

EVIDENCE BASED LEARNING: THREE INSTITUTIONS AND THREE TEACHING
FIRMS TOGETHER PREPARE STUDENTS TO SUCCEED

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Introduction

Evidence based learning (EBL) is not foreign to the teaching in a design school. Very much related to the EBL concept is the engagement in environmental design problems which require students to analyze and synthesize a problem in the build environment as a vehicle to learn problem solving skills inherent to design work. Such problem based learning (PBL) is well established in the medical education field as well as in design teaching. For a better understanding of my intent in this paper, I will also briefly contrast the concepts of Evidence Based Teaching (EBT) and Evidence Based Learning, as those concepts apply to the project described in this paper. The teaching and learning methods applied in the project, besides EBT and EBL are cohort oriented and cooperative as well as collaborative. 'Collaborative Learning' is often used as a synonym for cooperative learning when, in fact, it is a separate strategy that

encompasses a broader range of group interactions such as developing learning communities and stimulating discussions (Bruffee 1993). Generally I would argue that design students emerged in collaborative evidence based learning (CEBL) are, after completing the learning experience, highly motivated and better prepared problem solvers than traditional cognitive learners and that such students integrate better, what they know, in a self-directed manner (ongoing study by the author analyzing student learning perception comparing CEBL and individualized Problem Based Learning). The literature however suggests, there is no concluding evidence that EBL and Problem Based Learning (PBL) is more effective than conventional methods (Colliver 2000). While Norman and Schmidt (2000) agree that PBL does not result in dramatic differences in cognitive outcomes, they argue that the method, as complex and multifunctional it is, provides highly relevant outcomes. Often design teaching faculty experiences students which were exposed to a PBL curriculum, are better prepared to transfer their knowledge to a design solution.

Statement of the problem

Design labs or design studios are often modeled after a professional design studio, such as an architecture or interior design firm. Relevant design projects often provided by the architecture firm of record can either be in a stage of being build or in a mature planning phase. The applied design process in an academic studio setting is usually shortened in content depth to accommodate the academic schedule of a semester and to focus on relevant learning objectives, rather than the entire complexity of the original project. For example, the room and functional program of the building might have been provided to the students, shortening the building programming task to bring the required building relationships, space usage and applied building codes

together in a building form and space plan, that suits a student design intent rather than asking the students to develop the room program and necessary space relationships themselves as part of a design process. With a provided building program, a student will focus on building form and design or interior design depending on their design discipline, thus spending less time on the overall project to adapt to the rather short time available during an academic semester. Design solutions and learning outcomes over the period of the project task are every so often discussed between student and instructor, or student and student cohort. The student cohort would be most likely one discipline, e.g. architecture or interior design. The professional firm providing the design problem may or may not participate in a final review of the project, where individual students present their learning outcome to their cohort and instructor at the end of the project task and where students receive final feedback. Usually students are not able to apply such feedback into the design solution after the final presentation of the project.

Project framework

The project discussed emanates from multi-disciplinary design collaboration between architecture students and interior design students at the University of Oklahoma and from faculty and resources of three institutions. All three Universities partnered each with a design firm, interacting as a professional teaching firm (figure 1). Two of the teaching firms, HKS Dallas and IPPR Beijing, were involved in the development of a new eye hospital in Puyang China which became the academic project for the students. HKS Dallas has a long standing relationship with the Architecture for Health Program at the Texas A&M University and IPPR has a long relationship with the College of Architecture at the SE University in Nanjing. The third teaching firm, Milles Associates Oklahoma City is in vicinity of the University of

Oklahoma and has also extensive experience in the design of health care facilities with examples in the Oklahoma City Metroplex. Using a professional project and engaging design professionals from the participating firms as advisers, clearly shifted the teaching approach toward evidence based learning. The teaching firms provided examples from their own practice. In discussion with students, comparing the professional models with the students suggestions, students were able to compare and contrast their own initial design concepts with similar work of the design firms. Such comparison and reasoning of design concepts would contribute to the evidence based learning methods of the course. Faculty and student travel between the three institutions and the visit of a variety of eye hospitals in China and the US further supported the learning method. Invited speakers through web-cast (figure 2), enriched the intended course concept of multi-disciplinary contributions to the process and further provided evidence based design solutions as models to the students. There is support that such approaches promote student learning (Karsten, H.D., O.Connor, R.E. 2002). The guest lectures took place in College Station at the Texas A&M University on a regular, weekly basis and the interior design and architecture students from the University of Oklahoma and the architecture students from the SE University in Nanjing participated through video conferencing technology. Each lecture concluded with a question and answer session and lecture and interaction was videotaped and made available on a video web server provided by Texas A&M. Students worked together in multi-disciplinary or interdisciplinary groups. The University of Oklahoma is the only institution in this cross-institutional collaboration with an interior design program. Student teams from this institution were mandatory multi-disciplinary. The program is part of the College of

Architecture which also houses landscape architecture, regional and city planning and construction science. Students at the University of Oklahoma have easy access to students and faculty of the other disciplines to seek feedback and advice. The two partner institutions worked in mandatory interdisciplinary teams. The Texas A&M Universities Architecture for Health Program has access to landscape architecture and construction science within the College of Architecture and the SE University has access to landscape architecture in their respective institution for additional multidisciplinary support. Evidence Based Learning support however, was accessible to all students through faculty and teaching firm expertise. Student teams had to report their weekly progress, design strategies and goals in a wiki blog, publically accessible. Teams were encouraged to comment on each other's progress and leave formative assessment of their peers work online. Black and Williams suggest that one of the central tenets of formative assessment is feedback which identifies what the student has done well (medal) and focuses on what he or she can do to improve (mission). Following their research evidence that students pay more attention to comments when they are not accompanied by grades, evaluators were encouraged to give comments only, focusing on the "well done", followed by advise on how to improve learning outcome and goals on the learning that needs improvement . This required effort from both student and teacher, but led to the fostering of better learning environments as all saw that learning was improving. The lectures, the interaction with the teaching firms and the exchange with faculty and students from other institutions including other cultures, create a tutorial process in which students are able to identify their knowledge deficiencies relative to the assigned academic project. Such identified learning

deficiencies become the learning issues (Hmelo-Silver, 2004). Through this process students apply newly acquired knowledge to the project, often through self-directed learning, teaching without talking concepts and confirm the relevance of the solution through interaction with their peers in their own cohort or in one of the other participating institutions or the feedback they receive from one of the teaching firms.

A final review of the project took place in Dallas, TX with all three institutions and all three teaching firms present. Additional visiting practitioners from architecture and interior design augmented the feedback pool of faculty and teaching firms. The project presentation created a forum for all participants to reflect on the knowledge gained and to evaluate the generated design solutions. The project presentations and feedback was organized in a “round robin” style discussion, in which small groups of students and practitioners “surf” simultaneously from project to project in 20 minutes increments and during that time window discussed project process and outcome. The “round robin” style discussion enabled several student groups to present at the same time and to receive multiple visits and feedback sessions.

Pedagogy and Methodology

The literature review on evidence based teaching (EBT), evidence based learning (EBL) and problem based learning (PBL), from my viewpoint, is generous with interpretations and clear, research based attributes are ambivalent. For clarity in my attempt to understand slight differences in the application of evidence (learner versa teacher applied), I decided to separate evidence based learning in the context of this project from evidence based teaching. Through the evaluation of student feedback, anecdotal and through surveys, I came to believe that a realistic problem design, connected to workplace circumstances, creates a learning environment for students that

will enable them to find their own design solutions, modeled after evidence which they found in the given problems and models presented by faculty and the teaching firms. Many times students find evidence in a solution which they evaluate for their own project in self-directed learning. In other terms, evidence based learning equals “real life” learning and students should also be directed to independent learning, cooperative learning and teaching without talking methods (Petty G. 2001). A lack of pedagogy and avoidance of experimenting with methods that are known to work (evidence based teaching) are the most probable reasons why students would not make effective use of appropriate resources or fail to make progress in their learning. Evidence based teaching on the other hand is based on many randomized control group trials and similar research. Over 500.000 peer reviewed effect sizes show what works (Hattie J. 2011) (Marzano et al) and what works is remarkably unaffected by context. John Hattie’s effect size table synthesizes the experiments, showing the factors with the greatest average effect on student achievements. Three of the factors are championed: first, students are challenged by the task and need to reason in the task, not just reproducing a model, second, students are engaged in active learning with a clear purpose and with strong instructor direction and third, feedback to the learner and the teacher. As mentioned earlier in this paper, Black and Wiliam suggest that feedback must be informative including medal and mission feedback with clear goals and whenever possible, a mix of methods such as self, peer and spoof assessment. The evidence based teaching methods used in the discussed project are found in the EBT literature. Some of the methods are adapted or re-designed to fit the learning culture of an environmental design studio (figure 3). All learning methods and teaching principles

have been monitored and re-evaluated through observations with field notes and student surveys before and after the event in this classroom based research. Students were also interviewed and given the opportunity to produce a short video testimony. The observed collaborative multi-disciplinary, comprehensive evidence based learning projects with applied evidence based teaching methods took place in the fall semesters of 2008 to 2011. The control group was placed in the spring semesters of 2009 to 2011 and had collaborative inter-disciplinary student teams, but not with a focus on evidence based learning or evidence based teaching methods. However, some interactions in the environmental design studios and applied pedagogy is generally considered good practice and the presentation of problem or challenge (orientation), application of learning (reasoning) and review of learning outcome (summary and clarification) (PAR model) was applied in the control group as well. The instructional strategies employed included:

compare and contrast; Students are given an assignment to visit and study three precedent design cases that are similar to the design problem they face. They summarize their findings in a report reflecting on design principles, design strategies, lighting, materiality etc. In the report, they are asked to also include graphic organizers such as images, flow diagrams etc. and relate them to their findings further explaining differences, advantages or rejections of the evaluated designs.

summarizing and note taking; Students are asked to write an executive summary for each of the assigned weekly readings. They also write summaries after each of the provided weekly guest lectures in which they participate collectively over a video conferencing system. The question and answer section, after the guest lecture, is

documented through note taking. Weekly blog entries, writing and visual organizers, reinforce the strategy and also enforce feedback as students are required to leave notes and reflections for each of the team blog entries. Lastly, teams are required to meet weekly as a group in a formal and organized way to discuss progress, process and strategies, setting goals for the following week and confirm how or why not they reached prior goals. Those formal meetings are prepared through a written agenda and the meetings are documented through meeting notes.

reinforcing effort and providing recognition; The blog entries are public and accessible by everybody. Faculty and participants in the teaching firms reflect on the weekly entries through feedback. Students are required to leave reinforcement and advice with each blog entry of their peer teams. Student teams also receive design critiques once a week over the period of the project with a comprehensive mid-term and final review with all participants of the project present.

homework and practice; environmental design studios inherently produce many hours of homework and practice between studio days. Generally students will meet in studio with guided instructions and desk generated feedback twice a week for an afternoon, generating eight contact hours. The design projects are complex and require that students work additional two hours on the project for every hour spent in the guided studio.

collaborative learning; Students are organized in design teams with shared responsibilities. They will separate tasks of the project at some point in the process but initial learning, theory inquiry, problem solving discussions, design strategies and conceptualization of the design intent are a team effort. Students are guided at the

beginning of the project to better understand personality differences, methods and strategies on how to work effectively in a team, team communication etc. Team building exercises support this effort.

Discussion

As you look at the instructional strategies you might be thinking that there is nothing new to this and that you probably employ the same. Are the learning methods used to its full potential and are the methods adjusted to the project and student cohort? The magic of these strategies rests in the rigor and depth, and how the methods will reframe prior knowledge of the instructor. There will be slight differences in the effect of each one of the strategies depending on the tasks within the project were they are used, and the level of empowerment you will give to the students to execute their tasks, guided by the strategies. When designing or re-evaluating the direction for learning or goal setting, the student focus can be so narrow that unintended results occur. For example, if one strategy is designed to master a task. Generally stated objectives produce greater results. For example, strategies that include certain performance expectations or require certain conditions are usually not constructive in nature. Students are more successful if the learning outcome strategy will give them good direction but lets them interpret and refine how to align with the overall instructor goals. Contracting with the student teams for a grade based on these goals seems to have a motivating overall effect on student achievement. It also helps to design overall better quality learning strategies but such an assessment strategy might be difficult to implement, depending on the overall institutional culture and policies or the cohort number.

The nature of a cross-institutional collaboration brings many different viewpoints to the table. Team teaching is known not to have a great effect size and should not be the main emphasis. The clear advantage of bringing different institutions and multiple disciplines together and share pedagogy, is the depth of expertise, variety and quality of feedback and the sharing of resources. Strong and in-depth preparation of the project context and content with a common agreement on active learning methods and teaching principles is necessary to ensure that students will not receive contradictory directions over the course of the project. Depending on prior experience of instructors and participants of the teaching firms, a workshop covering EBT principals might be desirable. The variety of backgrounds and expertise in a group of instructors is a uncommon resource for students but has a high impact on their learning outcome. Because of the usually foreign teaching concept, students need to be prepared to understand the value of the resources and how to use them. An introduction and available background information on all teaching participants are necessary. This will better prepare students to judge feedback based on the source. For example, feedback will need to be constructive in nature and corrective, explaining what was done right and incorrectly and how to improve outcome, to have positive effect on achievement. Student need to demand such quality from their resources and might give direction to the party giving the feedback in order to receive quality constructive responses. A cross-institutional collaboration might also create challenges to provide feedback in a timely manner. Research indicates that immediate and constructive feedback in a classroom setting has greater impact

on student behavior and achievement. We find that immediate feedback that is spoken and written in a feedback note is more effective than only verbal responses. This notion is even more amplified if students are required to take their own feedback notes and integrate them into their learning logs and self-assessments. Relevant to productive feedback are assessment rubrics. Rubrics not only give direction to the learner prior to the task, they offer criterion-referenced feedback after the task.

Shared resources proved to be the most relevant factor in the cross-institutional collaboration. One single synchronous guest lecture series, available through video conferencing to all participants, minimized organizational efforts, cost, and sustainability in the classroom and insured a single focus on content. The contacts each institution had to affiliated teaching firms and practitioners brought a wealth of expertise into the classroom and enriched student learning otherwise too difficult to accomplish. The student teams also benefited from the participating variety of disciplines and many students would not have access to an interior design perspective otherwise. The mix of expertise and presence of multi disciplines within the build environment constituted a learning environment for the students that simulated a realistic work environment.

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Appendix

Figure 1

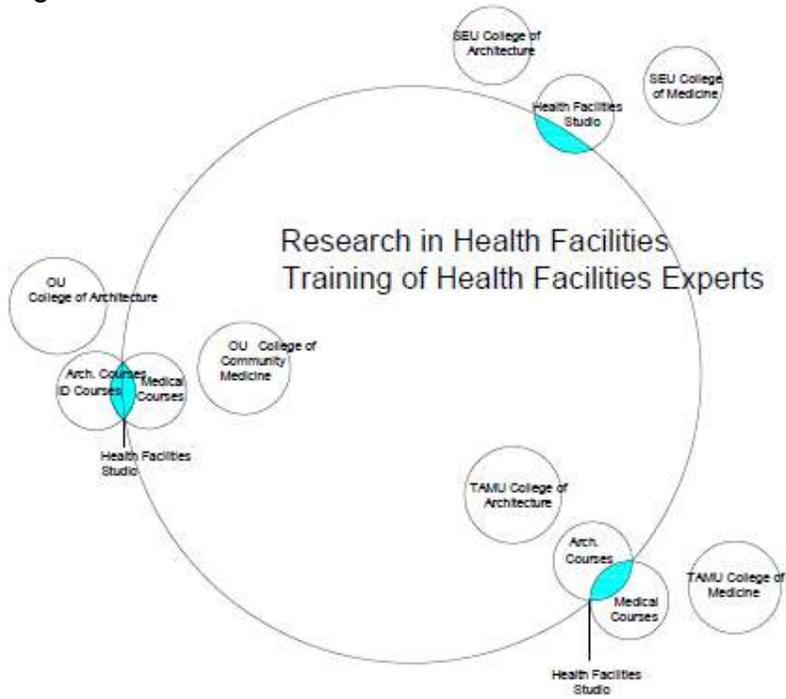


Figure 2

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Figure 3

Instructional Strategy EBL
Identifying similarities & differences
Summarizing and note taking
Reinforcing effort & providing recognition
Homework and Practice
Nonlinguistic representations
Collaborative and Cooperative learning
Setting objectives and providing feedback
Generating & testing hypothesis
Questions, cues, and advance organizers

(Marzano R.J. 2001) Classroom Instruction that Works