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**Holistic Training in a Corporate Environment**

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# **Holistic Training in a Corporate Environment**

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# **Holistic Training in a Corporate Environment**

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As the scope of responsibility and the sophistication of each job role changes there is no longer the ability to assume that certain skills/capabilities exist simply because the person has the correct degree or has been to the proper corporate training course. A broader, holistic view, of the person has to be taken.

My focus in this paper will be to look at the holistic training and development of employees through the context of Applied Materials. There has been a significant change in training, an evolution in the past several years in training from the learning of specific skills that will enable you to do your job more effectively to one where the whole learner is looked at from the time they are hired, giving them the skills they need to be successful and tying those skills sets into an overall career path. However while this is a long term goal not all training needs to accomplish all of these heady tasks.

Some training focuses only on the point skills necessary to be effective in the work place.

This paper will break down into four broad sections; the state of adult learning in America and the context of Applied Materials, a holistic view of the technical and sales professional, the value of training and its measurements, and finally I will look at four case studies employing the context and metrics defined earlier and drawing some conclusions about the evolution of training at Applied Materials to one where it is becoming more holistic and looking at the entire employee.

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## **Introduction**

Corporate training in the United States is a multi-billion dollar business. According to the ASTD (American Society of Training and Development) in 2008, the height of the current downturn, US companies spent \$134.07 billion (ASTD 2009). This does not include employees who are currently in an accredited college program. The US education department issued their "Digest of Education Statistics, 2009" showing at nearly 40% of those involved in post-secondary education were older than twenty-five, with the majority (over 3,000,000) over the age of thirty five (O'Donnell, National Center of Education Statistics, 2009). If you extrapolate the cost of this education using the average cost of \$12,283/yr., (O'Donnell, 2009) this is another \$89 billion spent for a total of over \$200 billion spent every year on adult education.

As a training professional whose span of responsibility covers both soft skill and technical training I want to look at both areas; how they are defined and implemented today using Applied Materials (where I work) as context.

As the scope of responsibility and the sophistication of each job role changes there is no longer the ability to assume that certain skills/capabilities exist simply because the person has the correct degree or has been to the proper corporate training course. A broader, holistic view, of the person has to be taken.

My focus in this paper will be to look at the holistic training and development of employees through the context of Applied Materials. There has been a significant change in training, an evolution in the past several years in training from the learning of



specific skills that will enable you to do your job more effectively to one where the whole learner is looked at from the time they are hired, giving them the skills they need to be successful and tying those skills sets into an overall career path. However while this is a long term goal not all training needs to accomplish all of these heady tasks. Some training focuses only on the point skills necessary to be effective in the work place.

This paper will break down into four broad sections; the state of adult learning in America and the context of Applied Materials, a holistic view of the technical and sales professional, the value of training and its measurements, and finally I will look at four case studies employing the context and metrics defined earlier and drawing some conclusions about the evolution of training at Applied Materials to one where it is becoming more holistic and looking at the entire employee.

## **The State of Adult Learning in America**

As I stated in the introduction over \$200 billion is spent each year in America on adult education. According to the ASTD, corporate training was not impacted very much by the downturn of '08. While it did fall a little, from \$1,110/student (2007) to \$1,068/student (2008) from this was only a 3.8% decline (ASTD, 2009). It was an increase of 2.7% over 2006, the height of the economic boom (ASTD, 2009). Outside of corporate training the O'Donnell estimates that the adult learning population is going to grow 20% y/y through 2018. We can conclude by the willingness of corporations and adults to engage in learning, after they have begun their careers, that continuing education is very important to the bottom line of both.

What is the reasoning behind the increase in continuing education in America? Why is so much of an organizations time and money being spent? According to the last report on adult education published in 2005 by the O'Donnell there were various reasons why. 56% of individuals polled indicated that they were participating to get a promotion or raise with their current employer and sixty percent indicated that it was to get another job with a different employer (O'Donnell, 2005). Obviously these reasons overlap one another and, though it is hard to tell from the data, it is a good indication of the flexibility of the US job market. However, this was just for external education such as colleges and vocational schools.

Of those participating in the survey and taking courses where there was not out-of-pocket expense for them, 63% indicated that they took the course because they were

required to (O'Donnell, 2005). Of these courses 95% indicated that this was to improve upon skills already obtained or to learn new skills required for work (O'Donnell, 2005).

Is it then safe to assume that the current flexibility in the US job market (i.e. layoffs and job change) is the primary driver? Not necessarily, because we can see similar results across the globe. There is a broad trend in post-secondary education.

“Postsecondary enrollment rose by 76% in Asia, 57% in Central and South America, 41% in Africa, 33 percent in Northern America, 32% in Europe, and 30% in Oceania” (Snyder, 2009). In the regions outside of North America and Western Europe these changes are due in large part to growing industrialization and population growth. China in particular is driving much of the change in Asia as it moves from a communist style planned economy into a free market system.

One other interesting indicator of those involved in adult education is whether or not you already have a degree. If you already had your bachelor's degree there was a 60% chance that you were likely to be enrolled in some form of adult education whereas if you had not graduated from high school there was only 22% chance likelihood that you were involved in adult education (Snyder, 2005). There was also a significant delta between those who were in the highest income bracket (\$75K+) versus those in the lowest income bracket (<\$22K), 58% and 28% respectively.

So what does all of this mean? We are spending a lot of money on education. Not just in America but globally. Also, those who make the most money and are the most educated tend to be those who value education the most. In my opinion this is because

in certain parts of the professional community the globalization of the workforce and the ever-increasing pace of technology drive this change. Specifically this is true in the engineering and technology world where I work. For example, Moore's Law for semiconductors states that average computing power will double every 18 to 24 months and has been the driving force in semiconductor chip manufacture since 1971. This explains some of the personal motivation behind seeking externally recognized credentials (such as Project Manager Professional, discussed later) but it does not address much of the training taking place inside the walls of the corporation.

In addition to the speed of change adult learners are interested in diversifying their skill set. According research done by the ASTD an average of 74% of professionals "feel that they have been asked to do tasks without receiving pertinent training." (ASTD, 2009) This can lead to employee disengagement from work, poor project control, cost overruns, and lower productivity (ASTD, 2009). All of these reasons are why corporations are very interested in corporate training and why they are willing to spend money in this area. In addition, the technical professional community is where this is felt most acutely. For example, in the same study it was found the IT teams topped the list of those who felt that they were unprepared to perform the job they were hired to do. This makes sense when we think about how data management has dramatically changed over the past twenty years.

## **Applied Materials—Context**

Applied Materials Inc. is the largest manufacturer of semiconductor capital equipment in the world. Our Customers range from the giants in the semiconductor industry such as Intel and Samsung, to large foundries in Asia like TSMC. In addition Applied Materials has branched out into several other opportunities in the past few years all in capital equipment manufacturing. These include; solar power, flat panel display, and LED. Applied Materials also has a large service organization called AGS (Applied Global Services) that installs, services, and operates all of our systems worldwide. As of the first quarter of 2010 Applied had net sales of 1.85B quarter over quarter (Business Wire, 2010)

Applied Materials as a company exists within a highly cyclical industry. Looking over the past ten years of performance here is what we see:



**Fig 1: Applied Materials 25 Year Chart (Yahoo Finance, 2011)**

There have been a significant number of upturns and downturns in this industry.

Applied's stock price (adjusted for splits) has in the past ten years risen as high as \$60/share down to \$9/share. This is a difficult industry to manage and be a part of. I remember when I first joined the company in 2000 a co-worker said to me, "Its good pay if you can get it."

Because of the roller coaster ride Applied has had to make very hard employment choices. These choices impact a group (degreed engineers) that do not expect to be out of work or laid off. In the past ten years there have been thirteen significant lay off actions taken. From a personal perspective I have seen my own group (training and

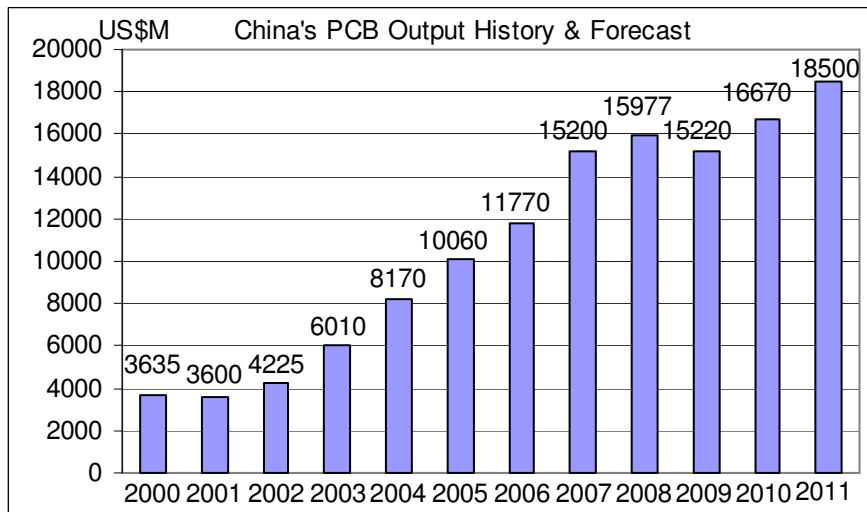
development go from over 100 globally to six. That is a greater than a 94% cut in personnel in the same time period.

Applied Materials is also becoming a much more culturally diverse company. In the late 1990s and early 2,000s the majority of the business was in North America and Europe, both of which have a similar western cultural outlook. Towards the second half of the two thousands that began to change, and is still changing.

Some of this change was due to outsourcing of jobs, mostly to protect the remaining employees. Applied pursued a policy of outsourcing and contract work. Most of the payroll, purchasing, and global computer infrastructure is now managed from India hiring several hundred people in Bangalore. The customer base has changed as well.

At one time, Intel, AMD, IBM, Motorola, Texas Instruments, ST. Microelectronics and others dominated the market place. The majority of these company's factories and corporate headquarters were located in North America and Europe. There were significant players in Japan as well, but, this was a much smaller part of the market. According to a study by Dedrick and Kraemer at the University of California at Irvine in the late 90's and accelerating in the early two thousands there has been a, "reorganization of knowledge work, with the rise of foundries who manufacture integrated circuits (ICs) for others. Taking advantage of the ability to outsource fabrication, a new generation of 'fabless' semiconductor companies has grown up entirely focused on design." (Dedrick, 2006)

According to data published in 2004 between the years 2000 and 2004 production of electronics (PCs) in China has risen from about \$25 billion to \$85 billion while in the US the numbers have fallen from \$90 billion to \$65 billion (Dedrick, 2006). According to a report by Dr. Hayao Nakahara these trends have continued and even accelerated. Looking at PCB (printed circuit board) information from 2007 we see the following:



**Fig 2: China's PCB Outlook (Nakahara, 2007)**

This accounts for 83% of total world production. The US is now only 8.6% of the market producers. (Nakahara, 2007)

At the same time American and European manufacturers have been decentralizing their production centers while in Asia vertical integration has been taking place.

Referring back to the Dedrick article two opposite trends are emerging:

- "Taking advantage of the ability to outsource fabrication, a new generation of "fables" semiconductor companies has grown up entirely focused on design." (Dedrick, 2007)
- "The major exception to this pattern are the large vertically integrated Japanese and Korean manufacturers, such as Sony, Toshiba, Matsushita



and Samsung, who still design, develop and manufacture most of their own products, often with many internally-produced components.” (Dedrick, 2007)

China has followed the Asian example with the establishment of SMIC (Semiconductor Manufacturing International Corporation) on mainland China and have become one of the largest producers of semiconductors in the world and are continuing to grow. SMIC is a vertically integrated company by the People’s Republic of China.

This has had a profound effect on Applied Materials culture. Once a California-based, California free-wheeling culture, just get it done, individual decision empowerment has been replaced by much more corporate control as we try to understand how different cultures think and operate. On top of this have been the impact of all the corporate down-sizing and the off shoring of jobs.

All of this has had a negative impact on morale. By 2009 the employees had stopped trusting its corporate senior leadership in America. This might not have been a problem if the job culture in Asia was not so diverse and fluid. With the lifting of travel restrictions to China and the explosive growth in the highly technical semiconductor field, combined with lower historic pay, it has been difficult to keep employees. Those with talent are routinely poached by rivals, customers, and even our suppliers.

In 2009 this exploded. In an open letter to Mike Splinter, picked up by Wall Street and lauded by most of the rank and file, “The Foaming Rant” stated how domestic

employees felt. In this letter “admin” laid out a compelling case. He stated, among other things,

“I will not tolerate you eliminating my job and my friends’ jobs so you can set up shop elsewhere and replace us all with workers in countries that cannot write to you freely as I am doing right now. I enjoy voting and I enjoy my human rights and I simply cannot excuse anyone that feels that these things are expendable in the pursuit of higher gross margin.” (The Foaming Rant, 2009)

The author posted this as a link in “Mike’s Blog” where the CEO monthly addressed the employees. There were hundreds of responses, most echoing what the author, not a few of them were from Asia. Although this exploded in 2009 largely due to the impetus of the latest down turn and layoff the views had been simmering at Applied for years.

Applied knew it had to do something to recover employee morale or else when the upturn came, and it has, they would lose several hundred of its most valuable innovators and engineers.

This was the context for the change in learning and development. Senior leaders wanted to provide employees with more than just learning to help them get their job done. Three new “academies” were formed to address the “whole” employee and look at them from a more holistic perspective. In the following sections I am going to be looking at training through this new holistic prism.

## **A Holistic View of the Technical and Sales Professional**

What do I mean when I talk about the holistic individual? Holistic was a term that was first mentioned after the publication of the 2009 employee survey. Senior management was discussing using training and development as a tool to keep talent and improve the morale of employees. The talent, learning and development group was rebuilt in 2010 and 2011 with a new role of vice president being added to directly oversee this group.

Added to the learning component was the idea of talent development. *Holistic meant looking at the whole person, providing training and development that met their short term, or task based needs as well as providing them a development path in their careers. How this effects training varies by job role. But the overall idea, addressing the whole led to changes in how training is put together and how it meets the long term, professional goals, of the individual and the corporation.*

### *A Holistic View of the Technical Professional*

Who is the technical professional? What are the knowledge, skills, talents and behaviors required for them to be successful that their job and why is it less demanding to understand and resource this type of person in comparison to other jobs, such as; management, sales, and human resources?

First, I the resourcing of these jobs is easier due to the rigor of the education. In most cases the requirement for an engineering job is an engineering degree. These are

difficult to obtain and requires a certain type of individual to be able to complete them. According to the a study published by UCLA in 2010 roughly 35% of those entering colleges (greater than 1 in 3) planned to obtain some type of engineering, or STEM (science, technology, engineering, mathematics) degree. (Hurtado, 2010). Of those initial enrollments, and after five years, “15.4% of initial White and Asian American STEM students and 20.7% of URM (under-represented minority) STEM majors were still enrolled in STEM programs.” (Hurtado, 2010) When this is compared to students who avoided the hard science the graduation rate was 73% for Whites, 46% for URM and 65% for Asian Americans. (Hurtado, 2010) This is a dramatic difference and shows how the weeding out process done at the undergraduate level provides more clarity when making hiring, training, and retention decisions at the corporate level.

Second, engineering is considered a profession, not just a type of degree.

According to Thomas Wolfe, associate dean of engineering at MSU a good working definition of a profession is that:

- “One is expected to have advanced knowledge in a specific area, well beyond that of the common person, including those educated in other fields,
- One may be expected to apply that knowledge to a broad range of situations, sometimes or often unique, such that the solutions cannot simply be tabulated in a list, book or manual,
- One in which the public may trust that their safety and well-being is protected by relying on the practitioner.” (Thomas Wolfe, 2002)

As a profession engineers are guided by a code of ethics and professional licensing.

Each of these licensing boards, credentialing entities, ensures that the professional

engineer is capable of doing their job. Much of this is because of the nature of the work. For example, if you are a mechanical engineer then you may be designing critical parts for an airplane, or a rocket. If you have not been certified by a rigorous authority then the part you design might not meet specifications and end up killing people. There are requirements beyond the degree, sometimes with re-certification necessary, to ensure that the engineer is capable of doing their job. Because of these types of institutions at the corporate level we have a much better idea of the capabilities of a person if they are an engineer.

In another sense the engineer is a much more focused profession. Usually the tasks/jobs assigned are highly individualized. Simply this means that they do not have to interact as much with others to get their job done. I realize that everyone is a part of a team and design is expressed as a whole and then broken down into its respective parts. That engineers need to cooperate with each other to get the system designed, software written, etc. But in their day to day role they are often focused on one aspect, working individually on their part of the project to obtain results. Often there is a project manager assigned (usually with an engineering background) who has additional skill sets, project management and people management to help drive the project to completion.

Finally, what makes a good engineer? What are the innate talents and behaviors of an engineer? There are a plethora of articles, analyses, and case studies discussing the different skills and attributes of a “good engineer.” One that I liked, and seemed to sum

up what I was seeing was from Maddocks. According to Maddocks the intellectual skills of an engineer are:

- “The ability to solve engineering problems, design systems etc. through creative and innovative thinking
- The ability to apply mathematical, scientific and technological tools
- The ability to analyze and interpret data and, when necessary, design experiments to gain new data
- The ability to maintain a sound theoretical approach in enabling the introduction of new technology
- The ability to apply professional judgment, balancing issues of costs, benefits, safety, quality etc.
- The ability to assess and manage risks” (Maddocks, 2002)

While Maddocks lists general transferrable skills such as effective communication and working in an interdisciplinary team these are not the same skills we would normally expect in these areas. For example, effective communication has a lot to do with developing and using engineering templates and design tools and properly explaining rather than writing a good paper. Maddocks also tends to emphasize the ability of the engineer to be innovative and solution oriented and capable of working within a rigid structure. (Maddocks, 2002)

Here are the knowledge, skills, talents, and abilities of an engineer in corporate America. They have been through a rigorous process already to weed out and determine who is an engineer. They must be self-motivated, highly technical, and able to work well within rigidly defined procedures and processes. The majority of their job is done individually, while completion relies on successful group engagement. Their output is measurable and quantifiable. The requirement for their job has been

determined by a number of collegiate, government, and local agencies to ensure they do not harm anyone because of their output.

Therefore much of the training or education required is highly quantifiable as well and skill gaps are easier to see. Because there is less reliance on soft skills, hence the saying “put them in a room and throw in pizza once in a while,” the traditional skill based, gap-based learning analysis works well. Because their outputs are highly quantifiable the successes are more easily measured when compared to soft skills.

#### *Holistic View of the Sales Professional*

What does a sales professional look like? What are the knowledge, skills, talents and abilities they require to effectively do their job. There is a lot of research available on this. Most what we used was informed by the research into technical sales from IBM, Intel, and Xerox but in the end we conducted our own research about our own sales group.

Over a period of about three months we conducted interviews of 32 sales professionals in our own company, or about 10% of our sales force. We took two specific sample sets for comparison. The first sample set was divided by job role. We interviewed direct line sales, management, and executive leadership. We also broke the interviews down around region. We made sure to have a relative sample from each job role in China, Taiwan, Singapore, Europe, North America, Japan, and South Korea. We

also made sure the relative sample included members of each of the different primary business units; silicon systems, solar, service, and display.

Our goal was to create not several models, though this was our fear, our goal was to develop one model of basic competencies that would be valid regardless of group region or job description. We were able to accomplish two of the three. In the end the largest differentiator between all three types of sample sets was between direct sales and management. In this case we chose to focus on direct sales and postpone any attempt at a competency model that included the difference between direct sales, management and leadership. This was due to a number of factors; wanting to test this model at the individual contributor level and there has been so much written recently about leadership development we did not know where to begin. This is the model we decided on:

	<b>Individual Contributor</b>	<b>Notes</b>
<b>1. Know Applied Materials</b>	a. Understand AMAT’s strengths – history in the industry, financial stability, technology & innovation leadership, commitment to customer’s success	
	b. Operate effectively within a matrix organization – understand stakeholder/colleague needs, build collaborative partnerships and manage conflicting priorities	
	c. Know AMAT products/services- their features, applications, capabilities and applicable government policies or incentives and how they compare and compete with competitor offerings	
	d. Utilize organization savvy to navigate beyond the boundaries of position and reporting relationships and solve customer challenges	
<b>2. Understand the Customer</b>	a. Know customer product offerings, competitive landscape, business challenges, and production/ sales/ budget cycles	



	b. Observe and understand the internal dynamics of customer's organization (hierarchy, decision-making, relationships)	
	c. Uncover customer's unmet/ future needs by asking targeted questions and listening for opportunities	
	d. *Utilize research, networks and other resources to identify prospects, qualify them, and establish contacts with potential customers.	<i>*may only apply selectively</i>
<b>3. Build Strong Relationships</b>	a. Understand people – their individual motivations, concerns, goals, priorities and personal preference	
	b. Establish trust & credibility by acting as an honest broker to serve the best long-term interests of the customer and by maintaining a solid personal reputation in the industry	
	c. Present self in a style (appearance, behavior, choice of words, etc...) that is consistent with the country and organization culture	
	d. Nurture long term partnerships by maintaining frequent contact and creating a personal bond with key clients, both inside and outside the office	
<b>4. Generate Solutions</b>	a. Utilize an enterprise perspective to identify and communicate product and service offerings which generate long term success for the customer	
	b. Effectively manage customer needs, offerings and solutions as projects – prioritize, coordinate and track milestones for multiple short & long cycles	
	c. Account Management – take ownership for with timely responses to requests and concerns, effective follow through, and careful attention to detail	
	d. Conduct business with highest standards of ethics, and integrity – protect IP and do the right thing	
<b>5. Persuade &amp; Influence</b>	a. Overcome resistance and neutralize concerns by communicating long term value of AMAT products and partnership and/or leveraging interpersonal savvy	
	b. Make proposals with compelling language and positions – managing the dialogue to advocate key points	
	c. Act as the AMAT bridge to and internal voice of the customer - educating colleagues and influencing priorities	
	d. *Negotiate and persevere to find the optimal long-term win for both parties	<i>*may only apply selectively</i>

**Fig 3: Applied Materials Sales Competency Model**

The competency model above is much broader than the one discussed in the technical training section. It is much more reliant on a company specific view as well. This is due to the nature of the job. Sales is soft-skill oriented highlighting the ability to get along with, and negotiate with is not something you can write a specification around. Also, there are no government regulatory agencies built around sales role professionalism. There are a few laws around pricing, selling and the protection of intellectual property, but, generally the sales professional needs to be able to “feel” their way around a customer, and the time to get to know them.

In addition, what you can see in the model is that there are five large “buckets” the competencies fit into and each is broken down into a subset. This was done purposely given the diversity of the individual contributor job role. For example, the competency “Build Strong Relationships” means different things in different regions. In North America our customers do not necessarily want to have as close relationships with us. This might sound counter-intuitive but it makes sense that our customers, who are often in direct competition with our other customers in silicon systems (manufacturing computer chips) may not want us to have an in depth knowledge of what they do. Normally, at one large customer I can think of, they give us a list of specifications our system has to meet us then need to design and work with the customer to meet these requirements.

In Asia it is completely the reverse, customers expect us to have very strong and very close relationships with them. They often include us in the design phase of their

latest chip sets to help us understand what they are really asking for when they give us their specifications. Both types of relationships seem to work, but culturally they are different.

Another example of a differentiator is contained in “Understand the Customer.” Here it was not the region that created the difference but the business unit. Specifically, in the sub-competency “Utilize research, networks and other resources to identify prospects, qualify them, and establish contacts with potential customers” there was a big difference between the Solar group and everyone else and because of that this specific sub-competency was required.

The solar industry is an emerging market where there are a lot of new companies getting involved. There is also a lot of venture capital entering the market (especially in Europe and Asia) all of this requiring the Solar group to be able to understand who the real “players” are and be able to qualify them. In the Silicon Systems Group and Display the exact opposite is occurring. Where there were once hundreds of different companies in the nineties, the majority of business now only comes from our top six to eight customers. The customer base is getting smaller.

This model was completed and accepted by senior leadership in each of the business groups in June of 2011. The goal was to develop this model prior to the development of “Sales Boot Camp” and would frame the development efforts of the Sales Academy going forward. The Sales Academy is the final case study of this paper.

## Value of Training

Training value is due to a number of factors; perceived value to the individual and corporation, the metrics around measuring the value, and all contained within training's limitations. Before we discuss perceptions and metrics we need to understand these limits.

### *Training Limitations—Andragogy and the 70/20/10 Model*

Training is not, as some see it, the panacea to overcoming all skill gap woes. In fact traditional training can be limited in what it can accomplish. Adult Learning Theory, or andragogy, helps to guide us in understanding why this is so.

“The core concepts of andragogical theory are that adults have a psychological need to be self-directing, that their richest resource for learning is the analysis of their own experience, that they become ready to learn as they experience the need to learn in order to confront developmental tasks, and that their orientation toward learning is one of concern for immediate application (Knowles, 1975)

Malcolm Knowles has been credited as one of the most widely known proponents of the study of andragogy in the twentieth century (Rachal, 2002). The above statement summarizes his evolving theory as it stood in 1975, seven years after he re-introduced to American scholars. Reading the above quote quickly delineates the difference between the adult learner and the pre-adult. According to Knowles the following principles apply. Adults are: self-directed, use their own experience as a basis for

learning analysis, they approach learning as a method of solving a problem, and they seek immediate application for their learning (Rachal, 2002)

Jonathan Green further defined andragogy in a comparison to pedagogy. He argued that there were five major distinctions between the two. These were based around the role of the learner, the role of the instructor, life experience, the purpose for learning, and the permanence for learning (Green 2002).

The key idea in what Knowles and Green were saying was around application. As pre-adults move into adulthood their scope of responsibility increases and their amount of available time decreases. They are focused on jobs, raising a family, and if there is any time left leisure and self-improvement. When we discuss self-improvement the ability to directly apply it to the job is paramount. I agree with Knowles and Green on this.

Using this idea of direct application to the job helps us to understand how formal education is much more limited. As a person ages their experience begins to trump what is learned in the formal classroom. Formal learning takes on less importance.

This is why I am persuaded by the 70/20/10 model which came out of Princeton in the 1990's, developed by Morgan McCall, Robert W. Eichinger and Michael M. Lombardo. Simply the model states the following (Princeton University Human Resources website, 2011):

- “70% (of learning is) from real life and on-the-job experience, tasks and problem solving. This is the most important aspect of any learning and development plan.

- 20% (of learning is) from feedback and from observing and working with role models.
- 10% (of learning is) from formal training.”

The model, based on my two decades of experience, makes sense when you understand the context of it within the adult learning sphere.

There is one caveat though, in how we define training and the formal experience. Constructed correctly, training can influence the top 30% at least of the 70/20/10 model through role play, mentorships and certification. With this in mind I want to take a look at how we have defined training for Applied Materials.

### *Technical Training Defined*

In my workplace training is commonly divided into two areas; soft skills hard skills. Technical training, falls into the second category. Soft skills are those things which help us get along with one another. Two examples of this are courses on “Doing Business with China”, or “Managing Interpersonal Relationships.” Non-soft skills are everything else. They can be anything from teaching you how to use your new SAP system, something legal needs you to know to avoid getting your company into a lawsuit, even how to use your email system. All of these are important but not what I would define as formal technical training at Applied Materials.

Technical training courses are the “hard” skills that teach you how to operate and repair that piece of equipment sitting in the corner, how to install and qualify a system

on the factory floor, or how to properly use that CAD software. Skills you need as a technical professional to do your job.

Leveraging the 70/20/10 model for learning in technical training is fairly simple. There are a set of known skills you want the learner to develop, for example, effectively operate a Physical Vapor Deposition (PVD) system in the fab. There are several things the technician has to be able to in software, hardware, to run wafers (what computer chips are made on) through. You accomplish this by:

- Formal training on the system (10%)
- Working with senior engineers in the factory who have “sign off” authority for your certification (20%)
- Accomplishing advanced certification tasks over time as you do your job (70%)

In technical training, as you can see, there are two primary components; formal classroom training and certification. Our approach to certification needs explanation because there are a lot of different definitions out there. You are certified on an Applied Materials system when you have actually effectively worked on an actual system initially at a training site and finally at a customer site. You have performed all the tasks required to operate and maintain that system. In this way we can leverage the entire 70/20/10 model.

This is important because in many cases the system you will be operating can be quite dangerous and even deadly if it is not operated properly. Because of the safety requirements it is not possible for a non-certified person to operate a system in a real working environment without direct supervision.

When looking at the holistic model discussed earlier technical training can be seen as failing to pass the career development component. Some of this thinking is correct, but not entirely. Recall how the holistic technical professional was defined, how they are often subject to several outside authorities and certifying agencies due to the nature of their job. The technical training curriculum follows the same path. Because of the tightly defined nature of the profession and the potential danger inherent in doing it wrong technical training emphasizes specific capability over soft skills.

Entire job families have been created around mastering this specific skill set. For example the process support engineering job role is stratified around technical capability but does address their entire capability.

There are seven levels of PSEs at Applied Materials ranging from beginner (PSEU1, Under Instruction) to PSE6. Each role has the following components which make up the qualification levels for each job:

- Recommended years of experience
- Minimum Process Depth: the minimum process certification level in one or more technologies needed to achieve a specific qualification level
- Minimum process breadth: minimum number of different processes to achieve a specific qualification level
- Minimum technology breadth: technologies are the different process groups in the different business areas.
- Process Integration: integration knowledge is a high level skill (PSE4 and above) that demonstrates the ability of the PSE to integrate the process into the total fab production system
- Soft Skill Development: three categories of basic skills required to effectively perform the PSE job role. These are defined as; professional, customer, and general technical



What can be seen in looking at the PSE job role is that while it makes a passing reference to soft skill development in practice these areas were simply “check the box” type activities while the technical skills were the ones focused on and developed. So, in the end, technical training does not ignore completely the soft skill side of development but focuses heavily on hard skill acquisition.

### *Sales Training Defined*

Sales training and development is almost the polar opposite of technical training. Sales training focuses almost exclusively on the soft skills and makes only a passing reference to hard skills. Sales success is directly related to people skill effectiveness. But they are only one component of the requirements which are often differentiated by region, business unit, corporate goals, and customer. Unlike the technical training process where the pen-ultimate goal of training was a person fully certified and safe to operate and maintain a system the sales professional often has to deal with more nebulous and often conflicting goals.

Sales training is therefore, not directly relatable to overall success as sales professional. When you apply the 70/20/10 model you can how the 70% is not affected by sales training. With all of this in mind, then, how can we define sales training? There are three parts to this; the competency model, local goal (direct management), and individual goal.

The competency model becomes the top line objectives for any sales training. It contains the specific knowledge, skills, talents and abilities required for a sales professional at Applied Materials. As stated in the previous discussion the model can be interpreted differently by different sales organizations based on region, customer, and business. This is good given the more nebulous nature of sales professional development.

Another part of sales training is around local goals of individuals. Before the competency model was available, and even right now, sales training is not assigned by job role, it is assigned by region in consultation with that areas direct management. We interview the local sales leaders to determine what they need and then compare it approved training courses adopted by senior executives. This is done to ensure consistency of the product we are teaching. Applied wants to make sure that the type of selling we do is consistent across the enterprise, while allowing for different emphasis of the local sales leaders.

Third, we have the personal goal component of sales training. The sales professional looks at the sales competency model and evaluates themselves against it. Generally the questions are fairly simple; “Is this an important skill in your area?” and “are you effective in this skill set?”

Finally, because sales training is more amorphous than technical training we need to make sure the individual has opportunity to practice in their job environment. According to a study published by Anita Sirianni sales professionals who do not receive

“systematic coaching reinforcement may lose up to 87% of the knowledge gained in training within one month.” (Sirianni, 2005) This is the flip side of the 70/20/10 model that states only 10% can be learned in formal training. Therefore there needs to be a structured way to leverage the second 20% of the model (coaching) to reinforce the top 10% of the model. We will explore this on more depth in our case of the Sales Academy.

The individual assessment and local group assessment are the biggest drivers in assigning training plans and they customized to the individual. Aside from hard skills vs. soft skills the ability to self-select is the largest differentiator between technical training and sales training.

#### *Value of Training—The ROI Model*

How valuable is training and what should we willing to pay for it? This is one of the primary questions in every learning and development department in North America. I remember about five years ago being exposed to an ROI methodology, often referred to as a Kirkpatrick level 5, though not by Kirkpatrick as he did not agree with it at all. (“Donald Kirkpatrick answers evaluation concerns”,2009) The ROI theory, according to the ROI Institute, “represents the fifth level of evaluation and is the ultimate measure of accountability. ROI answers the question: Is there a financial return for investing in a program.” (Phillips, 2007)

The ROI formula is: (ASTD “Measuring and Evaluating Learning”, 2005):

$$ROI\% = \frac{\text{Net Program Benefits}}{\text{Program Costs}} \times 100$$

The formula is fairly straight forward, put a value on the benefits of the program divide the benefit by the cost and turn it into a percentage. But, in my opinion, the formula does not answer the critical question, “what are the net program benefits in monetary terms.”

If we try to answer this question, and many have, you end up with a very convoluted formula that attempts to take into account every direct and indirect cost and then by, de-emphasizing the outcome by a value of 100, come up with a value. The thought here is that if you reduce the outcome dramatically then who can argue with the results? It turns out everyone can because the original number, regardless of how much math you apply, is still conjecture. This is why Kirkpatrick stated, “ROI does not necessarily live up to its reputation as the ultimate measure of results.” (Kirkpatrick, “Evaluating Training Programs”, 1998)

This is why, in most cases, I am going to avoid getting involved in the dollars and cents of the value of training and focus on the perceived value of training. The only time it makes sense is as one output of an overall level four Kirkpatrick evaluation of results. Also, it only makes sense when the job family is one for highly trained, highly paid individuals such as engineers and sales professionals. In all other cases perceived value is much more important, though less tangible.

Perceived value is the importance placed on the training by the individual or the group. In our case the group is the corporation.

#### *Perceived Value—Individual*

Recall the information indicated at the beginning of this paper. Those with some type of college degree will, on average, make much more money than those without. The US census bureau in a report issued in 2002 estimated that over a lifetime those with a high school diploma will make, on average, \$1.2 million in a lifetime. The average degree holder will earn around \$2.1 million (Day-Cheeseman, 2002). The result is even higher for those with professional degrees (doctors, lawyers, engineers, etc.) who will make \$4.4 million on average (Day-Cheeseman, 2002). From a pure dollars and cents perspective that is enough for many individuals to further their education.

In this competitive job market a college degree, and especially a master's degree helps to differentiate you from your peers. In 2008 report issued by the CAEL (Council for Adult and Experiential Learning) only 37% of the population in the United States had received at least an associate's degree. In 35 states less than sixty percent of the full time workforce had a degree.

Looking ahead, the post-baby boom workforce glut is coming to an end. However, at the same time you are, as stated in the previous section, in competition with not just the United States, but the world. There are several countries emerging from the third world, such as India and China, large workforces to whom many US companies are

“outsourcing” their labor. It is for this reason, when looking over US government material and their projections; they are somewhat short-sighted when they do not look beyond the border. But, we, the professionally educated adult do not.

We have seen the demise of the union, the retirement plan and the outsourcing of jobs. At the same time we have seen the rise of the transportable 401k plan. Also, most states are now “right-to-work” states. This is a clever way of stating that your employer can let you go at a moment’s notice if they believe it is in their best interest. According to the US Bureau of Labor Statistics the average amount of time the America worker spends at one job is just a little over four years (USBLS, 2008). If we can assume that a professional person enters the workforce at twenty-four then they will change jobs ten times, at least, in their career.

So what can we determine by all of the above statistics? That education is important, especially education that is transportable from job to job. Thus, the second two categories; external certifications and external accreditations are very valuable to the individual learner. Internal training and certifications are valuable only from the perspective of maintaining one’s competitive value in the interior workforce. This is because they are not generally recognized outside the organization by a larger authority. The value of the certification is directly tied to the credibility of the internal granting group.

*Perceived Value—Corporation*

A corporation will engage in training for a number of different reasons. Here are some of the more common.

- Belief it is a competitive advantage in attracting talent
- Belief it is critical in retaining top talent
- Motivating their talent
- Technical, safety, and engineering requirements
- Legal and compliance requirements

The first three bullets are about talent equity. The first two are about talent acquisition and retention. While training and development are only part of the answer they are a big part. While some might think you do not have to worry about people hopping from job to job in the current economic climate (9 +% unemployment) this is incorrect. Let us take a look at two examples, one in a good economy and one during poor economic times.

The first study, conducted in the current poor employment climate, the Sales Executive Council found that “low-performing, disengaged employees are 24% less likely to leave,” (SEC “Building a World Class Sales Academy”, 2009) while top talent “are just as in high demand as ever, and are more likely to seek jobs elsewhere.” (SEC “Building a World Class Sales Academy”, 2009) As a result of these two trends, poor employees staying and top employees leaving an overall talent shift was occurring decreasing the effectiveness of the organization.

An article published in good economic times, just prior to 2008, stated, “People are not motivated to take jobs that they would have in leaner times. Many employees are

eager to jump ship for a job they think will be better.” (Bradford “Attracting and Retaining the Best Employees, 2007)

From these two examples it is possible to see that good employee hiring and retention strategies are important regardless of the current economic situation. In America companies, which all have as a corporate tag line, “employees are our most important asset” are actually starting to believe it.

This idea of the value of employees is also gaining currency because of the large numbers of baby boomers who are planning to retire in the next 5-17 years. The US Bureau of Labor Services jobs outlook for 2008-2018 show a 78% increase in seniors (those above 65) and a net decrease of 1% and 5% in the 35 to 44 and 45 to 54 age groups respectively. (Sommers, 2009) At the same time the overall labor participation rate is expected to decline slightly. (Sommers, 2009) Because the size of the Generation X (those born in 1964 to 1984) workforce is significantly smaller than the baby boom, and the Millennial generation (those born 1985 – 2004) are just entering the workforce there will be a lack of an experienced trained workforce.

Bullet number three is about employee morale and motivation. The company with the more highly motivated employee has a competitive advantage over the other peer group industries. According to the Corporate Executive Board:

- Highly engaged employees are up to 87% more likely to stay with the company. (CEB “The Business Case for Employee Engagement,” 2009)
- Every 10% improvement in commitment can increase an employee’s effort level by 6%. (CEB “The Business Case for Employee Engagement,” 2009)



- Companies with a highly-engaged workforce outperformed industry average revenue growth, year over year, by 11.2%. CEB “Corporate Executive Board. “Rebuilding the Employment Value Proposition: Four Strategies to Improve Employee Effort and Retention,” 2009)

The fourth bullet, technical and safety training have been discussed before. When a young college graduate comes into the workforce as a new engineer, they still have no idea how to be an engineer in that particular company. Some internal metrics Applied ran in 2000 indicated that in order for a technician to be effective in the field would require at least one year of experience. The first three months of this were in the training center where they learned how to operate and maintain the system. The answers in the technical training area are much more binary. If they have been trained and certified they can do the job, if they haven't they cannot, or are not allowed to because of safety and liability issues.

Finally, (bullet number five) companies engage in training to comply with local or national regulations. An example of this type of training would be for someone who sells high-tech equipment overseas. They would be required to take government training regarding what can and cannot be sold to countries such as the People's Republic of China.

Compliance training can also be used to reduce the company's exposure to lawsuit. Remember in the late eighties and early nineties when “sexual harassment” became common after several high profile cases awarded millions to women who had been subjected to harassment by their male co-workers.

### *Cost and Time—Downside of Holistic Education*

The discussion of perceived value has to, at all times, be weighed against the cost of training. Because of the nature of holistic training and its much broader framework advocated in this paper cost becomes a major consideration.

We need to define cost in two distinct ways; actual cost and opportunity cost. Actual cost is made up of the cost in time and effort of the training person developing the course and actual cost to perform the training. In the case study titled “Project Management” the actual cost to the individual was \$2,100. The development time was roughly 80 man hours at \$150/hour (based on derived salary). This equated to \$12,000. Therefore in a population of 100 students the total cost would be \$222,000. This is no small expense for a corporation.

In addition, the student time in the class and studying for the Project Management Professional (PMP) exam is lost opportunity cost. What could they have been working on instead of going to class? For the project management example the baseline was 40 hours of training and 40 hours of independent study. This, again at \$150/hr., was \$120,000. Therefore the total cost of the program for 100 people is about \$340,000. But is it worth it?

When you begin to discuss holistic training the pie is even larger. You have the same cost principles, but the effort to develop is much longer and involves more people.

For example, the Sales Academy (final case study) which is an attempt at a complete holistic training program cost breaks down as follows:

1. Development:
  - a. Vendor: \$120,000
  - b. Training cost: ~\$8,000/student to complete all requisite courses
  - c. Development: 2 man months equaling \$48,000
2. Opportunity Cost: \$7,200,000
3. Total: \$9,768,000

Ten million dollars is a lot of money to spend on a training program. Does it actually pay for itself? The answer is yes. According to a study done by the Sales Executive Council an increase of employee engagement by 20% can result in a 2% improvement to the bottom line (Sales Executive Council. "Building a World-Class Sales Academy." (2009), especially in sales where Applied Materials chose to make the investment. In our company (~\$10 Billion yr./yr.) this equates to \$200 million in additional revenue, a 2,000% return on investment.

The key is to accurately measure that return on investment, which will require the performance of an extensive evaluation of the program and why such an investment is not always warranted. Sales direct impact to the bottom line warrants this type of investment.

## Training Metrics

Generally when we think of training metrics they are solely contained around the idea of training effectiveness. But we need to broaden our concept a bit and discuss not only effectiveness but; the necessity of training, the cost, and the length of a training program. All three of these are directly related to Kirkpatrick's first three levels of evaluation. This section will discuss all three levels and conclude with a theoretical discussion of Kirkpatrick's fourth level of evaluation, which is culture change, and this a critical measurement for holistic training.

### *Necessity of Training*

According to Kirkpatrick, "If programs are going to be effective, they must meet the needs of the participants."(Kirkpatrick, 1998) How do we determine what the needs might be? We perform what is commonly called a "gap analysis." In the book I wrote for Applied Materials I determined that there were four types of needs assessment that we should be able to conduct:

- **Organizational Needs Assessment:** What does your organization need? Normally this will be done in context of the course, or courses, you are being asked to develop and customized for the particular business unit you are building the program for.
- **Retro-Assessment:** Fill in background on a program you have been asked to create. In this case you need to interview the people at the top and find out how effective the program was.
- **Performance Gap Assessment:** In this case you are looking at what the performance should be and what it is now.

Without being quite so formal there are a number of ways to determine the needs, or the training gap, Kirkpatrick stated that these were some of the more common; (Kirkpatrick, 1998)

- a. Ask the participants
- b. Ask the bosses of the participants
- c. Ask others who are familiar with the job and how it is being performed, including subordinates, peers, and customers
- d. Test the participants
- e. Analyze performance results

Applied Materials training further defines necessity as a measurable function of the following components:

- a. Class fill rates—if a class is valuable it will be well attended
- b. Customer request
- c. Student evaluation questions 1&2 on our end of course evaluation which are greater than 5.0 of 7.0. The questions are:
  - i. “I learned new knowledge and skills from this class”
  - ii. “I will be able to apply knowledge and skills learned in this class to my job”

Usually the necessity of training is determined when a person of some influence on the business unit determines that there is a problem and the answer they arrive at is often training. Then we come in to determine if indeed this is the case. Most of the time, we determine that the answer is no, that some more clearly written procedures, or a business process change would solve the answer more simply.

How do we determine if there is a training need? We do this by asking a specific set of questions during a needs assessment. Here are some examples of the questions we would ask:

- Describe the most important business opportunity currently facing your workgroup?
- What are the roadblocks that are keeping you from taking advantage of that opportunity?
- In what areas within your work group does there seem to be a gap between expected performance and actual performance?
- Has the gap been increasing over time?
- What effects (consequences) of the gap are evident in the organization?
- How does the gap affect individuals inside the targeted group? Outside the targeted group?
- Can the problem be broken down into parts?

### *Cost of Training*

In a perfect world the cost of training should be directly translatable to money saved by the company or by increased revenues. In the training world we often focus on money saved. However, there are no methods available that show, unequivocally, money spent in training will reduce costs to the company. Recall the earlier conversation about ROI in the first section.

Kirkpatrick states that when looking for tangible (in our case monetary) results the question remains unanswered because “the findings probably provide evidence at best and not clear proof that the positive results came from the training program.”

(Kirkpatrick, 1998)

Training’s approach to answer this question of how much a course should cost, what is its value to us, is focused around two components:

- a. Can the cost reduced?
- b. Answer to questions #5&6 in our end of course evaluation receiving scores greater than 5.0 out of 7.0. The questions are:
  - i. “The training was a worthwhile investment to my employer”

- ii. “The training will improve specific business results”

However, these are tough questions to answer if this is the first time the course is being taught. Since we no longer have and a dedicated internal training force (no one teaches classes) we rely heavily on outside vendors. Our course “should cost” model is then made up of a comparison of various trainers who offer similar courses and understanding the market. For example, sales training courses cost a lot more per day than technical training course. This is due to the perceived value of the course. The sales group brings in all the money to the corporation. Sales skills are very important and very hard to measure.

Technical, or engineering courses, cost less because of the perceived value of the course. First they effectiveness is easier to measure, is the person qualified to work on the system or not? This may be because it is more measureable, quantifiable, and therefore there is less mystery to the knowledge.

### *Effectiveness of Training*

Training effectiveness is defined as the efficient transfer of skills and knowledge from one person to another, or from one person to a group of people. Efficiency is a time component and will be discusses in a later section. The key for an effective training program are well written course objectives. According to George Piskurich, “particularly well written objectives that are shared with the trainees and can be used by them to

guide their learning are one of the essential foundations of good instructional design.” (Piskurich, “Rapid Instructional Design,” 2000)

At Applied Materials we develop objectives based on Robert Mager’s principles, these are; “1) what should the learner be able to do, 2) under what conditions do you want the learner to be able to do it, and 3) How well must it be done?” (Mager, 1984)

Once you have the objectives in place you must have the criterion for testing to discover whether or not you have successfully met the objective. (Mager, 1984) This can in a number of ways; through exams, through demonstration (often in the form of certification), and through simple completion of the course. The method of testing is determined by the level of performance we are seeking out of our engineers once they have completed the training.

This performance assessment is based on Piskurich’s work on behavior analysis. He states, “Behavior signals the trainees what must done or learned in very specific terms.” (Piskurich, 2000) He breaks these behaviors into six different categories: knowledge, comprehension, application, analysis, synthesis, and evaluation. (Piskurich, 2000) Applied Material’s criteria for training is at the application stage. This is defined as the ability to demonstrate, employ and practice what was gained in class. This is also referred to as a Kirkpatrick level 2 evaluation.

A Kirkpatrick level three evaluation is defined as “the extent to which change in behavior occurs because of the training program.” (Kirkpatrick, 1998) This is a change that must be measured immediately and over time. After all how do you know if a



change in behavior has occurred unless it is consistently demonstrated over time? The level three evaluation does just this. It samples the student directly upon completion of the class with a final exam and then through follow up interviews with both them and their superiors it determines if there has been a change in behavior. It also measures if the change in behavior is the same as what was listed in the course objectives.

Applied Materials training further defines effectiveness as a measurable function of the following components:

- a. Final exam score greater than 80%
- b. Student evaluation questions 1&2 on our end of course evaluation greater than 5.0 of 7.0. The questions are:
  - i. "I learned new knowledge and skills from this class"
  - ii. "I will be able to apply knowledge and skills learned in this class to my job"

### *Length of Training*

Length of training is not an independent measure. In a sense it is a summary of all the other steps. It is a function of cost. After all a shorter course is cheaper and there is less missed opportunity cost for the students attending. A course which is effective by definition is the correct length. Necessity is also a determinant in course length since while the course might be "necessary" for the engineer to complete their job, if it is too long the necessity vanishes, especially in an environment as fast paced as the semiconductor manufacturing industry.

Only when all the other factors have been taken into account can we look at course length. Traditionally, and everything else being equal, it is best to try and fit

course length into blocks of weeks. If a course turns out to be six days long we try and reduce the length of the course to fit into a week. This is done to try and limit the cost of students attending who may have to fly in for the course. This is accomplished in two ways. Either we relook at the objectives to determine which of them may not be as important as we might have thought, or we lengthen the class day from the traditional eight hours into ten or even twelve hours.

There are no independent measures of length of training. Kirkpatrick is silent on the subject. In the Applied Materials training group we only look to see if the course is too close to the edge of the week. We use it only as a measurement when it falls into the six day category. We also have measured the length of our courses to the length of similar courses offered by other training groups outside of the company. If we see a trend that indicates the class we are teaching is much longer than others of its type in our industry we will re-evaluate the training product. However, if we determine that our additions are important to the class, or if our particular software suite, for example, is complex and requires the extra time, we leave the course alone and do not sacrifice efficacy for time.

If our course is shorter than what we are seeing in the industry we look to see if there are gaps in our instruction that we may have missed. Historically though when we have seen classes much longer this is usually because the course is being offered by a company whose primary purpose is training. These courses are suspect because it may have more to do with the cost of training than the effectiveness of training.

### *Kirkpatrick's Fourth Level: Evaluating Results*

According to Kirkpatrick, evaluating results is “the most important and perhaps the most difficult of all.” (Kirkpatrick, “Evaluating Training Programs”, 1998) During this section the harder question needs to be asked around improvement in; quality, productivity, engagement, and turnover need to be answered. In essence what are the tangible benefits of this training program for the individual and corporation? This has been notoriously difficult, time consuming and expensive to answer.

The problem with level four evaluations has always been around providing clear conclusive proof that training has actually made an impact in this area. However, this is where holistic training needs to come up with answers. To do this you need, as expressed earlier, to broaden the training picture and leverage the Princeton 70/20/10 model discussed earlier.

Rather than attempt to relate classes directly to improvement the classes become a part of holistic training which also includes mentoring, hiring, retention strategies and documenting on-the-job (OJT) training. The entirety of this will enable the training professional to evaluate holistic education. The fourth case study, the Sales Academy, is an attempt to do just that.

## **Training—Case Studies**

All of the case studies will follow the same general format. There will be an introduction followed by a determination of the necessity of training. We will then discuss the perceived value of the course, the effectiveness of the class based on Kirkpatrick level one through three evaluations, and discuss the length of the class. This will all be done through the established lenses we have previously discussed; the holistic learner, the perceived value of training and the Applied Materials context.

I chose these particular case studies because they are each different and believe that between them they represent key findings that support the positions advocated in this paper.

The first case study is the engineering drawing suite case study is a smaller case study and it looks more at a point solution and why it was necessary to implement changes in an existing course suite. This is a good starting point because it shows how training used to be done, the starting point in the evolution of training.

Our next case study, the solar training organization looks at training from a fresh perspective and strategic perspective. It does not focus on individual job roles but on enabling the company business unit to be successful.

Third, I am going to be looking at project management. This case study does not focus on a job role but touches the jobs of most of Applied's knowledge workers. It also adds the dimension of an external certification and how Applied Materials has leveraged

it to improve employee morale while at the same time improving internal business processes.

Finally, the sales academy case study is a study of an academy aimed at a particular job role, the sales person. This is unique at Applied Materials since, until 2011, did not have a consistent training curriculum for our sales force. How it is put together is also unique since we are able to start from scratch having no previous model to draw on.

#### *Engineering Drawing Case Study*

It is easy to see from that above example the perceived value of training. But what if the example was not so obvious? A more normal course development process was the implementation of a new engineering drawing course suite begun in 2009.

When analyzing the engineering drawing suite of courses the feedback was generally good. The students indicated at greater than 5.0 (5.0 of 7.0) that the course was worth the money being invested. However, in discussion with the head Global Engineering (GOME) and his senior staff the results were that they felt training was lacking due to several issues.

When we analyzed the current suite of courses (three in all) we determined that they contained a number of flaws. First, they were too vague. The course did provide standards for inclusion but did not detail how they were to be used. Therefore what was

happening was that when different mechanical engineers were creating parts they did not all contain the same level of detail necessary, which left a lot of interpretation up to our suppliers. This led to incorrect parts being manufactured and sent to our manufacturing facilities.

Second, the course was too industry generic. This course, taught by an outside vendor, was one that different companies used to teach the airline industry, and automotive industry. While it was a good overview of the standards both ISO and ASME it did not contain specific references to how Applied Materials used and created drawings. For example, we use Unigraphics suite to create our drawing, but, several other companies use AutoCad or something else. This led to differences in how drawings are stored, exported, maintained, and viewed. This led to many inconsistencies in drawings used by us and our vendors. It was determined that an understanding of specific functions of the Unigraphics software suite was required in the drawing classes.

Finally, because of the importance of the consistency of drawings we determined that there was a lack of rigor in the exams. The tests being used by an external vendor were simply too easy and, we felt, did not challenge the students appropriately.

Global engineering (GOME) did not need to be convinced that proper drawings would have a definite impact on our business. They understood the real costs in time (employee pay) and money (delayed shipments) that incorrect drawings would cause.

They also understood that we were paying an outside vendor for the service and this meant real money was leaving the company.

It was at this time that we decided to use an internal trainer. The person we picked was a senior engineer in the foundation engineering group, who was also a guest lecturer at the University of Texas at Austin on engineering drawing. It was his group's job to fix any drawings that came back and they knew first-hand what the issues were and what engineers globally needed to understand in order to get the drawings right the first time.

From the perspective of cost it was a true win-win situation. We needed training by the person who knew where the issues truly were and by using an internal trainer we saved the company an external payment. This did not mean there was not lost opportunity cost by using the engineer in the classroom, but, because we were in a downturn and we needed to cut costs and we decided the less money leaving the company the better.

Training metrics for this course were as follows:

Question Level Summary			
Question Text	# Responses	Average Response	Standard Deviation
I learned new knowledge and skills from this training.	45	6.6	0.69
I will be able to apply the knowledge and skills learned in this class to my job.	44	6.5	0.82
Overall, I was satisfied with the courseware quality.	45	6.31	0.87
Overall, I was satisfied with the instructor performance.	44	6.64	0.53
This training was a worthwhile investment for my employer.	44	6.57	0.73
This training will improve specific business results (such as increasing quality, decreasing costs, increasing safety awareness, etc.)	44	6.36	0.84

**Fig 4: Engineering Drawing One Level 1 Metrics**

Question Level Summary			
Question Text	# Responses	Average Response	Standard Deviation
I learned new knowledge and skills from this training.	44	6.66	0.57
I will be able to apply the knowledge and skills learned in this class to my job.	44	6.61	0.62
Overall, I was satisfied with the courseware quality.	43	6.63	0.49
Overall, I was satisfied with the instructor performance.	42	6.71	0.46
This training was a worthwhile investment for my employer.	44	6.59	0.66
This training will improve specific business results (such as increasing quality, decreasing costs, increasing safety awareness, etc.)	44	6.36	0.81

**Fig 5: Engineering Drawing Two Level 1 Metrics**

These were good responses and told us that initially at least the program was successful in the eyes of the students, at least initially. When we followed up with a



Kirkpatrick level 3 evaluation one year later we asked managers a series of questions about how much better their engineers were at developing usable drawing and if there was a cycle time reduction in getting approved drawings to our suppliers for development. We found that managers felt, on average, that there was a 17% improvement in capability. But the most interesting statistic was cycle time reduction for approved drawings, which was reduced by almost 30%. Now this was due to a number of factors; new business processes, suppliers experience working with us for over a year and general experience of the engineers going up. But management did tell us that they felt the new course suite contributed significantly to the 30% improvement number.

#### *Solar Training Organization Case Study*

In 2005 Applied Materials announced the first of several key acquisitions that would later become the Solar Business Group (SBG). Applied had decided a few years prior to that the silicon systems (computer chip industry) was too volatile for it to remain as our only product line. Applied wanted diversify to protect the company, and its employees, from the wild swings of the semiconductor industry. SBG was the first of such ventures.

We were entering a new market, solar panel capital equipment manufacturing. Applied had spent almost \$3 billion in acquiring the technology (mostly by buying smaller companies) and an exploding market in 2007. There were some estimates that

the solar market would soon dwarf the semiconductor market (which was \$8 billion/yr.). Becoming a dominant player in this market (which we have) meant cost.

Applied Materials adopted a new business model as well; instead of selling equipment into someone else's fab we would sell them their whole factory. We called it a "turnkey" fab where all the customer had to do when we were done was to come in and turn it on. This meant though that we were not going to be the manufacturer of all the equipment which was going into the fab and needed to seek out vendors who could supply the equipment we needed to finish out the factory.

In 2007 I was tasked with starting up a technical training organization for our new solar division. This was costly endeavor that took two years before it reached maturity. We had a lot of work to do. The business unit had matured enough and it was starting to add a lot of personnel, most of which were from semiconductors and not solar and had very little idea about the solar industry. The focus of the new training organization was to provide a level of understanding about the solar industry for all employees and train its technical staff to effectively build and operate solar factories.

The necessity of training was easy to see from a macro perspective. Here we were entering a new business with highly technical people who knew very little about the industry. Our first order of business was to build the technical staff for the SBG. Therefore we had to perform a massive organizational needs analysis to see what all of this would need to contain. We spoke with nearly everyone in the SBG at the time (still a fairly small organization) but focused on those who were making the decisions about

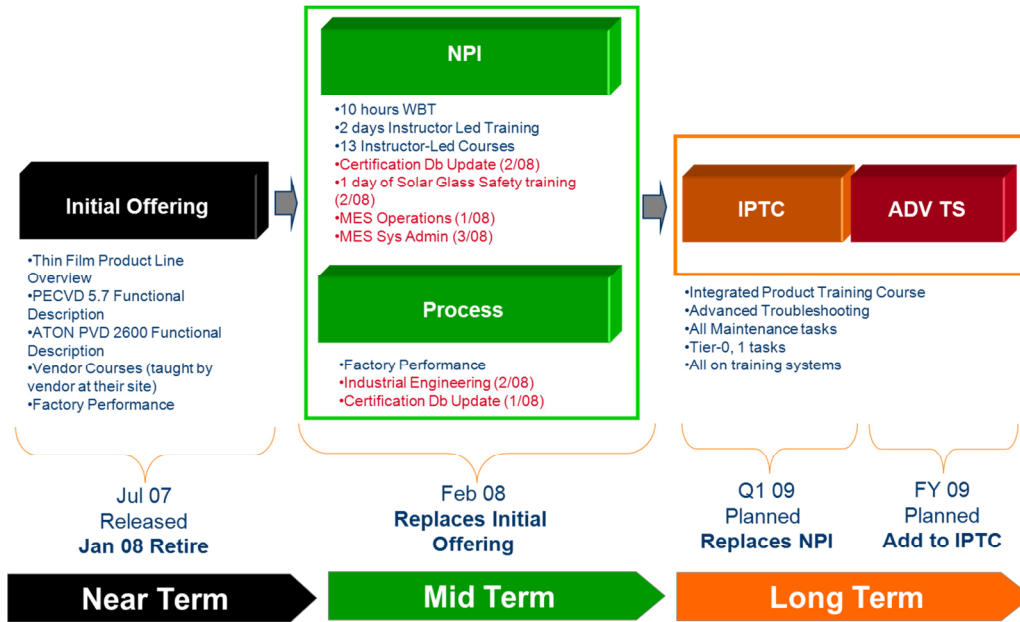
the make-up of the solar fab and those who would manage the onsite solar teams. The result was to discover what they needed to know and how we were going to train them. After we completed these interviews we were able to develop the onsite skill breakdown list. This list would tell us the equipment that was being installed on the site, the number of personnel required to run the systems, the job role of the person running the system and the overall hierarchy of the onsite team.

	HC	PVD Hardware	CVD Hardware	Laser Scribe	All other Vendors	Factory Performance	Factory Automation Operations	Factory Automation Sys Admin	Industrial Engineering	Notes
Site Ops	1									
CE Mgr	1	X	X	X	X	X	X	X	X	Take as many courses as possible. Will not be certified on Factory Performance
CE	1	X					X			Primary PVD
CE	1	X			X		X			Back up for PVD, primary tool will be vendor toolsets
CE	1		X				X			Primary CVD
CE	1		X		X		X			Back up for CVD, primary tool will be vendor toolsets
CE	1			X			X			Primary Laser Scribe
CE	1			X	X		X			Back up for Laser primary tool will be vendor toolsets
CE	1				X		X			Primary Vendor
CE	1				X		X			Primary Vendor
MES/soft	1						X	X		Factory Automation courses only
PSE	1	X	X	X		X	X		X	All PSEs should go to all primary tool training when possible, but at least have 1 primary and 1 secondary tool
PSE	1	X	X	X		X	X		X	All PSEs should go to all primary tool training when possible, but at least have 1 primary and 1 secondary tool
PSE	1	X	X	X		X	X		X	All PSEs should go to all primary tool training when possible, but at least have 1 primary and 1 secondary tool
PSE	1	X	X	X		X	X		X	All PSEs should go to all primary tool training when possible, but at least have 1 primary and 1 secondary tool
PSE/Y	1	X	X	X		X	X		X	All PSEs should go to all primary tool training when possible, but at least have 1 primary and 1 secondary tool
PJ mgr	1									
PJ mgr	1									
Prod mgr	1						X		X	
Admin	1									
TBD (Doc and parts clean)	1						X			

**Fig 6: Onsite Skill Breakdown List**

From this list we were able to start the training development process. We knew what equipment we would need, who needed to be trained and how many of would need to be trained to start up a fab.

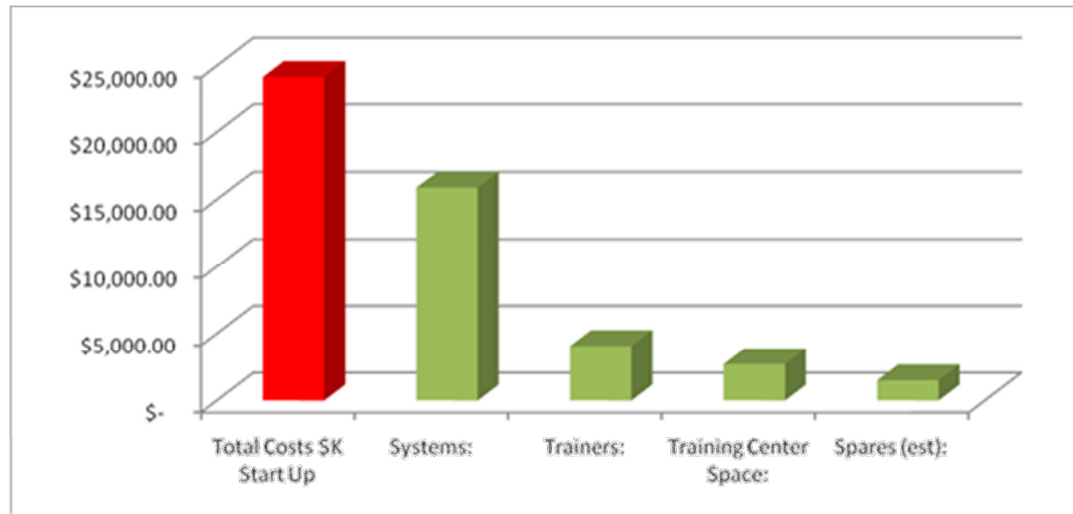
We then put together a three-tiered training plan. Tier 1 would focus on the near term goals, tier 2 goals six months to one year out and finally a tier 3 plan for two years out plus. Here is what the plan looked like:



**Fig 7: Solar Training and Development Plan**

There was a lot to do. We needed to hire and train instructors, work with the suppliers to enable factory floor training on some of the initial systems. I worked closely with our vendor engineering teams to design training systems based on only what we would need to train our customers and internal employees. We also had to find clean room space and prepare the correct “pads” for installing and operating our systems. Once all of this was done and we had enabled a near-term plan for training, we then created a budget to get the new training operation up and running. This was the cost of training on an organizational scale.

Breaking down costs and start up here are the figures we came up with that were required to get a training organization up and running:



**Fig 8: Applied Solar Training Center Start Up Costs, in \$K**

As you can tell from the data, it was going to cost \$25 million and take two years to implement. These costs did not account for everything, but it is a good rough estimate. The largest cost was the systems themselves mostly because we did not own most of them and we had to purchase them from our vendors. The second highest cost was the trainers. Surprisingly the training center space was fairly inexpensive because we were able to convert an old Applied Materials clean room floor into what we would need.

We had the plan; we knew who needed to be trained and how much it was going to cost. Here is where I am going to stop discussing the business side of the Solar Training Organization. There were huge obstacles still in our way but a discussion of

them would remove us from our focus. We are now going to skip all of that and take a look at the training effectiveness and the holistic solar employee training plan.

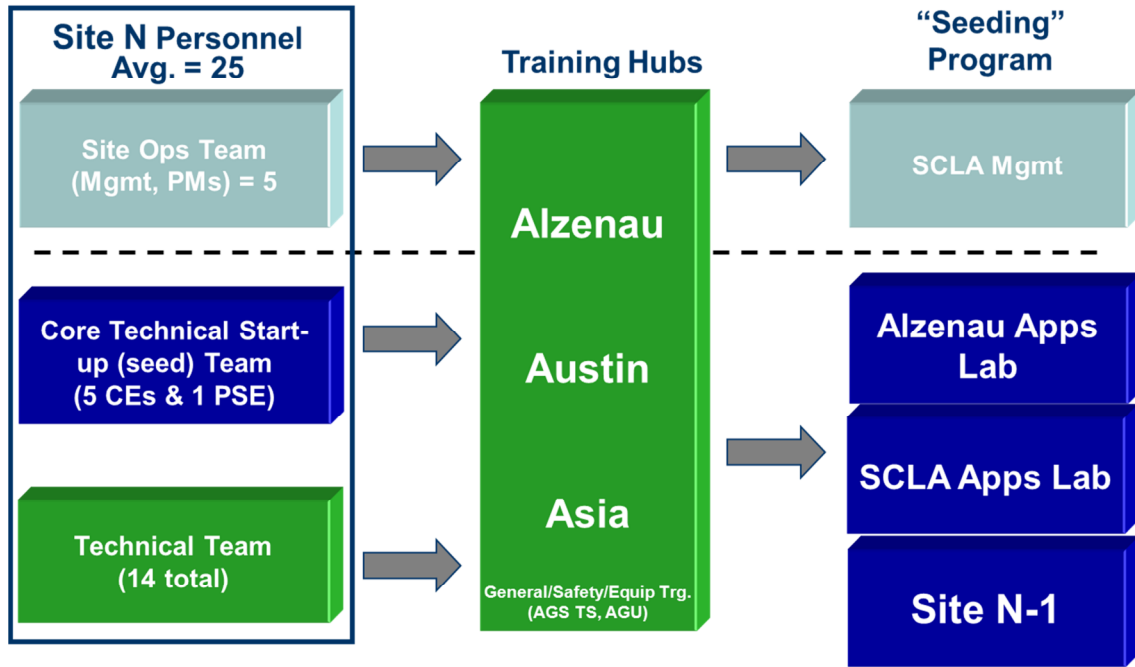
Looking back at the holistic training plan for solar we first needed to identify what roles this was and what type of person it was. Because our focus was on the technical side of the street first we engaged in a training plan for technicians. While at the time we did not call it holistic, or even talk about the 70/20/10 model in practice we enacted them. This is what was done.

Our global training program was to establish three training hubs. These would be: Alzenau Germany, Austin Texas, and Xian China. In each of these facilities we would have different training systems for students to work on. This was their formal education or the 10% of the training model.

Once students had graduated from one of the training centers they would be assigned a mentor and placed into a core technical start up (or seed) team. Here they would work alongside more experienced engineers (usually the engineers who designed the systems) and perform startups (take a shipped system and install it at a customer site).

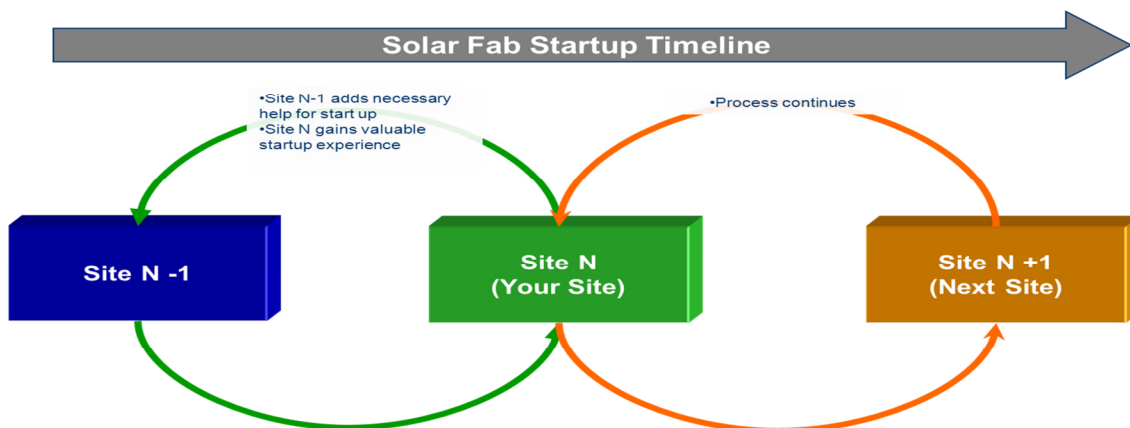
Finally after completing several hardware start-ups they would spend some time in one of the Applied Materials applications labs where we experimented with the system processes that would create the solar panel. It was thought that there would be a dual benefit. The equipment engineers could learn about the process and how to tune it to make it the most effective in the customer factory while the lab personnel could learn

about the latest hardware and system capabilities from those who had worked in the field. This was the 20% of the 70/20/10 model. You could even argue that this was part of the 70% as well. Here is what that looked like:



**Fig 9: Solar Global Training Strategy**

Once we got the first fab up and running we would then seed the other fabs by rotating personnel into it from the next fab in the line. The next fab, once started would then seed personnel for the next and so on. This leveraged the 70% of the 70/20/10 model which, if you recall, was learning by doing. Graphically the model looked like this:

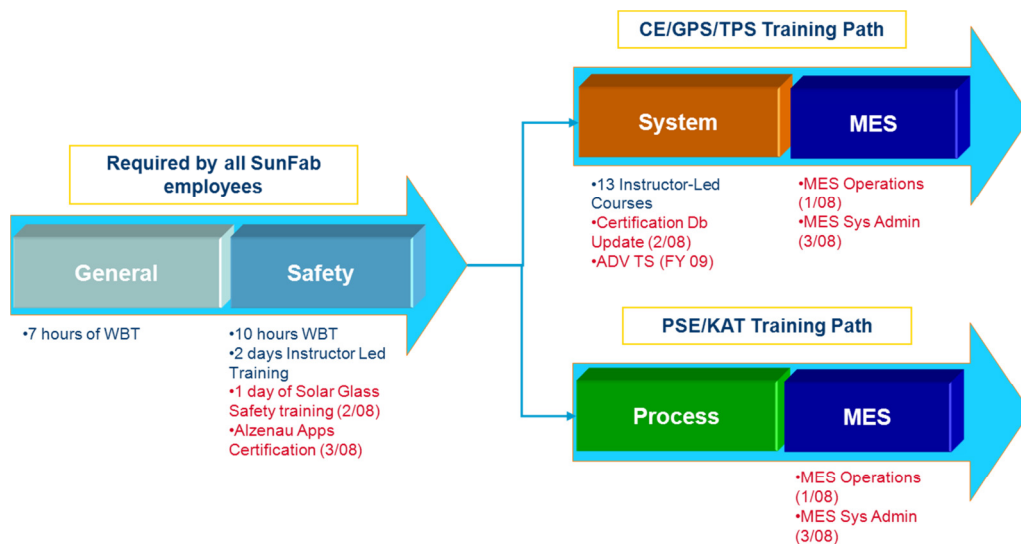


**Fig 10: SunFab "Seeding" Program**

We understand the solar training program from a perspective of the 70/20/10 model but how was it a holistic model? How did it address the development of the whole individual?

Recall in our discussion what was said about the holistic technical employee. They are highly individualistic, they are problem solvers, they have been through a rigorous course of study to be in the place they are today. Their job roles are tightly defined. Recall also what I stated earlier about the value of technical training and how it is perceived especially regarding credentialing and certification. Here is the model we chose:





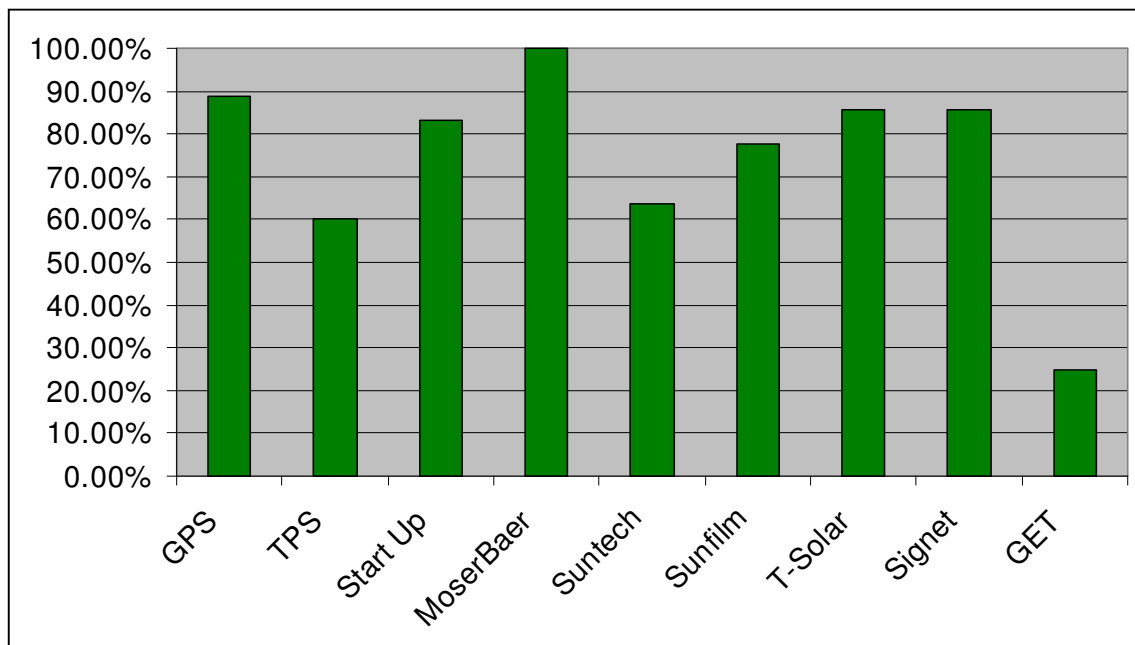
**Fig 11: Overall Internal Training and Certification Path for SunFab**

The focus of this model is on the training credential, in this case certification. In the beginning we were going to have vendors and design engineers certify the first customer site and then use the seeding program to certify the other engineers. We also built the career development structure around the technical components and made the soft skill components subordinate to the hard skill components. While I do not think we were able to get as far as we would have liked in addressing the whole solar engineer, we did, possibly, enable the future growth in an emerging technical field.

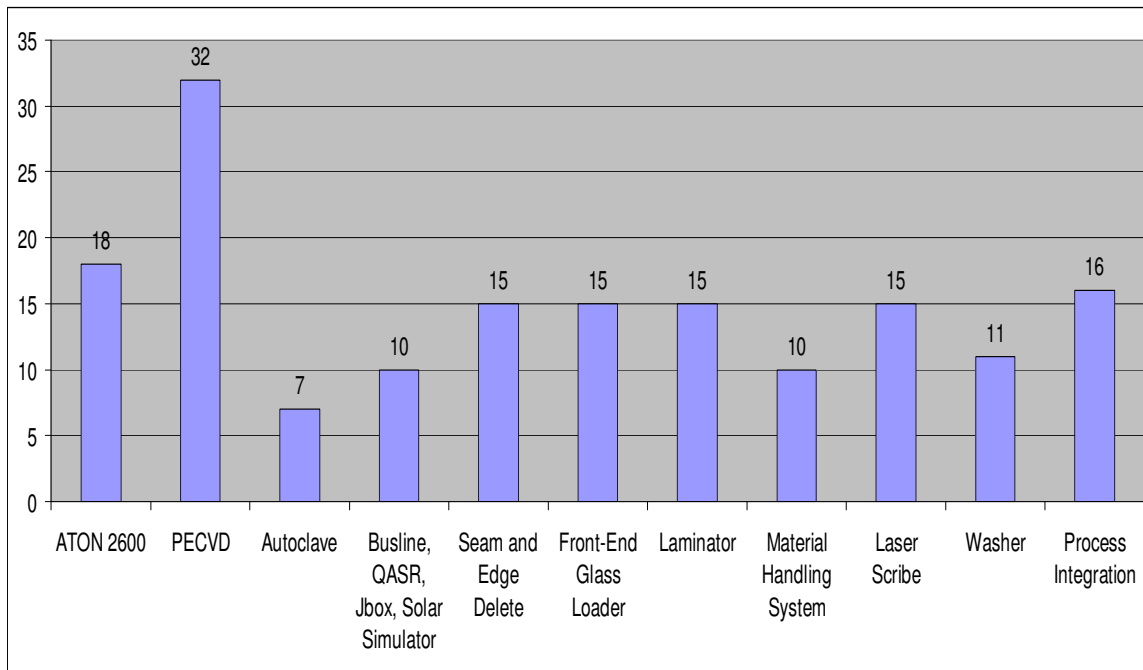
Finally it is important to understand how successful we were in the training program. In earlier sections of this paper we discussed the various training metrics we used to gauge the effectiveness of the program. We will do the same for SGB but here the metrics were somewhat different. Since no one really understood the systems and we were in the middle of a massive ramp, all the Kirkpatrick level 1 scores did not

matter. We did pay close attention to Kirkpatrick level 2 scores (certification) but did not run any level 3 metrics due to time constraints. However, one of our primary metrics of success that was not discussed in the previous section was our ability to get the personnel who were going to be starting up the next fab fully trained. Here are the metrics on how we did. By Q1 '08 we had accomplished the following:

- **17** instructor-led, **7** web-based courses developed that meet Applied Materials standards
- **693\*** Students have completed training
- **10,206** hours of training have been delivered (Q4 07-Q1 08)
- **174** students currently enrolled in upcoming classes, **38** students are waitlisted
- Average Evaluation = **88%** meets or exceeds expectations, three courses fell below 90% requirement
  - Laser Scribe = 73% (corrective action improved score to 85%)
  - Bussline = 57%, AMAT instructor assigned to develop and co-teach next class
  - Laminator = 70%, AMAT instructor assigned to develop and co-teach next class



**Fig 12: Solar Training Percentage Completed By Fab**



**Fig 13: Number of Engineers Trained (Total) on Each System**

These were some startling figures given where we had been only six months before. The Solar Training organization was meeting its obligation to the business by providing qualified individuals, in the numbers required to effectively start up the new customer fab sites.

#### *Project Management Case Study*

As a response to the employee malaise and understandable anger at top management and the focus training as a holistic employee development venture we launched a new program designed to provide the employees with a skill transferrable outside of the company in the form of “Project Management Professional (PMP).”

The PMP certification is a widely acknowledged and sought after certification globally. Currently North America, Europe, and Asia all recognize the certification and there are over 400,000 certified practitioners (PMI, 2011). In addition much of the work done at Applied is done in a project format. The systems we develop are capital equipment, cost millions of dollars, and are highly customized to the needs of our customers.

PMP certification, while highly sought after, is not easy to obtain. To be qualified to take the exam you need to have 36 months of “unique non-overlapping professional project management experience during which at least 4,500 hours were spent leading and directing project tasks.” (PMI Handbook, 2011) You must also have 35 contact hours of training. (PMI Handbook, 2011) Once you have successfully completed the certification exam you will need to maintain the credential by obtaining 40 contact hours of training over the next three years. It is quite an undertaking.

In addition, there is a complicated application process that requires the prospective PM professional to “prove” their experience and it is subject to review by PMI.

For the Applied employee who seeks the certification it provides them with a professional credential highly recognized in the business community that may help them find a job if they lose theirs at Applied.

The company standardized the work flow process, was a part of our PLC (Project Life Cycle) process, and helped maintain our ISO 2000:9000 business standards for

quality management systems. It was a win-win for both the employee and the business and it had the added feature of reverse the employee morale trend that stated the company does not care about the individual.

Our program was built around making it as easy as possible for the employee to become certified. There were several barriers we had to overcome. Most significant of these were:

- Payment
- Management of the application process
- Learning exactly what we needed to know for the exam

Typically, when paying for a credential like this, even when the company offered to do it was a long process and required significant temporary out-of-pocket expense for the employee. They would need to take the class (usually at a college, or some third party training company), pay for practice exams and then pay for the cost of the exam. Applied streamlined this process. Instead of any out-of-pocket expense our program would charge through our LMS system one flat fee. This fee would cover the cost of the training, exam, and a one year PMI membership. It also included robust practice testing software. This way when a student enrolled through our online internal system the entire cost would be charged directly to the business unit and completely bypass any out of pocket expense.

Management of the application process with PMI was difficult. It was a long multi-step process where the applicant needed to provide an account equivalent to three

years of experience, most of which had to be in leading projects. This was difficult to do given the complexity inherent in project management, and how PMI wanted you to account for it. PMI also had a tendency to actively audit a large percentage of those applying to maintain the validity of the credential. Applied Materials, as a part of the training program, provided help in completing the application, and using a third party, managed the application process for the individual so they could focus on the exam.

Finally, the learning itself was difficult. While there was no paucity of external training venues, PMI often changed their exam, and all of it was based on their nomenclature. Applied developed a training course aimed at professionals who already knew project management and just needed help learning the nomenclature and how PMI asked the questions.

The PMP Boot Camp class was launched in December of 2010. Since that time about 100 people have taken the class. How has it done so far? Here are the results:

Question Level Summary			
Question Text	# Responses	Average Response (max = 7)	Standard Deviation
I learned new knowledge and skills from this training.	86	6.62	0.56
I will be able to apply the knowledge and skills learned in this class to my job.	86	6.58	0.58
Overall, I was satisfied with the courseware quality.	84	6.63	0.55
Overall, I was satisfied with the instructor performance.	85	6.73	0.52
This training was a worthwhile investment for my employer.	86	6.72	0.48
This training will improve specific business results (such as increasing quality, decreasing costs, increasing safety awareness, etc.)	85	6.44	0.76

**Fig 14: Kirkpatrick Level 1 results (students perception of course)**

<i>as of 6/9/2011</i>	Total	Rate	Notes
<b>Total Participants</b>	95		
Completed	94	99%	
Incomplete	1	1%	
<b>Credential applications</b>			
Total submitted to PMI	92	97%	of all participants
PMI reviewed	84	91%	of those submitted to PMI
Approved	77	92%	of the applications reviewed by PMI (based on PMI charges
Audits	16	21%	of all applications approved by PMI
Not Approved (1st Pass)	11	13%	of the applications reviewed by PMI
Resubmissions - approved	4		
No Submission*	3	3%	of all course participants
<b>Credential Exam</b>			
Approved to take	77	81%	of all participants to date
Taken	14	18%	of all approved applicants
Passed	13	93%	of those having taken the exam
Failed	1	7%	of those having taken the exam

**Fig 15: Kirkpatrick Level 2 results (progress towards certification)**

So far we have discussed the necessity and effectiveness of PMP training and how it meets some of the needs of the holistic training methodology we had been aiming at since 2010. Let us turn now to the cost and length of training for the PMP certification.

The cost of training was \$2,100/student for a week of in class training. It included practice materials the one year's membership in PMI and the cost of the first exam. It also included management of the application process (which was quite lengthy and complicated). When these costs were removed the cost of training went down to \$1,300/student. When I compared this to several other programs offered by external training companies this was fairly reasonable when you considered the average cost/day/student training metric was between \$450-\$600/day. We compared the PMP course to several other vendors and this course, while not the absolute cheapest, for what it offered it was inexpensive.

The length of the course is a bit deceiving. The formal training component of the class was only one week but we felt that to be successful you would need to spend some time studying the exam and mastering the practice questions. We anticipated that this would take roughly two months end to end before signing up for the exam. As you can see from the results above when conducting a Kirkpatrick level 2 with a 93% pass rate this was probably a correct estimate.

*Sales Academy Case Study*



When discussing the necessity of training we need to take a look at the evolution of the sales academy began in 2008. At this time it was not called an “academy” but sales capability training. Its focus was to provide Applied Materials with a consistent training vehicle for all sales people. Up until this time sales training was mostly ad hoc and left to the whims of various sales groups based upon what they felt they needed. Applied Materials wanted to standardize sales methodology across all groups and give our sales people a consistent language and framework to work with. However, as the down turn progressed in 2008 and training dollars became more and more scarce the idea was abandoned and withered for some two years.

It was not until April of 2010 that the idea was taken up again. As before it was not called an academy and its focus was to drive consistency and a base level of capability across the sales force.

In 2010 Applied conducted a survey of our top customers, in several regions and across all business groups to determine how we were being perceived. The customer scorecard included many aspects: service, support, innovation, cost of ownership, and quality. most telling from a sales perspective was our net promoter score as “ease of doing business.” Both of which are directly driven by the sales force.

In the net promoter score (a score indicative of the likelihood of a customer to suggest our company vs. all competitors we were still the top but losing ground to our top competition. In 2008 we held a 15% advantage in this area vs. our top competitors while in 2010 this had slipped to only a 5% advantage.

In ease of doing business Applied Materials had slipped. When asked our customers indicated, differentiated by region, we were difficult to do business with. Our top score was 38% in China who found us easy to do business with, and the worst, North America and Taiwan, found us difficult to do business with 80% of the time.

Some of the change can be attributed to the decentralization of the sales function. In 2008 sales was its own functional group with an executive staff member running all of sales. In 2010 each BU had their own sales group, and each region had its own country president and the lines of authority were confused. While this did seem to give cover to the reduced score, the fact that the sales team was not able to streamline this and present one face to the customer was significant. Sales weakness in customer management was uncovered and shown the light whereas before senior executives would often come in and “save the day” this was not possible now.

From an internal perspective the sales force was unhappy as well. Every year Applied Materials issues an employee survey to determine the satisfaction and engagement level of its employees. Looking specifically at the sale force it showed a marked decline in engagement, only 26% of the sales force was currently happy or fully engaged in their jobs. Over 50% were actively seeking other employment. Much of this had to do with the change in reporting structure but 67% indicated their unhappiness in career development and internal growth opportunities.

From the senior management perspective the numbers were stark. They understood that their sales force needed something to bind them together and bring

consistency to sales or else the fracturing of the organization would (and had) result in silo-ing of talent and an unwillingness to work together.

As was stated in the previous section technical training, or the training of engineers is quite different from sales training. The biggest difference between the two is the people groups involved and the requirements to be successful. In a sales environment in order to be successful your job requires that you interact effectively with people and reach an agreement. It involves negotiation, influencing, advocacy, knowing the product, discovering your customer's needs, among other things. Each is not easily measurable.

Other than the completed sale, how do you know if you are good at influencing others? Aren't there a lot of other intangible factors involved as well, such as customer's perception of need, the value of your brand in the market place etc.? Because of these types of things Applied's vision of the sales person was that they were born, not created and also because of this our customers were regularly getting the best of us at the negotiation table. Because of this we determined that a new model was needed.

The Corporate Executive Board is a paid research organization comprised of 300 companies across the globe whose goal is to find best practices across like companies in specific areas. Each area requires membership dues paid each year by the member companies. Applied Materials is a member of the "Sales Executive Council" (SEC) and "Marketing leadership Council" (MLC). Their focus is on training and enablement. It was

through this organization that much of my primary research on sales training was completed.

In a report published in 2009 the CEB wrote about a trend in sales talent. This trend was:

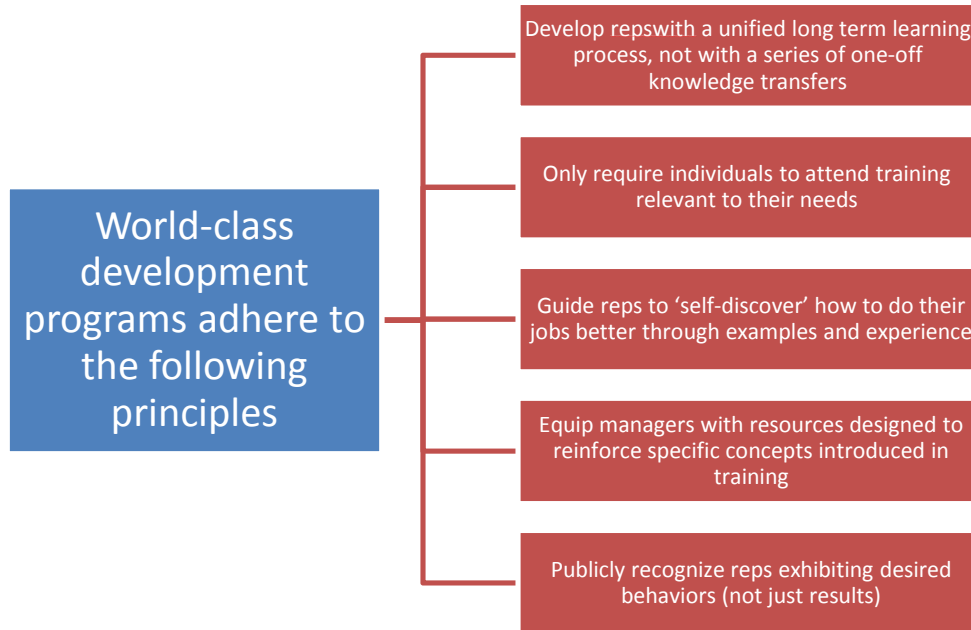
- “Low-performing, disengaged employees are 24% less likely to quit in 2008 than they were in 2006
- Star performers, on the other hand, are in just as high demand as ever, and are more likely to seek jobs elsewhere” (SEC, 2009)

When put together the high performing talent leaving, and low performing talent staying businesses were at risk of coming out of the down turn with less capability than when they entered it. Their conclusion was that there must be talent development investment to encourage the high performers to stay and up-skilling the low performers to meet the demands of a restored market.

The SEC took a close look at traditional methods of sales training (such as ours was to be though not yet implemented) and discovered that while sales training consumes a large portion of companies learning and development dollars it was not very effective. According to them, “only 13% of that training is retained on the job.” (SEC, 2009) This data matches what we have already discussed in the 70/20/10 model of training developed by Princeton.

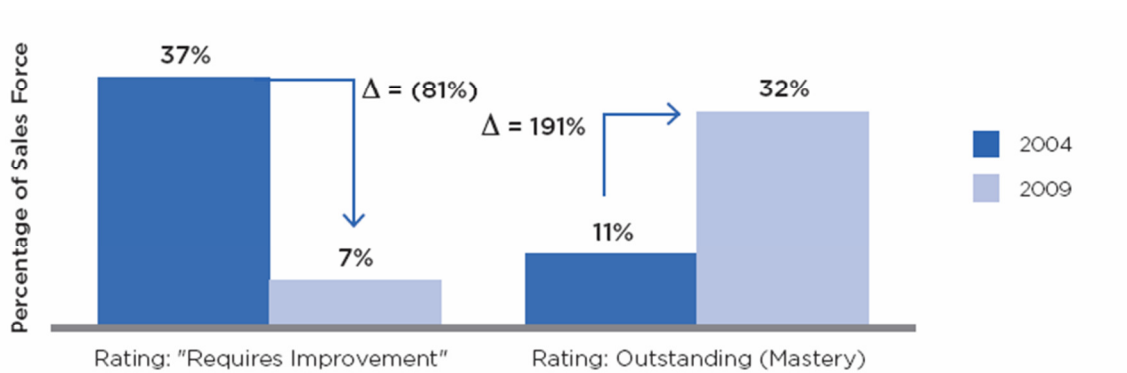
In a study from the SEC titled “Building a World Class Sales Academy” we found several components of what we were looking for. The SEC stated, “A ‘sales university’ is the best way of developing reps because it links all stages of the development together

under the same framework.” (SEC, “Building a World Class Sales Academy, 2009) Their solution included the following framework:

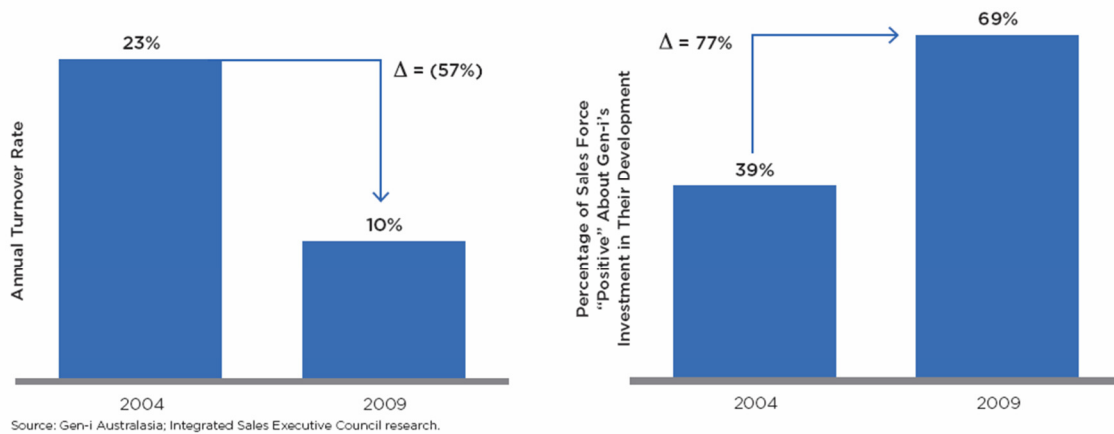


**Fig 15: Principles of a World Class Sales Development Program (SEC, 2009)**

As a proof of concept the SEC used Gen-I (telecom business in Australia) to show some of the results.



**Fig 16: Rep Skill Improvement; Manager Assessment (SEC, “Building a World Class Sales Academy, 2009)**



**Fig 17: Talent Retention and Engagement (SEC, "Building a World Class Sales Academy, 2009)**

These were exactly the type of results we were looking for. So in late 2010 and early 2011 the Sales Academy was born.

Our idea was to take the long view and to develop a sales professional and provide them a growth path for the future. We first built a competency model based on our specific needs in the company. I will not review the sales competency development here, please look over the section "The Holistic Sales Professional" in a previous section. Once we had the sales competency we looked for ways to develop the sales work force according to what it indicated.

Our strategy revolved around the individual contributor of the sales profession at Applied Materials. This was done for a number of reasons. First, we had never looked before at the job role of the sales professional before. Applied Materials had spent 40 years under the impression that sales people were not made they were born. There had

been a lot of data around management and leadership skills and fold these into the Sales Academy at a later time. Here is what our framework looked like.



**Fig 18: Applied Materials Sales Academy Focus**

From this illustration you can see how the focus went beyond training and into recruiting, selection, goal setting and career pathing. However, training and manager coaching was where we were going to spend our time in 2011.

We felt that there were several benefits to the sales academy model we were developing. First it was owned by the Applied Materials Sales Customer Council (SCC). SCC ownership was a different method of engagement for the training group. The SCC was a council of vice-presidents and the head of each of the sales groups in the different

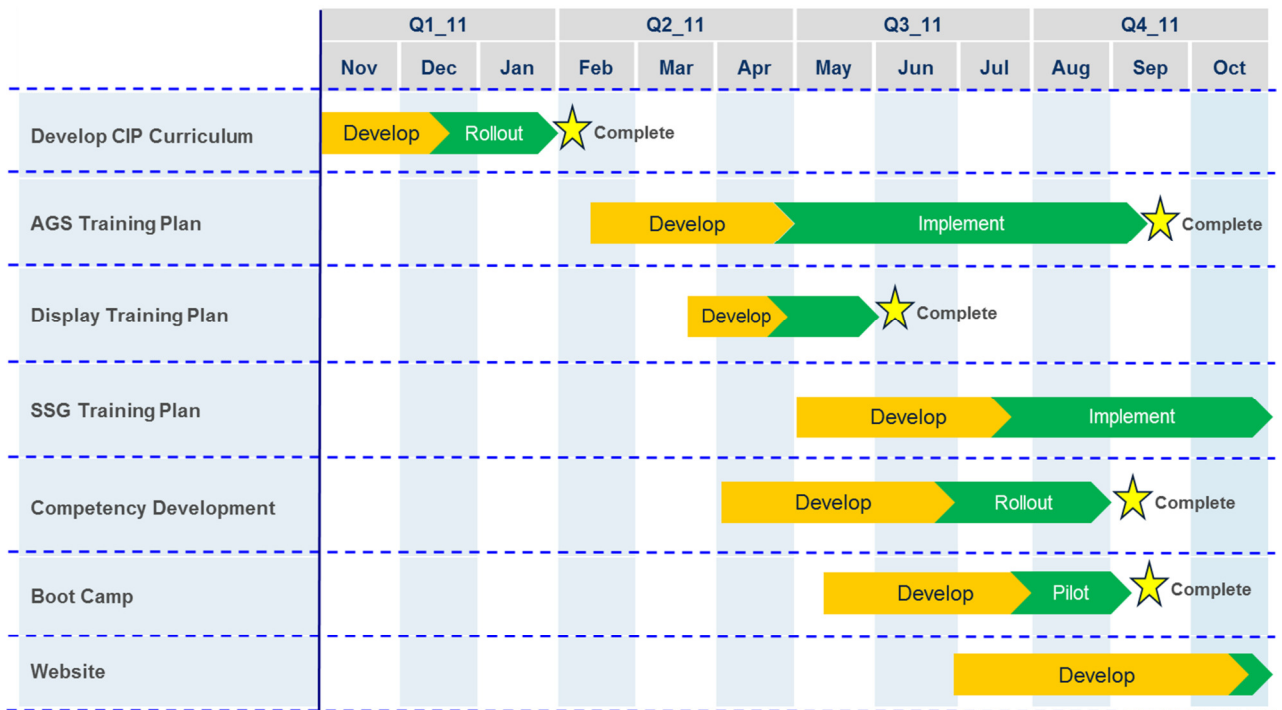
business units. Ownership by them would drive adoption of the sales methodologies taught and it would inform us on what was important and if we were being successful.

This framework also provided use with a unified learning framework that would not be ad hoc or piecemeal training like we had done in the past. Because it was as unified structure it would allow us to grow the training over time and not simply replace one class for another. It would also link all the stages from hiring requirements to career pathing together.

Third, it would help quantify and enable learning through discovery. This would help us to develop field-based BKMs (Best Known Methods), apply the model to the 70% part of the 70/20/10 model and leverage manager and peer coaching. Along with the formal training component application was complete for the entire 70/20/10 model.

Having our focus clear we adopted the following roadmap for 2011:





**Fig 19: Applied Materials Sales Academy Development Roadmap 2011**

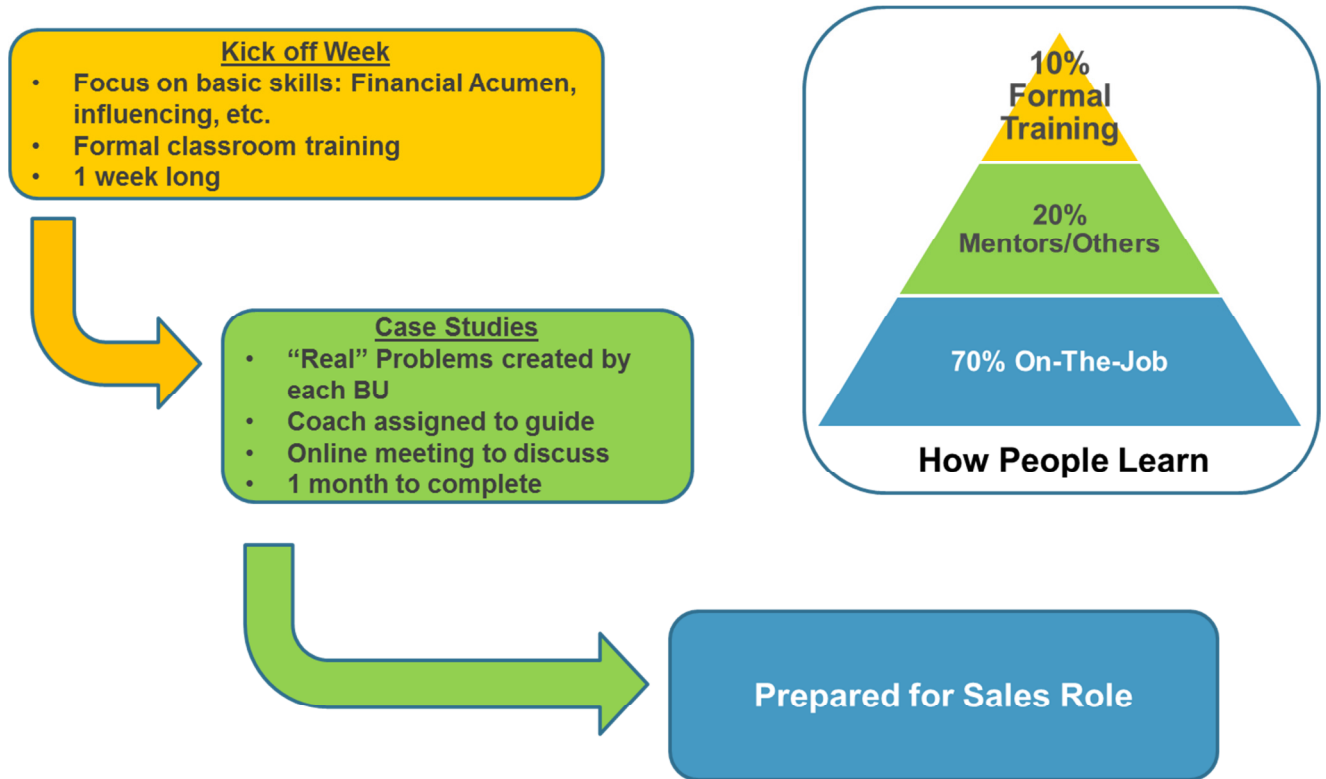
Our first goal was to develop curriculum for our CIP training. This would allow us to drive consistency in our methodology from business unit to business unit. From the roadmap perspective with was the creation of CIP (Continuous Improvement Plan) training. Next we wanted to establish training and development roadmaps for each business unit based on this plan. All of which was being done while we developed the competency model.

Once the competency model was complete we began to develop the Sales Academy Boot Camp. The boot camp would be the first program sales people take when entering the sales work force at Applied Materials. The goal was to develop a reproducible sales training program that teaches the basic skills and knowledge critical

to success as an Applied Materials sales person regardless of BU, customer, or region.

The team for development was comprised of senior executives from each of the

business unit's sales groups. The generic model of the boot camp looked like this:



**Fig 20: Sales Academy Boot Camp Model**

Again you can see how it was informed by the 70/20/10 model. It would have a kick off week of formal training teaching the basic skills requested by the SCC and the boot camp development team. Then we developed a series of case studies, one for each business group to provide the new sales people with “real world” problems and assign them a mentor to help them discover how to solve the problem.

The final goal for 2011 for the Sales Academy was to create a website or landing page for the Sales Academy where sales professionals could look to see what was happening and to, eventually, guide them in their career path. While the career pathing would not be done until 2012 we did want to include a method of allowing the sales person to self-analyze their capabilities and provide them with suggestions for training. We would do this by incorporating an online behavioral questionnaire, using the competency model to develop it, and tie it into the LMS (Learning Management System) to give them training suggestions. Once this was done we would be well on our way to providing a holistic training model for the individual contributor.

Training metrics are difficult to come by for the Sales Academy since it is basically a new program. We are going to perform a level 1 through 3 assessments on the training aspects of the boot camp and measure retention and job satisfaction in 2012. However, we do have some level 1 metrics around the CIP training we have been conducting all year and are provided below, each on a maximum of seven scale.

Question Level Summary			
Question Text	# Responses	Average Response	Standard Deviation
I learned new knowledge and skills from this training.	24	5.63	1.38
I will be able to apply the knowledge and skills learned in this class to my job.	25	5.72	1.46
Overall, I was satisfied with the courseware quality.	25	6.2	1.19
Overall, I was satisfied with the instructor performance.	25	6.16	1.14
This training was a worthwhile investment for my employer.	21	5.95	1.28
This training will improve specific business results (such as increasing quality, decreasing costs, increasing safety awareness, etc.)	24	5.58	1.44

**Fig 21: Executing Account Strategy Kirkpatrick Level 1**

Question Level Summary			
Question Text	# Responses	Average Response	Standard Deviation
I learned new knowledge and skills from this training.	63	6.24	2.35
I will be able to apply the knowledge and skills learned in this class to my job.	63	6.86	1.46
Overall, I was satisfied with the courseware quality.	62	6.01	1.48
Overall, I was satisfied with the instructor performance.	63	5.77	2.01
This training was a worthwhile investment for my employer.	60	6.05	2.27
This training will improve specific business results (such as increasing quality, decreasing costs, increasing safety awareness, etc.)	63	6.37	1.82

**Fig 22: Situational Sales Negotiation Level 1 Metrics**

We cannot take too much away from the available metrics since they only cover student's initial reaction and they have not been related back to retention and engagement scores. But what is significant is that these scores hold up fairly well globally. Looking at the standard deviation of the scores and knowing that these courses were taught in; North America, Taiwan, China, Singapore and Europe. These courses have institutionally held up well.

Finally, to assess the actual impact of the Sales Academy we will need to measure the effectiveness of the program in how it affects employee engagement. This score was chosen because of its direct relationship to revenue as discussed in an earlier section of the paper. If the Sales Academy can move the employee engagement needle up by 20% this will have been a successful program.

Because of the strategic nature of sales a year long performance of the Sales Academy will need to take place to measure improvement of employee engagement. However, if Applied did not believe in the Academy idea the initial investment would not have been made which documents to value of the program as it has been developed.

## Conclusion

The premise of this paper was development of the holistic training program through the context of Applied Materials. We looked at the state of training in North America and the value placed by all industries. We looked at the perceived values of training to the corporation and to the individual. We saw how the down turn of 2008 significantly impacted how companies placed value on employees, at least at Applied Materials. This has led to an evolution in training.

Applied Materials training and development has been evolving over the past two years. We have moved from training as a point solution and moved into developing the whole employee. There is a difference in what this means to different employees and this is why I chose to look at two divergent groups; the sales person and the engineer. Each has their holistic framework and values training differently.

The engineer is guided several internal and external certifications, requirements and licensing. The sales person is much is broadly defined as an expert in those soft skills such as negotiation and interpersonal relationships.

Because of this the value of training is different for each. For the engineer they want to attain greater certification and maintain certification in order to be allowed to practice in their chosen field. For the sales person they want to be able to achieve the largest margin on their sale while at the same time meeting the needs of the customer and the company they work for.

The four case studies we looked at; solar training organization, engineering drawing, project management, and the sales academy each had a different focus and showed the evolution towards holistic training.

Engineering drawing was more of a point solution and was concerned about improving the skills of an engineer. Of all the case studies it was the least holistic in its discussion. But I felt this was important to see because it was how things used to be done. There was a problem and, hopefully, the training solution would help to correct that problem.

The solar training organization was a macro study about the development of an entire organization to meet the needs of the company. It was the more holistic in nature than the engineering drawing example. Its goal was to enable Applied Materials to be successful in a brand new market. However, it did contain some components of developing the whole employee, at least how they were defined in technical training. It provided a career path based on certifications borrowing heavily from the framework of professional engineers.

Project management training was much more holistic in its outlook. The course was built and informed by the outcome of the 2009 employee survey indicating a general unhappiness with employee's career development path. The project management boot camp was created to meet the needs of the company and to provide a highly sought after global credential to improve employee morale. While work is

continuing on this we can see how there was a definite shift from a point solution to more mutually profitable solution.

Of all the case studies the Sales Academy was the most holistic. It contains much of the latest research in developing the whole employee. It is not about a course or a suite of courses but how we drive the job of sales professional forward and provide a framework for advancement in the company. Because it is new the various components will be coming online over the next two years. Interestingly though the premise of the academy was not begun from answering a training problem. It looked at employee feedback from the 2009 survey; it built a competency framework around the required knowledge, skills, talents and abilities first then using the 70/20/10 model from Princeton built the development framework around it.

Through these four case studies then, we can trace the evolution of training at Applied Materials from point solution to employee development. However, we must make certain distinctions between the value of holistic training in all cases.

In professional job roles, such as we discussed regarding engineering and sales this makes sense. In the Sales Academy we have the opportunity to move employee engagement up 2% which can equate to a \$200 million improvement in bottom line revenue. In engineering the cost in time to market can mean the difference in hundreds of millions of dollars in lost revenue due to the inability to meet our customer's request. Applied Materials saw such a missed opportunity in 2009 with our inability due to lack of capability in our 200mm system refurbishment program.



For other job roles, project management, HR, finance this might not make the same kind of sense. You need to be strategic in applying holistic training methodology because it is not a one size fits all solution.

## References

- Applied Materials Quality Policy, internal website. Accessed 3/22/10.
- ASTD. "Measuring Return on Investment." Measuring and Evaluating Learning Certificate. (2005).
- ASTD. "Learning Remains Steady During the Downturn." Training and Development State of Industry Report 2009 (2009) <  
[http://www.astd.org/TD/Archives/2009/Nov/Free/0911\\_SOIR.htm](http://www.astd.org/TD/Archives/2009/Nov/Free/0911_SOIR.htm) >
- ASTD. "Transatlantic Training Shortages." Training and Development (2008): Accessed 7/18/10 < <http://www.astd.org/LC/2008/2008news.htm> >
- Bradford, Robert W. "Attracting and Retaining the Best Employees." Compass Points (2007): Accessed 6/28/11 <  
[http://www.strategyletter.com/cp\\_0700/FeaturedArticle.php](http://www.strategyletter.com/cp_0700/FeaturedArticle.php) >
- Business Wire, "Applied Materials Announces Solid First Quarter Results." Business Wire (2010): Accessed 3/22/10 <  
[http://www.businesswire.com/portal/site/appliedmaterials/permalink/?ndmViewId=news\\_view&newsId=20100217006887&newsLang=en](http://www.businesswire.com/portal/site/appliedmaterials/permalink/?ndmViewId=news_view&newsId=20100217006887&newsLang=en) >
- Clark, Ruth Colvin. (2003). E-Learning and the Science of Instruction. San Francisco. Jossey-Bass/Pfeiffer.
- Conrad, Kerri. (2000). Instructional Design For Web-Based Training. Massachusetts. HRD Press.

Corporate Executive Board. "The Business Case for Employee Engagement." (2009)

Accessed 5/11/11 <

<https://sec.executiveboard.com/Members/Presentation/Abstract.aspx?cid=100145169&fs=1&q=The+business+case+for+employee+engagement&program=&ds=1> >

Corporate Executive Board. "Rebuilding the Employment Value Proposition: Four

Strategies to Improve Employee Effort and Retention." (2009) Accessed 5/11/11 <

<https://sec.executiveboard.com/Members/ResearchAndTools/Abstract.aspx?cid=100145261&fs=1&q=highly+engaged+workforce+11.2%25&program=&ds=1> >

Day-Cheeseman, Jennifer and Newburger, Eric. (2002). The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings. US Census Bureau.

Dedrick, Jason, and Kenneth L. Kraemer. "Is Production Pulling Knowledge Work to

China? A Study of the Notebook PC Industry." (2006) Accessed 6/17/11 <

[http://www.google.com/url?sa=t&source=web&cd=1&ved=0CBkQFjAA&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.88.7822%26rep%3Drep1%26type%3Dpdf&rct=j&q=is%20production%20pulling%20knowledge%20work%20to%20china%20a%20study%20of%20the%20notebook%20pc%20industry&ei=8sIQTrP1DIS5twffiljaDQ&usg=AFQjCNESEqs72ZZF\\_8jQcHyy1WIKkZz-fg&sig2=bO1ksUR7YSohO\\_6za\\_Img&cad=rja](http://www.google.com/url?sa=t&source=web&cd=1&ved=0CBkQFjAA&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.88.7822%26rep%3Drep1%26type%3Dpdf&rct=j&q=is%20production%20pulling%20knowledge%20work%20to%20china%20a%20study%20of%20the%20notebook%20pc%20industry&ei=8sIQTrP1DIS5twffiljaDQ&usg=AFQjCNESEqs72ZZF_8jQcHyy1WIKkZz-fg&sig2=bO1ksUR7YSohO_6za_Img&cad=rja) >

European Association for the Education of Adults. (2006). Adult education trends and

issues in Europe. Rue de la Concorde 60 B-1050 Brussels (Belgium)

Ewell, Peter and Kelly, Patrick. (2008). Adult Learning in Focus: National and State-by-State Data. Council for Adult and Experiential Learning.

Foaming Rant, The. "An Open Letter to Michael R. Splinter." (2009). Accessed 6/3/11 < <http://thefoamingrant.blogspot.com/2009/11/open-letter-to-michael-r-splinter.html> >

Green, J. (n.d.) Andragogy: Teaching Adults. Retrieved August 6, 2010 from the Encyclopedia of Educational Technology < <http://coe.sdsu.edu/eet/> >

Harward, Douglas. (2006). How to Measure the Corporate Training Industry. Training Industry Inc.

Higgins, Nicholas J. "Competitive Advantage Through Strategic Human Capital Management." Journal of Applied Human Capital Management. Volume 1 No 1 2007.

Hurtado, Sylvia and Mitch Chang. "Degrees of Success: Bachelor's Degree Completion Rates among Initial STEM Majors." Higher Education Research Institute at UCLA. (January 2010).

Kirkpatrick, D. "Donald Kirkpatrick Answers Evaluation Concerns." (2009) Accessed 7/27/11 < <http://www.cedma-europe.org/newsletter%20articles/TrainingZONE/Donald%20Kirkpatrick%20answers%20evaluation%20concerns%20%28Jan%2009%29.pdf> >

Kirkpatrick, D. (1998). Evaluating Training Programs. Berkeley. Berrett-Koehler Publishers.

- Knowles, M. (1975, November). "Adult Education: New Dimensions. Educational Leadership, pp 85-88.
- Knowles, M. (1980, August). "Andragogy—No Panacea, No Ideology. Training and Development Journal, 8. 48-50.
- Liming, Drew and Wolf, Michael. (2008) "Job Outlook by Education, 2006-16." Occupational Outlook Quarterly Accessed 5/21/11 <  
<http://www.bls.gov/opus/ooq/2008/fall/art01.pdf> >
- Maddocks, AP, Dickens JG, and Crawford AR, 2002. "Encouraging Lifelong Learning by Means of a Web-based Personal and Professional Development Tool", ICEE 2002, UMIST, Manchester, 18-22 Aug, 8pp.
- Mager, R (1984). Analyzing Performance Problems. Belmont. Lake Publishing Company.
- Mager, R (1984). Goal Analysis. Belmont. Lake Publishing Company.
- Mager, R (1984). Making Instruction Work. Belmont. Lake Publishing Company.
- Mager, R (1984). Measuring Instructional Results. Belmont. Lake Publishing Company.
- Mager, R (1984). Preparing Instructional Objectives. Belmont. Lake Publishing Company.
- Nakahara, Hayao (2008) "PCB Market and Opportunity." Accessed 6/25/11. <  
<http://www.ipcaindia.org/pdf/PCBMktOppDrNakahara.pdf> >
- O'Donnell, K. (2006). Adult Education Participation in 2004-05 (NCES 2006-077). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Phillips, Phillips, and Hodge (eds.) (2004). Making Training Evaluation Work. Maryland.

ASTD Publishing

Phillips, Jack J. and Jon Wollenhaupt. "ROI Basics Part One in a Series." ROI Institute

(2007) Accessed 6/28/11 <

<http://www.roiinstitute.net/publications/articles/2007/nov/01/roi-basics-part-one-series/> >

Piskurich, G. (2000). Rapid Instructional Design. San Francisco. Jossey-Bass Pfeiffer.

Princeton Human Resources. "Learning Philosophy." (2011). Accessed 6/26/11 <

<http://www.princeton.edu/hr/learning/philosophy/> >

Project Management Institute. "What Makes PMI Certifications Stand Apart?" (2011).

Accessed 6/3/11 <

<http://www.pmi.org/GLOBALS/~media/Files/PDF/Certification/PMI237%20Crede ntialsUK222.ashx> >

Rachal, J. (2002, May). "Andragogy's Detectives." Adult Education Quarterly, 3. 210-228.

Rothwell, W and Kazanas, H.C. (2002) Instructional Design. John Wiley and Sons Inc.

Sales Executive Council. "Building a World-Class Sales Academy." (2009). Accessed

5/11/11 <

<https://sec.executiveboard.com/Members/Events/EventReplayAbstract.aspx?cid=100129495&fs=1&q=Building+a+world-class+sales+academy&program=&ds=1> >

Sales Executive Council. "Developing Leading Sales Training Programs." (2006). Accessed

5/9/11 <

<https://sec.executiveboard.com/Members/ResearchAndTools/Abstract.aspx?cid=54208374&fs=1&q=Developing+leading+sales+training+programs&program=&ds=1> >

Senge, Peter M. (2006). *The Fifth Discipline*. New York. Doubleday.

Sirianni, Anita, "How to Build a Sales Training Program that Actually Improves Performance." *Proofs* (January 2005): p. 68.

Snyder, T.D., and Dillow, S.A. (2010). *Digest of Education Statistics 2009* (NCES 2010-013). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Sommers, Dixie. "Charting the Projections: 2008-18." *Occupational Outlook Quarterly*. (Winter 2009-10). pp. 30-50)

US Bureau of Labor Statistics. "Economic News Release: Employee Tenure Summary." (2008): Accessed 7/25/10 < <http://data.bls.gov/cgi-bin/print.pl/news.release/tenure.nr0.htm> >

Westgaard, Odin. (1999). *Tests That Work*. San Francisco. Jossey-Bass Pfeiffer.

Wolff, Thomas F. "Engineering is Hard!" (2002). Accessed 6/18/11 < [http://www.egr.msu.edu/~wolff/students/engr\\_is\\_hard.htm](http://www.egr.msu.edu/~wolff/students/engr_is_hard.htm) >

Yahoo Finance. "AMAT Basic Chart." (2011) Accessed 6/25/11 < <http://finance.yahoo.com/echarts?s=AMAT+Interactive#chart1:symbol=amat;range=my;indicator=volume;charttype=line;crosshair=on;ohlcvvalues=0;logscale=on;source=undefined> >