Transitioning to a Global Classroom

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ABSTRACT

The world is no longer comprised of isolated pockets of communities, but now has become an interdependent web that spans the entire globe. Training must be able to reach across the globe to provide a worldwide training solution. As companies span the globe, education for their employees must do the same.

This is a case study combining design, construction and facility management concepts for advanced technology facilities using web-based technologies. This method provides student's access to receive the necessary training while being available at the work site for their companies. It incorporates Project Based Learning (PBL) to provide students a safe environment to experiment, create and sometimes fail, while allowing the opportunity to think, discover, and most importantly, learn.

Technology allows combining online and face to face education for optimal learning. Current research indicates students retain 75% of the information presented when they are engaged and learning by doing. Web-based modules allow students to learn at their own pace while interacting with peers, encouraging collaboration and sharing of lessons learned. Additionally a face to face learning environment enables review and clarification of topic information as well as practical, real-life application of scenarios that are common to facility and/or project managers.

Keywords: Web based learning, project based learning, facility management, project management, technology for education, training, global training.

1. INTRODUCTION

We as educators have a great opportunity to utilize technology to transform our educational practices to accommodate the global marketplace. Not only can education and training be delivered around the world, but unique knowledge and expertise can be brought into a classroom from virtually anywhere. This becomes more important as companies span the globe. Education for employees must change, allowing them to continue their employment regardless of where the job takes them.

Research indicates students retain 75% of the information presented when they are engaged and learn by doing [10]. Technology allows us to combine online and face to face education methods establishing an optimal learning opportunity for working individuals. The Project Managers Development Program (PMDP) and the Facility Managers Development Programs (FMDP) at Arizona State University show a high degree of success in utilizing this method to train individuals around the world. The PMDP covers the major concepts in the design, construction and renovation of advanced technology facilities. These facilities have additional complexities due to the various cleanliness and certification requirements, which require a higher skill set for construction. The FMDP is focused at Facility Managers of an advanced technology facility. While most Facility Managers have extensive experience operating various general purpose facilities, the complexities surrounding the operations and maintenance of a high technology facility presents unique challenges, an order of magnitude different from general purpose buildings.

The PMDP and FMDP programs are a blended learning experience that combines both on-line and residency training for the students. The activities that are part of the overall program are specifically designed to increase the retention of the information presented. On-line lectures provide the basic course knowledge. Virtual conferences allow the students to discuss the material as well as provide information about a specific topic. Finally the face to face residency is designed to have the students apply course material in a real-life scenario.

One key to the success of these programs is that students are put in a cohort providing an opportunity for students to interact and share knowledge and experiences with fellow classmates from different locations and backgrounds. To increase success students are put in groups and encouraged to collaborate and share experiences and lessons learned throughout the program.

2. USE OF TECHNOLOGY

Technology has changed how we communicate and now is able to change how we educate employees. "Technology is not another subject, another class. It represents a pervasive set of changing tools for learning and teaching" [1]. As the presence of technology increases, online education can be used to continue the tradition of passing quality information on to more individuals.

Online education enables students to access course information as many times and as often as necessary, it gives them the ability to pause and further research or clarify any point of the material [11]. Connectivity provides the potential to connect everyone to everything all of the time [1]. Online environments provide the opportunity to self pace the learning that would not otherwise be available in traditional classroom instruction methods.

Students are able to access course material even if they are not on campus because of distance or other responsibilities. This availability allows a large population the ability to receive an education or participate in an educational endeavor. [4] Technology provides the opportunity to deploy the training information across the globe, making it available 24 hours a day, seven days a week, only requiring an internet connection for access.

Instructors can engage students by providing increased opportunities to extend a student's learning experience to a global level. Instructors do so by engaging students from other locations, or diverse cohorts, in practical learning environments [5]. This provides an opportunity for students to interact and share knowledge and lessons learned with fellow classmates from all over the world. Online learning allows for asynchronous learning which is being able to see the material and information anywhere at any time in a self-paced format accommodating different time zones and schedules.

The internet has opened up many new options for communicating and collaborating. In the past it was very costly to connect the students with industry experts. Technology now enables students to have access to a wide variety of industry experts affordably. Online education continues the legacy of providing quality access to more people, providing multiple opportunities to expand the influence of education beyond a physical footprint, moving towards an "anytime anywhere (educational) model." [6, 3] Online learning is an optimal way to disperse training and information to a global audience affordably. However, there must be some additional components to provide a best case scenario.

Forming a cohort, a group of students moving through common courses together, utilizes relationships to increase learning. Students who have gone through a program as part of a cohort receive certain benefits from instruction including increases in integrating the course content [5]. Being able to share and learn from others reinforces the material and provides a support and encouragement system. "Students benefit from peer teaching – explanation, comments, and instruction from their course-mates" [6].

Engaging the students in hands on teaching methods increases the amount of information they retain. Studies have shown that students only retain 5% of the information conveyed during a lecture, increasing to 20% when audiovisual presentations are included with the lecture. Information retention increases to 30% when a skill is demonstrated and reaches 75% when participants are engaged and learn by doing [9, 10].
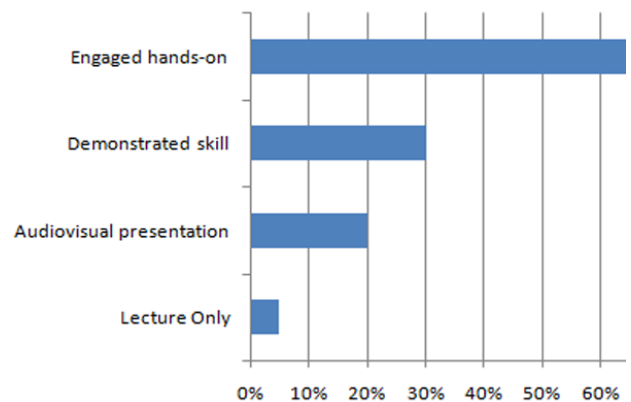

Figure 1 – Retention percentages

3. PROJECT BASED LEARNING

Project Based Learning (PBL) is an educational model where students learn through problem solving. This process includes connecting previous knowledge with new knowledge to bolster learning and retention. PBL provides an interactive hands-on approach that engages students in learning by doing, applying the information to a relevant problem. PBL encourages students to take all the individual pieces they have learned and blend them into a viable solution. It stimulates teamwork, critical thinking, problem solving skills, and reinforces the information they have learned [10].

Learning with projects provides the platform to connect all the pieces. Learning typically consists of several units or topics being presented. Concluding those units with a project drives students to link all of the topics together for a fuller more in depth understanding of the material that has been presented.

PBL also provides the opportunity to customize the learning incorporating company or industry specific challenges to work through.

During the online portion students gather all the information regarding an advanced technology facility providing them the individual pieces to the overall picture. During the face to face the students are given case studies and projects that help them put the pieces of the puzzle together and not only have an understanding of the information, but also have practiced how to implement it and how each aspect inter-relates to the other. This is not always a part of the education process.

4. PROJECT AND FACILITY MANAGERS PROGRAMS

One solution to this challenge is a program developed at Arizona State University in the Del E. Webb School of Construction. This program entitled Project Managers Development Program (PMDP) allows students to learn and receive necessary training while still fulfilling their current work assignments. The PMDP not only presents the material to the student, but provides opportunities for them to implement the learning. Students engage with others in the program to discuss topics, share any personal experience or to clarify. Students who have been involved with the program represent twelve countries.

Training and education is vital to keeping a company productive. Improving job skills through access to specialized technical information while retaining the services of employees during intensive training is a benefit for companies. The PMDP was developed because of a need to increase technical skills to the existing workforce. The recognized need was a lack of knowledge regarding the support systems and the methodologies required to design and construct complex manufacturing facilities. These complexities are apparent when the manufacturing environment must be controlled to ensure product viability.

In the case of the PMDP the complexities of the semiconductor manufacturing processes are affected by the facility systems because of the controlled environment necessary for the wafers. Controlled environments relate not only to the ambient air (HVAC), but the facility itself (structure and vibration). The process complexity due to both hazardous materials and number of different gasses and chemicals presents challenges for even the most seasoned professionals. With the need established and a graduate level course available several program level changes were instituted to improve the learning outcomes. The revamped program is available through an internet portal providing the student access 24 hours a day, 7 days a week.

5. EXAMPLES

Each week students watch a video lecture presentation from an industry recognized expert, typically about two hours in length. These lectures are web based and available anytime, anywhere an internet connection is available, enabling students to receive the training at their convenience. The students complete a study guide based on the presentation materials and meet within their group to discuss the study guide and materials in the presentation. This group remains the same throughout the online portion, approximately 9 months, forming a strong sense of community within the group. These group discussions are a time to also discuss applications or experiences with the topic that could benefit the group. The students submit the completed study guides to the program coordinator to be reviewed by the faculty, and address any gaps or misunderstandings in the responses of the students. Students are also able to send emails with any questions for further information or clarification on a topic.

Within each of the groups, a weekly team leader is assigned to coordinate the team meeting and any logistics that are required, such as phone bridges or meeting rooms. Team leaders are also responsible for tracking attendance and sending the information along with any questions to the program coordinator. Students are given the opportunity to be the team leader to practice and enhance their leadership skills.

At the end of each section, approximately 5 topics, a conference call with the entire class is set up. Typically each student is assigned outside articles to read and present a brief overview of the information to the rest of the cohort, including how the information that has been reviewed in the section can be applied to the topics or to their position. The articles could be focused on more in-depth information on the topics or additional information that enhances the topics in the session. Reviewing the articles also allows the students to think beyond their current position and current trends and information and summarize that material to others.

The online portion of the program culminates in a packed four (4)-day face to face at Arizona State University. The face to face enables students to receive additional information and clarification on the information presented during the on-line lessons and connect them with industry experts. They continue

to build their network as they are mixed with a different group to work on a "real world" project that requires them to develop a proposal, based on current industry issues, to present to a "board of directors". The project will typically address several issues including budgeting and technical systems giving them the experience to see how to implement the knowledge they have gained.

- Currently we have a student enrolled in the PMDP who is completing the training and enhancing his skill set. Without the format of the PMDP this training would not be possible because he needs to remain at his location and take care of his wife who is pregnant.
- The past year many travel budgets have been cut, one company in particular had to increase the skill set and knowledge of their employees, but all travel had been restricted. Because of the format of the PMDP the employees were still able to get the required training even with the restricted travel.
- The cost of training is another inhibitor for companies to train their employees. When compared to the cost of a year of tuition at a public university the PMDP will provide a cost savings.

6. CONCLUSION

In conclusion, the PMDP and FMDP training programs are a benefit to employees as they are able to gain needed training while maintaining their current job responsibilities. Because they are still in their positions they are able to immediately implement the knowledge they are obtaining. Companies are able to train their employees, enhancing their workforce,

without significant downtime. Training is becoming an option for individuals who could not have done it previously. Companies are able to train their employees affordably and effectively.

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