Learning by Doing: A Hands-on Value Management Workshop for Postgraduate Students

Zuhaili Mohamad Ramly; Geoffrey Qiping Shen, Ph.D.; Ann T.W. Yu, Ph.D.; Zhao Yuan; and Jacky K.H. Chung

Abstract

Value management (VM) is a powerful management technique to attain best value for money in construction projects. This paper shares the implementation of a hybrid teaching approach adopted for a VM subject for postgraduate students and demonstrate how it helps them to understand the subject better. VM subject aims to empower future construction professionals with knowledge on VM. Observation was carried out during the implementation of the workshop and a survey was conducted upon completion of the workshop. The data was then analyzed using Statistical Package for Social Sciences (SPSS Ver. 20.0) software to examine how the students perceive the approach adopted. Based on the students' performance during the workshop and examination, including their feedback, it is shown that the hybrid-mode teaching approach was practical and effective within the characteristics of construction industry in Hong Kong.

Keywords

Teaching and Learning, Value Management, Workshop.

Introduction

Value management (VM) was first introduced to Hong Kong (HK) in 1988. Since then, the awareness and applications have increased, but not emerged due to several reasons. Shen (1997) reported that time constraint is the main problem in HK scenario. It is hard to gather all key stakeholders for a 40-hour workshop, rental rate to host the workshop is high, and professional fees for the facilitators are higher as well. Hence, Fong and Shen (2000) strongly urged that VM needs to suit the local practices. In consequence, clients in HK tend to demand shorter and more focused VM studies, despite more complex projects undertaken nowadays.

In 1998, the HK government issued the technical circular of mandatory VM applications for government projects exceeding HK $200 million. To cater the demand by the industry, the Department of Building and Real Estate (BRE) introduced the VM subject at both undergraduate and postgraduate levels. The subject aims to meet the needs of future construction professional who wish to use VM methodology to obtain best value for money by broadening and deepening their knowledge of VM within the construction context.

This paper aims to share the implementations of hybrid teaching approach for a VM subject that combined both lecture and hands-on workshop to a group of postgraduate students. The findings try to proof that the adopted approach was effective and practical for teaching and learning of VM subject. The observation method and questionnaire survey was adopted to examine the performance of the teaching approach adopted.

Design of VM Subject

Seventy-four (74) students enrolled in a VM subject in academic year 2011/2012. They were among students undergoing the postgraduate scheme run by four different departments within the Faculty of Construction and Environment. As such, the students' backgrounds varied and formed a good pool of multidisciplinary participants for the workshop.

Learning Outcomes

This subject has been developed based on the Outcome-Based Education (OBE) approach by the faculty members who actively conduct research in VM field. In OBE, the decisions about the curriculum are driven by the outcomes that the students should be equipped with (Harden et al., 1999). Hence, at the end of this subject, the students should be able to:

A. Understand the VM methodology;

B. Use VM tools/techniques such as function analysis;

C. Organize and manage VM workshop in a project life cycle;

D. Exercise practical creativity skills and work with a team of stakeholders to arrive at innovative solutions;

E. Ensure value for money for projects by applying VM in business and/or technical situations;

F. Implement the VM methodology and techniques in real-life project.

Teaching Approach

Teaching and learning of the VM subject need both theory and practical experience in order for the students to achieve the learning outcomes. The theory equipped the students with knowledge on the methodology, tools and techniques, and managerial aspect of the workshop. The practical allowed the students to practice the theory and performed required soft skills to enable the workshop to achieve its objectives.

Hence, we proposed learning by doing which combined lectures and hands-on workshop for this subject. Students learned the theory during the lectures and applied the theory during the hands-on workshop. This was one-off experience where the students organized the workshop by themselves. They learned the theory individually, then applied it at once with the other students. In addition, a real project adopted for the workshop gave a clear scenario and problems for consideration.

Lectures

Lectures involved the process of delivering the knowledge to the students. Commonly, the following approaches used for teaching and learning activities at the tertiary level. It engaged both deductive and inductive learning to achieve effective learning experience (Prince and Felder, 2006).

A. Teaching-oriented activities

According to Lam (2008), teaching-oriented activities include the design and planning of teaching and learning activities, teaching materials and schedule, criterion-referenced formative and summative tests, remediation and enrichment activities, and the required facilities.

Within these activities, students were given the inputs on the related subject contents via the study guide booklet. Apart from the theory, information sharing during lectures covers the real life experience of VM applications and also current research activities related to VM. It enable the students to see what VM can offer and how does VM can improve their business activities in the future.

B. Learning-oriented activities

Meanwhile, learning-oriented activities include implementation of the instructional activities, monitoring and improving students' mastery of learning (Lam, 2008).

In between the lectures, the students were instructed to form several small groups. The students were given a problems and situations related to the VM and construction industry to be discussed. During these sessions, the process went very well as majority of the students were currently working in the industry. They shared their thoughts based on their own experience. Interestingly, the group activities were not only limited to VM applications, but extended to creative thinking exercises to stimulate and encourage innovative solutions. That was, in fact, the spirit of VM to promote innovation and challenges the norms (Shen, 1997).

Figure 1. GDSS applications during workshop

Hands-on Workshop

The workshop briefing was carried during the first lecture. Necessary information such as the workshop brief, layout of the project, and agenda of the workshop were provided. That allowed the students to do the preparation. In term of the implementation, the students were split into three teams: Teams A, B, and C.

Different approaches adopted for workshop implementation are shown presented in Table 1.This paper specifically focuses to the hands-on workshop of Team B.

Table 1. Hands-on VM workshop approaches

Team	Approach	No. of Students
A	Traditional face-to-face	24
B	Traditional face-to-face supported with GDSS	26
C	Virtual VM workshop	24

Team B adopted traditional face-to-face supported by Group Decision Support System (GDSS). According to Thierauf (1989) in Shen and Chung (2002), GDSS help to improve the efficiency, reliability, and quality of group decision in meetings. To work with, each group was provided with a laptop installed with the customized GDSS. A detailed comparison between traditional workshops with GDSS-supported workshops can be found in the works of Fan and Shen (2011).

The customized GDSS is a product of continuous research into computer applications to improve the performance of VM studies carried out by Shen and Chung (2002), Fan and Shen (2009), and Luo et al. (2011). Chung and Shen (2002) further elaborate that the system benefits in terms of facilitating the information management, improving the collaboration between team members, promoting active participation and interaction, and assisting in analyzing the decision of the workshop.

Students' performance assessment

There are three types of assessment conducted to assess the students' performance.

A. Written report

The students were required to produce two written reports. The background information prepared during the pre-workshop contributed 10 percent, while final report of the workshop contributes 20 percent.

B. Workshop participation

The hands-on workshop will ensure the students achieve the intended learning outcomes. The student should be able to apply the theoretical knowledge of VM together with other skills and attributes such as working in the team, communication, and capabilities to argue and defend their ideas. The students' participation assessed by the VM facilitator and contributes 20 percent of the marks.

C. Written examination

The final examination was designed to examine the level of understanding toward the theory, concept, and applications of VM. That contributed 50 percent to the overall marks.

Design of the Hands-on VM Workshop

The implementation of the hands-on workshop was divided into three stages to accomplish the workshop objectives.

Pre-workshop

The pre-workshop stage served as a preparation stage for the participants to obtain information that would help the effective and smooth running of the workshop. Generally they were assigned with dedicated roles for the project (e.g., clients, consultants). Every stakeholder had to prepare his or her back-

Figure 2. Meeting with the CDO representatives

ground information paper to explain and highlight how the project was related to them. In doing so, a meeting with the PolyU Campus Development Office (CDO) was arranged on 23rd February 2012 to obtain further information about the project. Two representatives from CDO attended the meeting to share information and clarify issues raised by the participants.

Workshop

The hands-on workshop was held on 24 March 2012 with 26 participants. The participants were randomly assigned to four groups with 6-7 participants of mixed stakeholders. Demographically, they played various roles within the construction industry.: 33 percent were engineers, 25 percent surveyors, 9 percent from the government sector, 4 percent respectively were the client's project manager, architect and builder/contractor, and 2 percent were leasing agents. The majority of the participants were between 21 and 40 years old (89%) and employed at professional and middle management levels (59%). The mixture of the participants helped the group to function more effectively. The workshop agenda was designed according to the VM job plan of five phases as it is an important success criterion of a VM workshop (Shen and Liu, 2003).

A. Information

The information phase is important for the stakeholders to share the information regarding the project. This is the right venue for the client to clearly express their expectation for the workshop and the project. Meanwhile, the other stakeholders can highlight constraints in relation to the project.

The client representatives gave an overview on the project objectives and scope.The end user representative highlighted the needs of a conducive teaching and learning environment based on the functions of each department. Meanwhile PolyU Student Union representative dragged attention to the basic needs of students, such as the lecture theater, sports facilities.

The respective consultants—architect, civil and structural engineers, mechanical and electrical engineers, quantity surveyor and energy—presented critical information from their respective disciplines. The main contractor representative highlighted the procurement method and also issues of quality control, environment impact and the tight timeframe of the project.

Figure 3. Team building activities during the workshop

Finally, the representative from local residents expressed their concern of the impact of the project upon their residential area. Issues raised related to the building height and public green space which might affect their existing living condition.

B. Function Analysis

The main objective of function analysis is to generate a pool of functions and classify them into basic and secondary functions.

The participants were driven by the facilitator to focus on providing the necessary functions to the project. During this phase, the groups discussed and proposed the functions of the project. Post-It® notes were used to write down the functions. The participants were reminded that all functions must be put in specific verbs and nouns.

The facilitator then led students to consolidate those functions. The discussion took some time before reaching consensus as the to categories for those functions. Finally, the functional tree diagram was constructed using the GDSS tool. The finished diagram was again presented to all before the workshop proceeded to the next phase.

C. Creativity

Based on the agreed functional tree diagram, the workshop then proceeded to the creativity phase where ideas were generated to meet the desired functions. The brainstorming technique was used to invite participants to contribute ideas. They were reminded that there should be no judgment during that phase. Again the GDSS was utilized in which the participants were instructed to key-in their ideas into the system.

D. Evaluation

Those ideas would then undergo further screening to determine how realistically they could be implemented and how significantly they would meet the desired functions. The ideas were classified either into P1 (realistically possible to be implemented), P2 (remotely possible), or P3 (impossible to be implemented).

After the selection of evaluation criteria, Weighting Evaluation Technique (WET) was carried out to evaluate the relative importance of each criterion to take into consideration. Again, the GDSS was utilised in order to assign the appropriate weightage based on the identified criteria; project duration, initial cost, operating cost, functional performance, flexibility, environmental, comfort, and aesthetics.

E. Development

The objective of the development phase is to further develop the best alternative ideas that can meet the identified functions and provides value for money. This involves not only detailed technical and economical evaluation, but also consideration of the probability and practicality of the ideas.

All P1 ideas were taken into consideration for detail study.

During the workshop process, the facilitators conducted some team building activities to support teamwork among the participants. It was believed that doing so would directly build a better relationship and trust among participants working together. Apart from that, it served as a relaxation activity while their minds had to work hard throughout the workshop.

Post-workshop

The post-workshop stage involved the finalization of the written report to be submitted to the client. The report was inclusive of all processes during the workshop with the output at all phases. Detailed action plans were included for the final consideration of the client whether to implement it as recommended.

Outcomes of a Hands-on Workshop

Two methods were applied to gather data from this workshop. The outcomes and performance of the workshop were obtained through observation while the satisfaction of the participant was measured through a questionnaire survey.

In general, the perceptions of the participants on the implementation of the overall hands-on workshop are presented in Table 2. The mean for all four statements are above 4.00. The standard deviations of all statements are more than 0.500, except for statement number three. This has proof that the participants were mutually satisfied with the process, interactions and environment of the workshop and according with the VM methodology. Particularly for statement number three, the possible reason is that the participants do not really making a critical decision within the process of the workshop as this is only a mock-up workshop. It is expected that the scenario will be different in the real workshop where the decision makers of respective stakeholders are presence.

Table 2. Overall performance of the workshop

Statements	Mean	Standard Deviation	Agree/ Disagree with the given statement
I am satisfied with the VM workshop.	4.29	0.550	Agree
My team members are able to actively interact with each other.	4.17	0.702	Agree
The workshop processes has accelerate the decision making process.	4.13	0.448	Agree
The workshop environment enhanced the communication and understanding among the stakeholders.	4.25	0.532	Agree

A. Information

Each stakeholder has his or her representative during this phase. However, the respondents found that they did not manage to clarify the project given/assumptions clearly based on the information presented. Through observation, it is found that the stakeholders' representative have to speed up their presentation due to the limited timeframe provided. As consequences, the participants feel that they do not managed to complete the task comprehensively.

B. Function Analysis

At the end of this phase, the team managed to agree on the functional tree diagram as the objective of the project. Majority of the participants agreed that they managed to generate so many ideas since there is no limitation in term of the number of ides to be generated. Moreover, this process was among the easiest as the participants only need to think logic ideas to address the identified functions. (See Figure 4, right.)

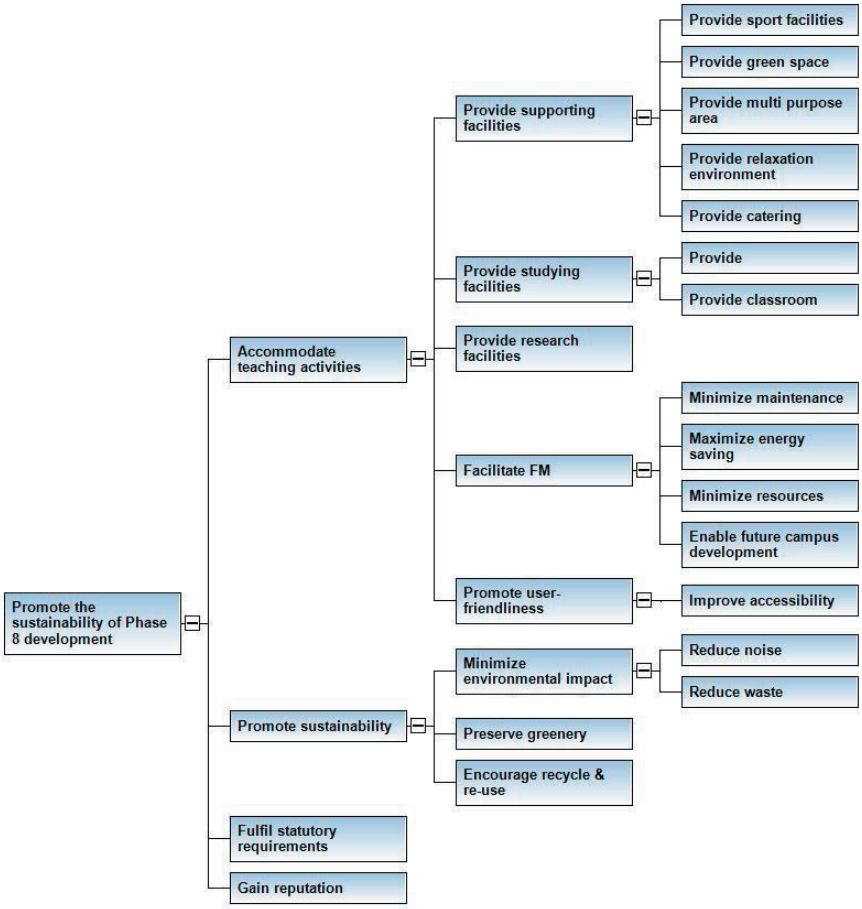


Figure 4. Functional tree diagram developed using GDSS

C. Creativity

From the earlier stage, team B managed to develop their functional tree diagram based on the objectives of the workshop in which among others to clarify the functional requirements of the project, to ensure sustainability and value for money to the client. For the sake of comparison with team A and team C, four functions had been identified to be scrutinized at the creativity stage. It was also due to the time constraint of the workshop that the team had to work on all identified functions. Three hundred twenty-eight (328) ideas were generated by team B as an output during creativity phase for four identified functions. However, it was found that only 210 unique ideas (64%) were generated, due to the duplication of some ideas. (See Table 3.)

Table 3. Output of the VM workshop of Team B

Identified functions	No. of generated ideas	No. of unique ideas generated
1. To obtain BEAM PLUS certification	71	45
2. To create PolyU identity	44	41
3. To ensure comfort	115	72
4. To enhance appearance	98	52
Total	328	210

During this phase, the participants within their group were free to share and communicate their ideas. Those ideas were keyed-in into the GDSS provided in every group. This kind of interaction allowed the participants to think of some other ideas which could effectively increase the identified functions. From the survey, it was found that the respondents rated this phase as the most well performed.

D. Evaluation

After generating the ideas, the next process was to classify the ideas into different categories; P1, P2, or P3. For examples, to enhance the appearance of the project, 23 ideas were generated all of the ideas categorized as P1 ideas, where it was realistically possible to be implemented. All ideas then underwent the WET that was embedded into the GDSS. It was proven to be very helpful where the calculation was done automatically. The system generated the results of ideas that obtained the highest marks. The process was then repeated for the remaining three identified basic functions. (See Figure 5, next page, top.)

With regards to the performance of evaluation phase, the respondents experienced problem with the time allocated during this phase. We should admit that the nature of face-to-face workshop involved more argument when it comes to agree on something. Hence it believed to affects the efficiency and effectiveness during this phase. (See Figure 6, next page, bottom.)

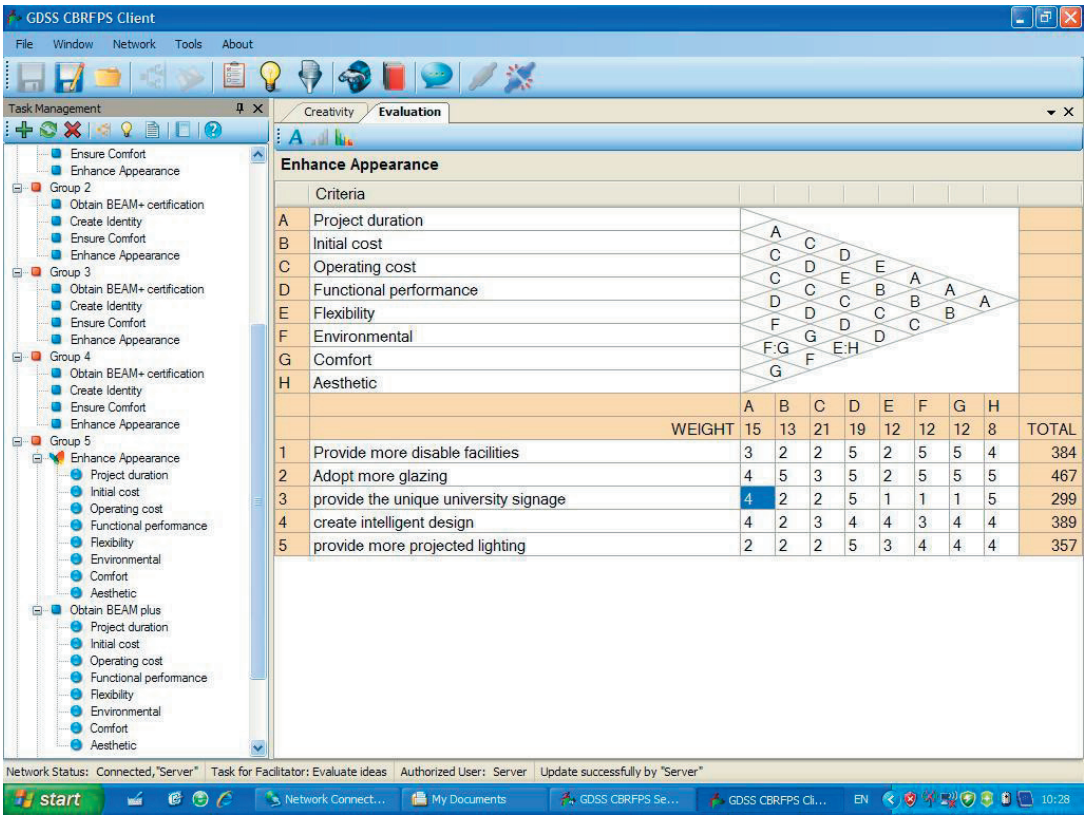
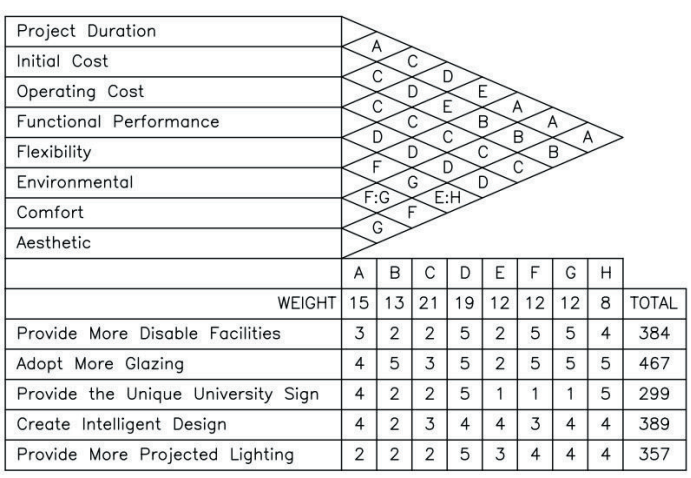


Figure 5. WET embedded into GDSS

E. Development

The action plan was developed including the necessary time frame for implementations and necessary action to be taken by related stakeholders. The students were given 10 days before they had to hand in final reports. There were complaints from the students that the duration provided was too short. However, it was made clear that such was the scenario of the workshop in reality where the report would be handed-in to the client as soon as possible due to the commercial pressure.



	A	B	C	D	E	F	G	H	
WEIGHT	15	13	21	19	12	12	12	8	TOTAL
Provide More Disable Facilities	3	2	2	5	2	5	5	4	384
Adopt More Glazing	4	5	3	5	2	5	5	5	467
Provide the Unique University Sign	4	2	2	5	1	1	1	5	299
Create Intelligent Design	4	2	3	4	4	3	4	4	389
Provide More Projected Lighting	2	2	2	5	3	4	4	4	357

Figure 6. Final score of WET of ideas generated to enhance the appearance

Discussion

Generally, the students felt that the hands-on workshop offered a great learning atmosphere and interesting way of teaching and interaction. The ambiance of the venue and refreshment provided an environment conducive to keeping the workshop forward and achieving the objectives.

However, they doubted that the workshop duration was sufficient. It was too tight and with not enough time provided in every phase. This situation forced them to decide on something in hurry. They believed that if more time for discussions could be allowed, then more innovative ideas would be generated. Technical problems experienced also somehow distracted the focus of the team.

In relation to the applications of the GDSS, the students welcomed a greater intervention and application of the system into the workshop. They found that the features and functions were user-friendly, especially during the function analysis and evaluation phases. GDSS did help the team to be more efficient.

Apart from that, a post-mortem session was conducted on 3 April 2012. Lecturers, facilitators and the technical support staff were invited. It was agreed that the overall running of the hands-on workshop was well conducted and had achieved its objectives.

However, several issues that are worth consideration included the technical support, duration, and time control of the workshop.

By having both lectures and hands-on workshop in place, we strongly believed that the objectives of learning the VM subject were accomplished. Students were able to understand the VM methodology during the lecture, applied it during the workshop, and managed to answer the theoretical question during final examination. For the rest of the objectives, it was accomplished via the hands-on workshop where the students managed to organize the workshop very well based on a real-life project. They were able to apply and use practical VM techniques and work as a team during the workshop. Apart from that, they practiced good soft skills to communicate, present, and argue throughout the workshop process.

Conclusions

Teaching approach is an important aspect when designing the curriculum and syllabus for a particular subject. This will enable the teaching and learning to equip the students with necessary knowledge and skills, hence meeting the demands and need of potential employer in the future. OBE is just one of the options that seems to comprehensively and effectively help the teaching and learning process of the VM subject in particular. It has many inherent benefits and advantages as discussed by Harden et al. (1999).

At this point, we believe that the approaches used are practical and effective within the characteristics of construction industry in HK. It is proven through the survey, which indicates the approach helps the students to understand better and attain the intended learning outcomes. Feedback from the students shows that they are happy with the teaching approaches adopted with agreement that it does help them to gain more practical knowledge.

References

Fan, S.C. and Shen, Q.P. "The effect of using group decision support systems in value management studies: An experimental study in Hong Kong." *International Journal of Project Management* 29 (2011): 13-25. Accessed May 5, 2012. doi:10.1016/j.ijproman.2010.11.008.

Fong, P.S.W. and Shen, Q.P. "Is the Hong Kong construction industry ready for value management." *International Journal of Project Management* 18 (2000): 317-326. Accessed May 7, 2012. doi:10.1061/S0263-7863(99)00028-9.

Harden, R.M., Crosby, J.R. and Davis, M.H. "Outcome-based education: An introduction to outcome-based education." *Medical Teacher* 21 (1999): 4-14. Accessed May 7, 2012. doi:0142-159X/99/010007-08.

Lam, S.Y.W. "Teaching engineering surveying in a civil engineering program: Curriculum, pedagogy, and assessment." *Journal of Professional Issues in Engineering Education and Practice* 134(2) (2008): 173-177. Accessed May 7, 2012. doi:10.1061/(ASCE)1052-3928(2008)134:2(173).

Luo, X.C., Shen, Q.P., Fan, S.C., and Xue, X. "A group decision support systems for implementing value management methodology in construction briefing." *International Journal of Project Management* 29 (2011): 1003-1017. Accessed May 7, 2012. doi:10.1016/j.ijproman.2010.11.003.

Prince, M.J. and Felder, R.M. "Inductive teaching and learning methods: Definitions, comparisons and research bases." *Journal of Engineering Education* 95(2) (2006): 1-16. Accessed May 7, 2012.

Shen, Q.P. "Value management in Hong Kong's construction industry: Lesson learned." *SAVE International Conference Proceedings*, Seattle, May, 4-7, 1997).

Shen, Q.P. and Chung, K.H. "A group decision support system for value management studies in construction industry." I*nternational Journal of Project Management* 20(3) (2002): 247-252. Accessed May 10, 2012. doi:10.1016/S0263-7863(01)00076-X.

Shen, Q.P. and Liu, G. "Critical success factors for value management studies in construction." *Journal of Construction Engineering and Management* 129(5) (2003): 485-491. Accessed Nov 7, 2011. doi:10.1061/(ASCE)0733-9364(2003)129:5(485).

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