Exploring the Efficacy of Interactive Classroom Methods Assessed by the Competencies of Information Transference

Brian W. Loss, J.D.

Steve Schaffner, M.S

Abstract

As instructors in a Building Construction Management program it has been our observation that the traditional lecture, memorize, test pedagogy is a less than ideal platform to convey the material our students require for success. Specifically, the traditional format does not inspire motivation among students or deliver the information transference conducive to the critical thinking necessary to develop effective leadership skills for industry. This paper is based in part on the experience of the authors in developing an effective curriculum for the instruction of construction management (CM) for the undergraduate program. This curriculum is based upon Dialogical Teaching (DT) and Problem Based Learning (PBL) pedagogy as opposed to the traditional Lecture, Memorization and Testing (LMT) approach long common in the college classroom. Instruction of CM is inherently practical; we are about the business of inculcating practical understandings that are to have immediate application in an industrial setting. These understandings require levels of student motivation and involvement that are more likely to be achieved than in a traditional classroom environment. Specifically, we have found that leadership and its corollaries, such as effective, spontaneous, jobsite communication and negotiating skills, are understandings that defy mastery without a motivated student involvement. It is that motivation as well as how it is to be achieved that we explore in this paper.

Introduction

"To be is to do." Socrates

"To do is to be." Plato

The reality that involvement in an activity will yield a greater understanding than being told about it is far from new. This type of education has been utilized in areas of medicine for several decades (Antepohl & Herzig, 1999). Problem based learning is organized thematically with the goal of promoting problem solving skills through presenting real world situations by using analysis and evaluation techniques guided by an instructor (Barrows, 1984). Platonic understanding of how we know things urges that we become as close to the original concept as possible. This can best be accomplished by removing the layers of opinion between the activity and the instruction of the activity. The instructor's opinion on the subject can be interesting or illustrative but is not

necessarily determinative; the students' discovery process, conversely, is. The instructor in the problem base learning pedagogy becomes a facilitator in the discovery of knowledge. This conforms to the Platonic understanding that the more we copy a copy the less clear the image; the more opinions we have between the actual and the teaching the less clear the idea. This would seem to lend validity to the idea that our best opportunity to convey knowledge is by motivating our students to become active participants in the process of what they are being taught. Then, once involved subject them to a close approximation of what they will be expected to perform.

In our capacity as instructors in the Building Construction Management program we are charged with the task of preparing students to master the challenges that will be a daily part of their working lives. To that end we have developed a curriculum that draws the student into the process and challenges them on a number of levels. Students develop understandings of the industry as independent, creative participants in the process as opposed to passive note takers. This process of immersion and creative involvement addresses the problems of motivation and concept transference inherent in the Lecture, Memorization, and Test pedagogy. The development of this curriculum, one that anticipates what students will be expected to perform as professionals, forms a bridge between academia and professional life. It is not sufficient for the student to know something intellectually. To know something connotes having possession of the knowledge. Success in the construction industry requires that the students understand intuitively, almost by reflex how they should proceed in any one of a myriad of situations and possess the leadership skills to apply that knowledge in real time.

Discussion

As the instructors developed our objectives and goals of this curriculum, we realized that intrinsic student motivation and concept transference were critical to what we were trying to achieve. Our initial focus was to foster an educational environment to promote autonomy, which in turn produces intrinsic motivation (Patrick, Hisley, & Kempler, 2000; Faye & Sharpe, 2008). Brophy (2008) discusses that autonomy "is associated with better cognitive and affective outcomes." Assor, Kaplan, & Roth, (2002) indicate when students feel their autonomy is supported, they are more likely to place greater value on the subject and task as well as the experience. Additionally, Norman and Schmidt (1992) indicated that PBL facilitates intrinsic motivation. For this reason the traditional Lecture, Memorization, Test (LMT) pedagogy was ruled out for what we consider its inherent limitations in this context.

Consequently, we adopted what could be described as a hybrid of Project Based Learning (PBL) and Dialogic Teaching (DT). Dialogic Teaching is the introduction of a dialogue in the classroom with all participants working together to discover knowledge, "… dialogic teaching reflects social-constructivist theories of learning (e.g. Piaget & Inhelder, 1969; Vygotsky, 1986). These theories view students as active meaning makers who can progress to higher levels of cognitive development through their interaction with the environment. Language is seen not just as

a medium for communicating ideas, but also as a primary tool for *forming new ways of thinking and knowing* (Vygotsky, 1986). "In this view, the purpose of schooling shifts from the acquisition of established facts to the internalization of intellectual competencies that underlie the development of disciplinary knowledge" (Reznitskaya, 2012).

One of the devices that established the dialogic approach in our classroom experiment was simulated site meetings with question and answer sessions that followed. This exercise utilized industry professionals who behaved in character for the often combative meeting experience. As in industry, the student/contractor was confronted with real issues that must be resolved in a timely manner. In most instances that required a prioritization of issues with some being resolved at the meeting and more complex problems tabled for further discussion. The students, who had a project to execute, were inspired to produce creative solutions for issues for which they had no prior knowledge.

This dialogic approach establishes a curriculum that introduces and allows the students autonomy; a central component of leadership skills. This in turn gives them a firsthand view of both the rudiments of managing a project as well as how leadership/communication skills work and why those skills are necessary. Students are given a project to run, a checkbook to pay expenses, and a budgetary need to collect past due receivables. They are faced with the not uncommon reality of using their homes as collateral to facilitate cash flow. Contract analysis and subsequent negotiation provide an exercise to redact onerous provisions from the provided agreement. These negotiations involve the students in the give and take of working with others in an environment where all have much at stake. By having to structure the agreement with realistic cash flow parameters the students begin to take ownership of the project in a practical sense. This reality is reinforced by the introduction of industry professionals against whom the students must role play in simulated jobsite meetings. At the conclusion of the meetings the students are critiqued followed by a question and answer session with these professionals.

We selected the hybrid approach for its promise of motivating the students and utilizing a pedagogy that would facilitate transference between that which is taught and the utilization of the information in the field. We also concluded that this pedagogy would more closely reflect circumstances encountered in the construction industry. The construction industry is unique in that each project is a one of a kind production; each with its own challenges and special circumstances. A myriad of issues create a constantly changing matrix of circumstances that must be mastered in seamless fashion with little, to no, hesitation that might result in a delay in the work.

The discipline of project management has two general areas of understanding that must be mastered: the rudiments of management or "nuts and bolts" and the leadership/communication or "soft skills". Nuts and bolts issues include: creating and maintaining the schedule, site logistics, payment applications, contract review and matters of finance. Soft skills conversely, are the interpersonal dynamics of negotiation, sales, customer/contractor relations, as well as facilitating meetings. Although components from the first category lend themselves to the LMT pedagogy

better than the second, the contextual framework for understanding both is greater in a dialogic interactive problem based environment.

To establish context and for purposes of orientation the first category or "nuts and bolts" issues are covered initially.   Specific topics such as permits, bonds, construction financing contract reviews and site logistics are covered in these briefings. We avoid what we refer to as lapsing into lecture. Our experience has taught us that when we begin to expound the students go to sleep or check out mentally.

Our overarching operating philosophy is that our process must "make it real" for the students. Writing and presenting are a daily component in class as they are in the field. Writings include proposals, memoranda, and change work orders. The presentations are corollaries of the writings. Negotiations are not structured as such; they arise naturally as a part of the process as they do in the field. Students present, or observe others present, in each class session and must submit written reports on the status of their projects for each session.

In order to cultivate an appreciation for the value of the content, the curriculum must be structured so as to be applicable and relevant to real world applications (Brophy, 2008). This requires that the classroom structure supports autonomy as well as clarifies and expounds on the relevance of the content (Assor et al., 2002). Relevance is best presented through examples that pertain to real world applications germane to the student's life (Brophy, 2008).

Our classroom experience therefore is structured around three elements: Briefing/Orientation, Creation of a Business Plan/Award of Project and Running the Project.

Briefing/Orientation:

In this component of our curriculum we establish what we are going to do and how it will be relevant to the students' careers. The students are briefed on the nuts and bolts as well as soft skills; these sessions are Socratic in nature. Students are encouraged to shape the discussion.   Each session's briefing is kept as succinct and as basic as possible demanding that the students think for themselves as a matter of necessity. It is here that we encourage/force the student into a position of autonomy.

Create a Business Plan/Award of Project

The students then are divided into two person contracting entities (partners are assigned, not self-selected) for which they must assemble a business plan, corporate identity, history, logo, and operating philosophy. They are then given a project to manage. The project involves a set of circumstances that closely mirrors what they will encounter in the field: plans and specifications of some complexity, a bank account dangerously low on cash, past due receivables that must be

collected from a recalcitrant customer and a "standard" contract that has been heavily modified (as is often the case) to favor the owner/general contractor. It is within this context the student contracting entities must function by: formulating a bid within tight time constraints, preparing a Request for Proposal (RFP) and giving a sales presentation. They also are responsible for submitting Requests for Information (RFI) that are not answered effectively or in a timely fashion, performing contract analysis/contract negotiation, requesting a loan to facilitate cash flow, then finally being awarded, and running the project.

Running the Project

Once the contract is awarded the student teams are subjected to the day to day rigors of running a project: —updating the schedule, deducting labor, material and subcontractor invoices and expenses, submitting pay applications as well as maintaining submittal logs and job cost variance reports. From the soft skill side, the students deal with the inevitable conflicts inherent in the process set in the context of face to face meetings with current industry professionals (often two at each session) who are as unrelenting in the classroom as they are in business settings.

What we have achieved in our classroom experience is an involved group of students who are brought into the educational process by way of a dialogic approach to the material and immersion in the project. In doing so we have addressed the two problems that keep students from the level of success that we believe they are capable of: -motivation and concept transference.

Motivation

In the classroom, as in the construction project, the first order of business is motivation. Most teaching professionals will attest to the validity of the assertion that students listen 50% of the time during lectures (Terenzini & Pascareua, 1994). Clearly, the problem of student engagement in the classroom experience is an issue here; one way dialogue does not bring most students into the educational process to the extent we required for mastery of the material. The importance of advocating a motivational environment within the classroom has been posited by many scholars (Patrick et al., 2000; Brophy, 2008; Turner & Patrick, 2008).

Transference

The second theoretical question regarding the classroom structure was, once the student has bought in to the experience how do we increase the likelihood that the information will be as innate and second nature as we believe it must be to give the student the best chance of success?

Dolmans, De Grave, Wolfhagen and Van der Vleuten (2005) have found a connection between the use of problem base learning and the inspiration of intrinsic motivation in the classroom:

> Norman and Schmidt (1992) conclude in their review that there is a strong theoretical basis for the ideal that PBL students may be better able to transfer concepts to new problems, and that there is some preliminary evidence to this effect. Thus, PBL stimulates contextual learning in the sense that it enhances transfer of concepts to new problems. … Thus, PBL stimulates students to become self-directed learners, i.e. intrinsic motivation. Evidence for this claim and the key learning principle of self directed learning also comes from a more recent study by Schmidt and Van der Molen, in this study, PBL graduates rated themselves as better prepared than colleagues who were trained with conventional curricula for collaboration skills, problem solving skills relevant to run meetings and the ability to work independently. (p. 736).

Results

We have run the class one time in the Spring Semester 2012, which was our pilot study; we will run it again Spring Semester 2013. Consequently, we cannot produce scientific analysis. What we have observed however has been encouraging. Levels of student interest and involvement were significant and refreshing. A student from that class, served as an intern with the Engineering News Record's Specialty Contractor of the Year. He asked if he could perform a contract review (one of the skills we teach) on an agreement that the company was on the cusp of entering. Pursuant to his contract analysis our student located and redacted 80% of what their legal department had found. He was a junior at that time; he will graduate this spring and has had several offers of employment including from that company. – Would he have performed as well had the material been presented in the LMT format? We cannot be sure. The origin of this level of transference is difficult to qualify without a longitudinal study. What we can offer from our observations as instructors is that the motivation or "buy in" on the part of the students was significantly greater as was the student's ability to see the project in its entirety; rather as an organic whole. This is significant. In the construction industry, not only must each issue be foreseen, avoided or addressed, each issue must also be accomplished in a manner that maintains profitability, taking into account legal ramifications as well as maintaining positive construction team and customer relations. Consequently, the contemporary project manager must be a leader; part constructor, part manager, part negotiator and part lawyer. He or she must not only wear these hats but must be able to change them at a moment's notice. Time is always of the essence in an industry that is competitive by nature. – For the construction professional, a pause to solve a problem is a pause in momentum, and consequently; profits are lost. If one does not consider legal ramifications, then one could expose single problem could turn a profitable project into a loser. If one fails to be diplomatic as problems are resolved, then one risks polluting relations which can lead to bitter,

acrimonious feelings that are unproductive. If one fails to negotiate a fair deal, then one can lose money now and a client later. What the authors teach therefore is less a set of skills or basis of facts but a way of looking at the project in its entirety. We want the student to discover that the project is an event in time rather like a musical composition wherein the individual components must be incorporated in the optimal way and at the appropriate time. The overarching reality that we seek to inculcate is developing the means to preempt potentially problematic situations as well as developing a way of thinking and responding to the ongoing realities of the project.

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