is not surprising that they are challenged in adjusting to unfamiliar teaching and learning styles. In their studies (De Vita[28]; Butcher and McGrath[29]) acknowledged that a number of international students face the following problems: differing views about the interaction between educators and learners; a mismatch between teaching and preferred learning styles and unsuitable assessment methods. The results of this dimension clearly demonstrate that, construction project management lecturers face unique challenges arising from a complex mix of teaching methods and cultural differences of understanding. Differences between learners from different social, racial and cultural backgrounds cannot be addressed without a determined and prolonged effort to inform, to understand and to eliminate misunderstandings[30]. To boost confidence and enhance cohesiveness in class, it is necessary that construction project management educators in the United Kingdom develop modules using a variety of formats and techniques that appeal to various learning styles.

Summary and conclusion

The issues that have been identified in this study relate to different teaching methods and these have an impact on the students' learning. The evidence from this research shows that all eight teaching methods were significantly associated with different approaches to learning. From the findings, it has been shown that construction project management students have a strong preference for and against active-like and passive-like teaching methods according to their capability and familiarity. In relation to active-like teaching methods, the survey results showed that students highly rated class discussions/group discussions. It is worth noting that several students suggested that class discussions/team project (group work) offered them a chance to practice construction project management skills. In order to create a unified class environment, the educator has to provide a model for thinking like a project manager and a structure for student discussion. The findings also demonstrated that the students found the case study approach more interesting, more motivating and essentially gave them a much better idea of managing projects.

Educators need to illustrate construction project management concepts with real world examples and encourage their students to think from this perspective. This process needs to be discharged meticulously, because as highlighted in this research, construction project management students come from different educational and value systems. In relation to passive-like teaching methods, participants found lectures delivered by module coordinators very important. Given the general dynamic nature of project management, educators should use interactive lectures. It is essential for the educator to ensure that interactive lectures are complemented by project actives. These actives can be in the form of discussion, direct questions back or small groups. The findings have confirmed that video lectures help students understand construction project management concepts.

On the issue of guest lecturers, participants suggested that guest lecturers provide expertise in selected project management areas of which module coordinators may have imperfect

knowledge. As noted previously, the module coordinator has to ensure that the guest lecturer has a clear understanding of the module. As it has been shown in this study, in Higher Education, particularly at master level, a mixture of teaching techniques are used rather than the traditional lecture alone. Teaching in this way provides a good mechanism for introducing up-to-date developments in construction project management to students. Keeping up with modern construction project management developments is particularly essential for project management learners. This research was limited to construction project management students, though there is no reason to presuppose the findings would generalise to other learners in other courses. Future research into teaching methods ought to investigate the experiences of online students and the difficulties they face in utilising different approaches to learning.

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