

Technology Maturity Model Benchmark Analysis

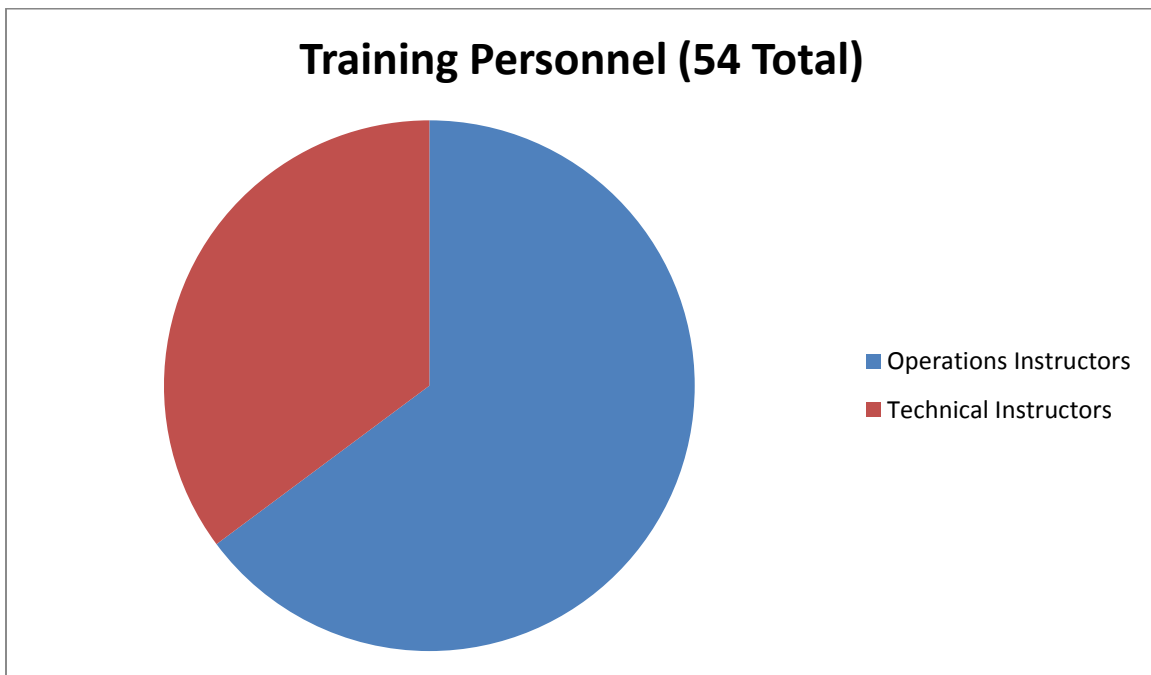
Millstone Nuclear Power Station

Introduction

Millstone Nuclear Power Station is located in Waterford, Connecticut. It is a two unit site consisting of a Unit 2, a 870MW Combustion Engineering plant which went on line in 1975, and Unit 3, a 1210 MW Westinghouse plant which went on line in 1986. Unit 1 was shut down in 1999 and is cold and dark. Plant staffing consists of approximately 1000 personnel divided into various work groups, the largest of these groups being Operations, Maintenance and Engineering.

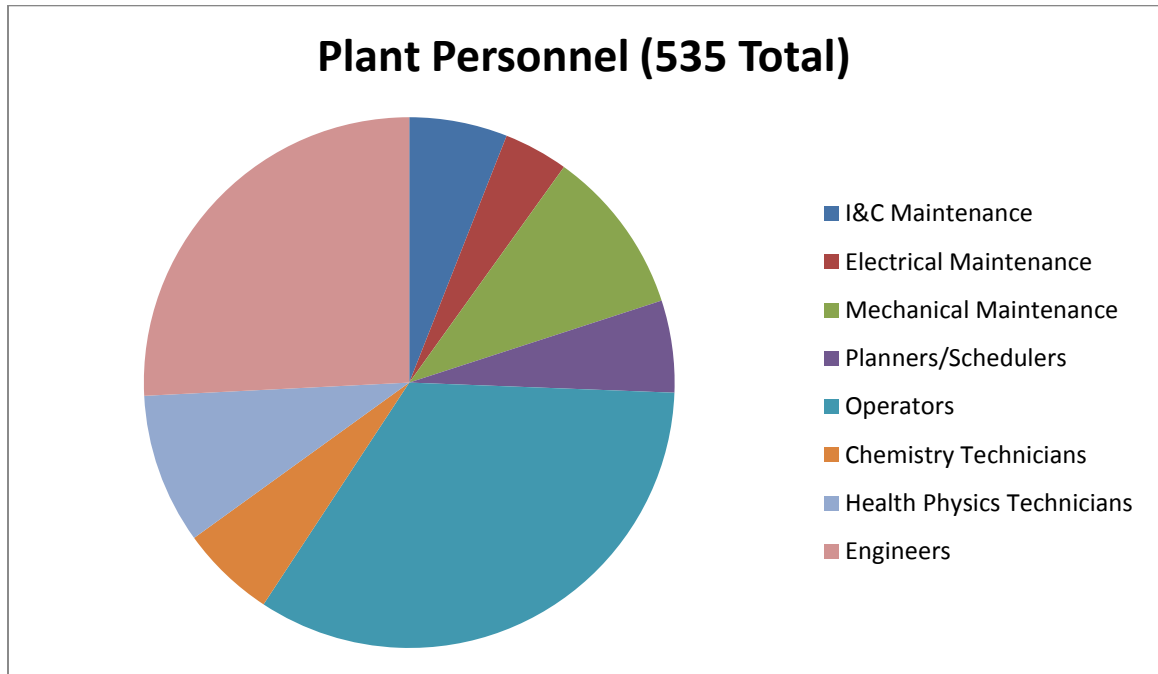
Demographics

The Nuclear Training Department is broken up into 2 sections, Operations Training and Technical Training. There are five supervisors who serve under the Manager of Training. Three supervisors cover Operations Training and two supervisors are in charge of technical training. There are currently 35 Operations Training instructors while Technical Training has 19. There is also an 8 man staff to support operation and maintenance of the Control Room Simulators.



The Operations Training Department gives regular operator training on a 5 week rolling cycle. They are also responsible for initial qualification courses for both licensed and non-licensed operators. Technical Training is administered on a "as needed" basis and the subjects taught are decided up by various departmental training review boards. Additionally, Technical Training is responsible for providing initial training to contractors coming in for refueling outages. The majority of this training is computer based. Computer based training is also used for various qualification and requalification of site personnel. Individuals are required to

maintain qualification on a yearly basis. A Learning Management System is used to track qualification data and personnel are notified by email of their required courses.



Section Summaries

Administrative

Policy

Behavioral: **Emergent**

There is very little in the way of a formal planning process for the use of technology. There is no specific group in charge of training technology. The Informational Technologist for training reports to the corporate office rather than the local Training Manager and has dual responsibilities for Instructor Training as well as technology coordination.

Resource/Infrastructure: **Islands**

There is no overarching control of technology in the classroom. Hardware is made available, but with very little formalization. That technology that is introduced into the classroom is done on an ad hoc basis dependent on the educational level of the instructor. As a result, the use of technology within the classroom is spotty at best

Planning

Behavioral: Emergent

There is no formal planning committee for the use of technology in the classroom. Corporate technology newsletters are available, but instructors very seldom use the tools that are referenced due to a lack of understanding. These tools are primarily generic templates which require a great deal of tuning for specific classes.

Resource/Infrastructure: Emergent

Although training has a graphics staff of three people, there is no one on staff to develop applications designed specifically for classroom use. The training website is designed and maintained by corporate staff with input from the local training staff, but the site offers minimal content and interactivity. Presently, there are no funds available to develop technological applications for training.

Budget

Behavioral: Islands

There is no formal budgeting process for technology use in training. Because of corporate cost constraints, there is hardly any budget for training at all outside. This, along with the computer restraints which will be discussed later, has led the instructors to work with their home computers to develop training materials.

Resource/Infrastructure: Islands

Budgets and therefore technology is limited. Instructors often use their personal computers and software for course development. These budget constraints have led to a culture which does not embrace technology. Instructors generally do not explore technology because they know that there will be no money available to purchase it, and even if it was purchased there would be no training on the use of what was bought.

Administrative Information

Behavioral: Integrated

Information such as Operating Experience, or OE, is regularly consulted and downloaded as part of course design. Instructor tools and best practices are readily available and used by all. The nuclear industry, as a whole, does a good job at documenting OE. This is more a matter of operational support rather than support of nuclear training. Workers are required to review nationwide OE before commencing any job.

Resource/Infrastructure: Intelligent

Access to industry websites is available to all personnel. Individual workers have computers available to them and are able to capture this information. Some training material, specifically the initial training for maintenance personnel is available on line, but is minimally interactive.

Curricular

Electronic Information

Behavioral: Intelligent

Information resources are used by staff on a daily basis. Most plant procedures and drawings are available electronically and utilized for course development. Procedures and drawings are searchable and can be pinned together as groups to allow moving from one drawing to another without conducting another search.

Resource/Infrastructure: Integrated

The plant drawing database is limited to those drawings that are deemed Ops Critical. Other drawings have limited support electronically. The end result of this deficiency is that instructors must travel to the document library in order to provide a complete set of drawings for some classes. These procedures and drawings are available in a PDF format which allows pre-class editing and day of class interaction.

Assessment

Behavioral: Emergent

Technology for the assessment of student work is limited to computer based training for all plant personnel. This computer based training is corporate, rather than local, driven. Additionally, there are no tools available which would enable the student to test themselves prior to the day of the class test.

Resource/Infrastructure: Emergent

Electronic tools are limited to plant wide computer based training for annual repetitive qualification. These tools are controlled by the corporate IT Department rather than the Training Department. Training's function vis a vis computer based training is the development of content for these computer based courses.

Curricular Integration

Behavioral: Emergent

Technology used in most classrooms is limited to Power Point Presentations with very little integration of supplemental technologies. Additionally, instructors use Power Point in the most rudimentary fashion, presenting glorified static slideshows. The graphics used during these presentations are the graphics which were developed during the early days of Millstone training and offer little value and understanding.

Resource/Infrastructure: Islands

Some classrooms equipped with Smart Boards. All classrooms equipped with projectors linked to classroom PCs. The technology used is for presentation rather than interaction. Smart Boards are not utilized in an interactive fashion, but rather serve as traditional white boards.

Teacher Use

Behavioral: Islands

Technology used by instructors is mostly limited to static Power Point presentations. Technology and interactivity are not integrated into the classroom experience. Teaching methods have not been updated since the early 1970s. Lesson plans are reviewed for accuracy, but, in general, not changed. Hands on interaction with the equipment is used, but 3D modeling and virtual interaction are not.

Resource/Infrastructure: Intelligent

All instructors have personal computers. Each classroom equipped with computer and projector. These computers are connected to the LAN and have internet access.

Student Use

Behavioral: Islands

Students use of technology is limited to referencing plant procedures and drawings. There are no available video presentations to provide refresher training prior to going to the field. Students will use the internet when searching for available vendor information

Resource/Infrastructure: Integrated

Most students have the use of a personal computer in the work environment. Access within the classroom environment is limited. Tablet and smart phone technology has yet to be incorporated into the training environment.

Support

Stakeholder Involvement

Behavioral: Emergent

Very few instructors are aware of the technological tools that are available to them. Most use home computers for software implementation and content creation. Additionally, there is no single point of contact or resource which covers emerging technologies. Technology is not covered during instructor continuing training.

Resource/Infrastructure: Emergent

As there is no formal plan for the use of technology, work groups are unaware of any planning. Additionally, the Information Technology Department is a separate entity from the Training Department which limits communication and integration. This separation and lack of planning has resulted in instructors being more technology users rather than developers.

Administrative Support

Behavioral: Islands

Minimal support is provided by plant management to integrate technology into the training process. Observations of training include the use of technology in the classroom; however, since those doing the observing are unaware of the capabilities of technology, this is often treated as a check mark meaning there is a computer present in the classroom.

Resource/Infrastructure: Islands

Silos exist between the IT Department and Training. Training owns the computers; however, IT dictates which software is allowed for use by instructors. Computer help is limited to access issues and not software use. There is no local computer expert available to instructors.

Training

Behavioral: Emergent

Training staff is self-taught in the use of software that is available. There is very little formal training on the use of emerging technologies such as RSS feed use and creation. More importantly, Nuclear Training lacks a true technology instructor. None of the trainers possess the necessary knowledge to present technology courses.

Resource/Infrastructure: Emergent

Formal training for instructors consists mostly of training in course development. There has been little formal training in the use of various applications that are available to them. Additionally, required reading materials virtually ignore presentation methods and concentrate solely on learning theory and cognitive development.

Technical/Infrastructure Support

Behavioral: Emergent

Support for the use of technology is limited to informal discussions between instructors. There is no IT presence in training. The IT help which is available on site is primarily hardware and network related. There are no software subject matter experts

Resource/Infrastructure: Islands

There is minimal technical support for those instructors that choose to incorporate technology in their classrooms. There is no technology users group or working group. Implementation of technological changes are developed in a vacuum.

Connectivity

Local Area Networking

Behavioral: Integrated

All personnel have access to the LAN, but access it exclusively for the download of procedures and plant drawings. The LAN contains minimal training material and provides very little in the way of content that would be necessary for continuous learning

Resource/Infrastructure: Integrated

High Speed Network access is available to all. Wi-Fi is available via a cumbersome process.

District Area Networking

Behavioral: Islands

Training staff uses networks in a traditional manner to access material for class preparation. There is minimal social media presence and peer to peer interaction. There is no regular communication between training and the workers and transmission of important operating experience is limited to a generic daily email rather than a specific RSS feed.

Resource/Infrastructure: Intelligent

Networks are used for data and some communication of plant meetings. The means is available to training to conduct virtual meetings with their peers, but again, traditional walls of separation exist. Dominion is a large corporation consisting of three separate nuclear power station and as such, each station believes it is incorporating best practices rather communicating with each other.

Internet Access

Behavioral: Islands

Staff uses the internet for class development; however classroom materials do not include links to germane websites. Additionally, class materials are not posted on line or on the LAN, and instructional videos are non-existent.

Resource/Infrastructure: Intelligent

High Speed Internet access is available to all.

Communication Systems

*Behavioral: **Integrated***

Email is used to communicate course information between staff and student. These emails are for specific course information rather than periodic communication. RSS feeds, which would greatly enhance and encourage student learning, remain unused.

*Resource/Infrastructure: **Intelligent***

Email is available to all and is accepted as a communication tool.

Innovation

New Technologies

*Behavioral: **Islands***

The training staff embraces new technology when they become aware of it. Very few experiment with new technology as very few have access to it. Experimentation, when it does occur, generally happens within a home environment, outside of work. As such, this knowledge remains unshared with the rest of the group.

*Resource/Infrastructure: **Islands***

New technology is accepted, but use is limited to those few instructors that are technically savvy. Instructors know that there are new tools available, but due to a combination of budget constraints and the ability to install new software, feel that time would be wasted learning those tools.

Comprehensive Technologies

*Behavioral: **Integrated***

Technology use is limited due to budget constraints. Very few video and animation tools are used. The use of freeware is discouraged. There are no current strategies for incorporating technology into the learning environment.

*Resource/Infrastructure: **Islands***

Technology use is limited to the use of the PC for classroom presentations and Smart Boards in a few classrooms. Tablet PCs are not in use, and there is no Wi-Fi in the classroom.

Conclusion

An evaluation on a 4 point scale reveals the Millstone Nuclear Training's average technology score is 2.21. This places us firmly in the "Islands" category. It is important to note, however, that those institutions that are not moving forward, technologically speaking, are receding. The higher scores in this survey are based on that technology which the corporation rather than training have put in place. Things such as email, internet access and a local network are those things which are required to run the plants rather than training personnel.

A change of philosophy is required in order to continue to be successful. It is important to note that Millstone is a power plant. We are in the business of supplying megawatts to the grid. Our core business is not training. Our business is making electricity. As such, Nuclear Training is often overlooked come budget time. Given the fact that over 50% of the nuclear workforce is retiring in the next 5 years, training will need to adapt new methods to train the next generation. These methods need to not only incorporate new hardware and platforms, but will require new content to be developed. The age of the overhead projector is past. New tools and new techniques are necessary.

My analysis has revealed to me that, as an organization, we are falling behind the curve. As an industry which is dependent upon technology to function, we cannot afford to let this happen. Ours is a unique, special technology. As operators of nuclear plants, it's our responsibility to protect the health and safety of the public. We will face challenges unless we devote resources to training the next generation. Purchasing the tools to train is not enough. We need to develop a specific strategy to use new methods to bring the next set of workers up to speed quickly. In order to do so, we need to form a technology working group and devote more time to teaching our instructors the tools that are available to them.

