

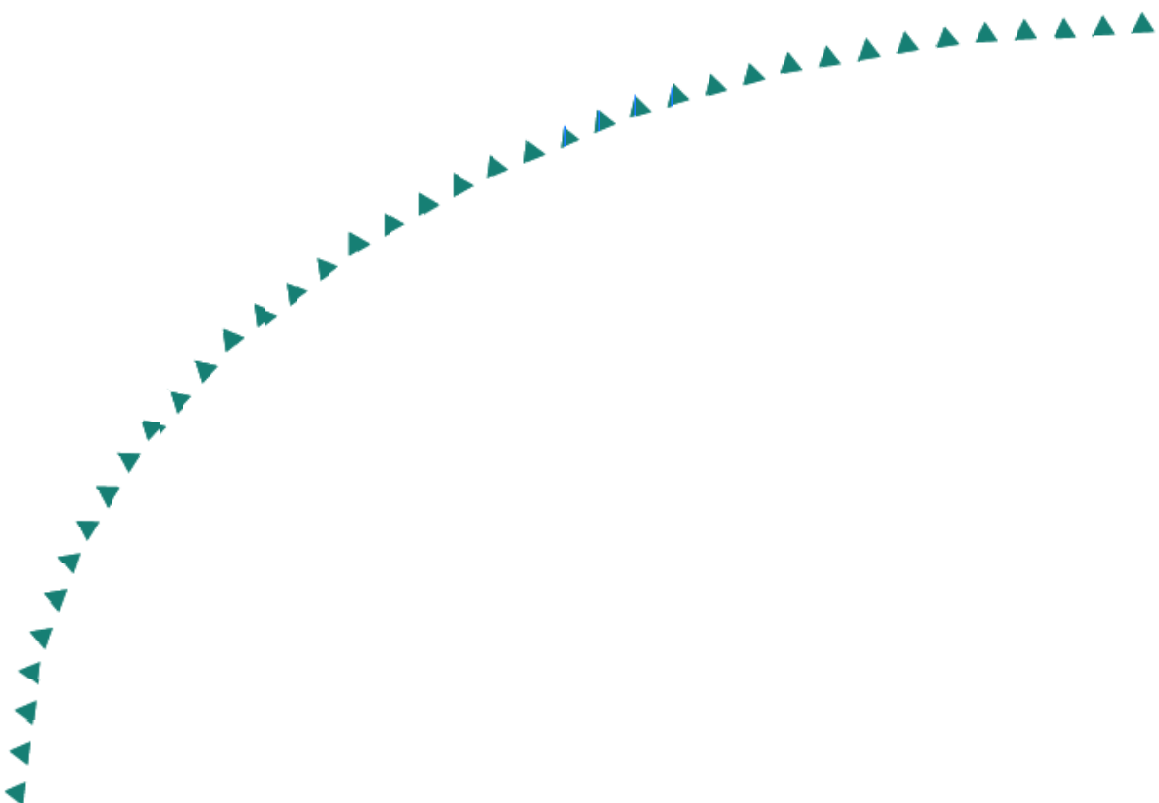
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Final Report

Developing Project Management Expertise



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Executive Summary

The Mn/DOT Project Management Academy (PMA) for new and existing project managers was launched in 1994. Nine years later, Mn/DOT's infrastructure continues to evolve, and so do the roles and responsibilities of project managers. To ensure that the PMA continues to meet Mn/DOT's present and future organizational needs, we reviewed the PMA based on industry-accepted project management best practices.

The Mn/DOT Project Management Academy (PMA) has an excellent track record in assisting with the development of project management skills. The research conducted in this project – **Developing Project Management Expertise** – provides evidence of the impact on projects as well as the increased effectiveness of project managers. Positive effects have been shown in the areas of understanding cost sharing principles, being sensitive to local issues, including all stakeholders in initial project meetings, and documenting projects.

Research Approach

The project focused on gathering data that explores how project management expertise is developed. These results are intended to be used in the design of an enhanced Project Management Academy and Advanced Project Management Development Program. Our overarching purpose was to understand how project management expertise is acquired and used in Mn/DOT. First, we reviewed the content and format of current project management short courses and workshops, such as the Mn/DOT PMA to provide an update of Dale Grove's (1993) capstone project. Second, we conducted focus groups with Mn/DOT PMA alumni to identify retention, implementation and concepts learned during the PMA. Third, we conducted in-depth interviews with a subset of the focus group participants to gather examples that demonstrate the impact of knowledge gained from the PMA in their work practices.

The overall project goals were:

1. Provide a foundation to design an enhanced version of the Mn/DOT Project Management Academy.
2. Provide a foundation to develop an Advanced Project Management Development Program.

Our research objectives were:

1. Measure the effects of project management courses and workshops on project management practices at Mn/DOT.
2. Identify critical success factors and effective ways of developing project management skills and knowledge for Mn/DOT project staff through focus groups and create critical success factors based course for advanced Mn/DOT Managers.
3. Document the application of project management practices

This executive summary provides an overview of the three-part final report:

1. Recommendations
2. Task One Report
3. Task Two Report

A copy of Master of Science thesis related to this project, Critical Success Factors in Project Management: A review of the state of the art, by Brandon Pierce, is available in the University of Minnesota Library as well as the Mn/DOT library.

Recommendations

We recommend that Mn/DOT follow six steps in order to gain maximum benefit from the PMA. These recommendations involve a shift in design choices for the PMA. The current implicit choices about structure and participant involvement are based on an individualistic, topic-oriented workshop model. The PMA has the potential to further enhance project management practices if it were to be structured by:

- knowledge through explicit connections co-created by participants and instructors working together
- teamwork
- instructors' collaborating and sharing of extended examples throughout the Academy.

The recommendation section lists six steps that Mn/DOT can take in order to implement these recommended design enhancements.

Task One Summary

The task one report addressed research objectives 1 and 2, specifically we:

- Conducted an extensive review of the literature on best practices;
- Conducted focus groups with PMA alumni across Mn/DOT;
- Correlated the research with the focus group findings; and
- Formulated recommendations for enhancing the PMA.

The Task One research provided a review that correlated the design and effect of the PMA with the current literature in project management. Mn/DOT has had a long-standing commitment to developing project management expertise as illustrated by the many offerings of the PMA. The purpose of this research project was to help Mn/DOT refine their programs for project management professional development.

Our comprehensive review of the PMA content and format and participant feedback, coupled with a review of the literature, and PMA participant focus groups and personal interviews, revealing three gaps in the current academy:

1. The academy's central message,
2. Instructional focus and format, and
3. The diverse participant profile.

Exploring the gaps led to four main categories of recommendations that can help enhance the effectiveness of the PMA. Mn/DOT can reflect these organizational changes and close the gaps pointed out by our evaluation of the PMA through:

1. Aligning the PMA with the goals and mission of the organization;
2. Making connections;
3. Incorporating ways knowledge is managed; and
4. Clarifying the audience.

Task Two Summary

Following our presentation of the Task One Report, Tasks Two and Three were renegotiated with the substitute Technical Liaison, Mollie Zauner. The changes were made with the research team and Mn/DOT working together. Mn/DOT requested that we change Task 2 and 3 when it became evident that the timing of the Advanced Project Management Academy was out of sync with the research schedule, and other priorities shifted. Specifically, the Advanced Project Management planning was well underway and the timing didn't support much input from us, timing also prevented access to Advanced Project Management Academy participants for focus groups, and difficulty accessing personnel for follow-up interviews or on-site observation. Research Director Mukhtar Thakur outlined a series of research questions at the Task 1 meeting that seem to resonate with the broader group, so we proposed addressing Mukhtar's questions. The renegotiation with our Technical Liaison resulted in agreement on the following revised Tasks:

1. Work with Mn/DOT Employee Development to determine whether quantifiable data has been collected on the effectiveness of project management training.
2. Investigate training and professional development expenditure percentages in DOTs, other governmental organizations and private organizations.
3. Review our focus group transcripts for responses that address the new questions.
4. Review focus group transcripts to identify participants for potential follow-up interviews.
5. Conduct 5-10 follow up interviews.
6. Create and present a brief report on the remaining tasks.
7. Submit a Final Report that includes an Executive Summary, revisions from Task 1, Task 2, and Graduate Thesis.

We reviewed the 2002 ASTD Learning Outcomes Report, which summarizes training effectiveness across all types of training. The overall scores for skill change and utility range between 4.2 and 4.3 (out of 5). These overall ratings are consistent with the Mn/DOT PM Academy ratings. The evaluation methods are mostly self-report (~85%) as in the Mn/DOT PMA. Evaluation by Observation and Focus Group methods comprise about 20 percent and 6 percent of the courses, respectively. The follow-up impact evaluations reported in the ASTD Learning Outcomes Report revealed that across all courses, learners reported that their

performance on the objectives of the courses rose 36 percent and their overall job performance rose 31 percent.

According to data from focus groups and follow-up interviews, it is clear that the Mn/DOT PMA positively impacts projects as well as the effectiveness of Mn/DOT Project Managers (Mn/DOT PMs) as they work with each project, on a project-by-project basis, and a daily basis as well. According to the responses of interviewees, the PMA has helped them work more effectively in their roles within the organization. Respondents gave examples that illustrated ways in which the PMA helped them in the areas of understanding cost sharing principles, being sensitive to local issues, including all stakeholders in initial project meetings, and documenting projects.

Our recommendations to enhance the already successful PMA include: The incorporation of either an extended example or simulations into the academy would help instructors work together with each other and the students to “unpack” the connections between the information and skills that each instructor offers and the ways in which those skills can be effectively applied in context. Future steps would include building more support for the existing communities of practice within Mn/DOT, offering regular opportunities throughout the year for employees to come together and learn from each other through participating in problem solving teams and simulations or getting help with real problems that different project managers may be facing. Working together on problems, and facilitating interpersonal conversations and knowledge sharing across all phases of projects from pre-planning through implementation and repair will allow Mn/DOT to leverage the knowledge base already within the organization, with exponential gains acquired through people working together and making connections between their knowledge structures and experience.

Our literature search and focus groups results reinforce each other by demonstrating that *knowledge is “sticky”* (Brown and Duguid, 2001), that is, it moves directly from person to person, not person to database to person or person to manual to person. Setting up and integrating opportunities for knowledge growth throughout Mn/DOT will enable Mn/DOT to leverage the knowledge resources currently present within the knowledge structures and practices of experienced Mn/DOT personnel. The first step to leveraging this knowledge is restructuring the PMA. The effects of a restructured PMA will be to help make connections between information and application more explicit for everyone, help expose people to the entire project process, set up a situation that enables people with PMA training to begin from an integrated perspective, and model the team work that supports Mn/DOT’s success.

The changes we recommend will begin to enhance and distribute current best practices in a systematic manner throughout the organization, thus ensuring that Mn/DOT can take advantage of continual learning. Mn/DOT is addressing these needs in part by creating an Advanced PMA. The combination of the PMA and the advanced PMA is an excellent start to building the kind of support structure that continually develops project management expertise. Since project management operates within an organizational context, more work that integrates support structures for people to develop their knowledge structures into the organizational structure will help Mn/DOT leverage its’ vast knowledge resources and gain exponentially from people developing their expertise together as part of a knowledge organization. Project management professional development can be integrated into the fabric of the day-to-day operations on

Mn/DOT by beginning with some structural changes in the academy, and guaranteeing resources for longer-term planning that compliments the PMA in its support of developing project management expertise. Karen Ayas argues that in order to maintain a competitive advantage and permanent success in project management, a 'professional' element [involving a shift in management philosophy and practice] is required (1996). This shift focuses on an information-based knowledge-creating structure, where all project team members have the opportunity for continual learning (Ayas 1996: 131). Thus, to follow Ayas' recommendations for success, developing project management expertise needs a stronger support structure than a two-week academy can provide.

Right now, Mn/DOT has the opportunity to further strengthen the PMA, a program which sets Mn/DOT employees on the road to continual learning, and influences the way they approach both working on projects and project management practices. Incorporating the structural changes we recommend for the PMA will enhance Mn/DOT's success and provide a base to expand the support for developing project management expertise throughout its day-to-day operations.

Chapter I: Developing Project Management Expertise – Task One Report

Introduction

Recognizing the increasing complexity of program delivery and need for cross functional integration, Mn/DOT launched the Project Management Academy (PMA) for new and existing project managers in 1994. Nine years later, Mn/DOT's infrastructure continues to evolve, and so do the roles and responsibilities of project managers. To ensure that the PMA continues to meet Mn/DOT's present and future organizational needs, we are evaluating the PMA based on industry-accepted project management best practices. To understand these best practices and demonstrate how Mn/DOT can harness them to enhance the PMA as well as workplace practice, we have:

- conducted an extensive review of the literature on best practices;
- conducted focus groups for PMA alumni across Mn/DOT;
- correlated the research with the focus group findings; and
- formulated recommendations for enhancing the PMA.

In this report, we trace the history of the PMA and summarize its evaluations and focus group findings, leading to three key areas of concern for alumni - the academy's central message, the instructional focus and format, and the diverse participant profile. Then we use the best practices in Project Management and Training literature to build the case for effective ways to address these key areas by aligning the PMA with the goals and mission of the organization, making connections, incorporating ways knowledge is managed, and clarifying the audience. Finally, for each of Mn/DOT's methods of effectively addressing the key areas that participants noted, we present recommendations and suggestions for implementing them in the PMA.

Mn/DOT Project Management Academy History

In 1993, the Mn/DOT Project Management Task Force produced a report outlining the importance of project management training. A key goal of the academy was to "clarify and stress" the role of the project manager independent of organizational structure (Gerdes et al 1993: 3). Spearheaded by Dale Grove's 1993 master's thesis, "Training the Project Manager," the University of Minnesota's Executive Development Center was hired to develop the PMA with one goal, "to provide comprehensive Project Management Skills to State employees."

The task force used quality improvement methodology to gather data through surveys and interviews about current and ideal project management practices in Mn/DOT. Based on survey results, feedback from other states, and experience in the organization, task force members came up with an underlying training philosophy and topic categories for the PMA.

According to the underlying training philosophy of the academy, (Gerdes et al 1993: 4):

“The Project Manager must understand how the various parts of the Mn/DOT business fit together so that he or she can take a holistic approach to project development.”

This philosophy was then applied to a process of selecting topics, based on Grove’s 1993 model for project management training emphasis (28). The task force developed a list of 30 topics selected for the PMA that were developed during a brainstorming session (Grove 1993: 19):

Project Management Philosophy

- Multimodal Transportation
- Diversity of Values
- Ethics
- ISTE A
- Public and Agency Involvement
- Quality Improvement Integration

How-Tos

- Conflict Resolution
- Group Dynamics
- Team Building
- Understanding Mn/DOT’s Business
- Project Development Process
- Social, Environmental and Economic Overview

Roles and Responsibilities

- Problem Formulation and Decision Making
- Project Manager Technical Skills
- Project Record Keeping
- Project Manager Roles and Responsibilities

Skill Enhancement

- Argument Presentation
- Conducting Effective Meetings
- Dealing with Angry Crowds and Emotional Behavior
- Listening Skills
- Making Presentations
- Managing Consultants
- Marketing the Decision
- Negotiations
- Public Speaking
- Stress Management
- Time Management
- Working with the Media
- Writing

The academy follows the structure recommended by Grove of two week-long sessions, including six-weeks separation of the session to “allow participants to return to and catch up on work (26).” The PM Task Force refers to the weeks as Module I and Module II. These four areas were chosen with the understanding that the majority of project managers are new employees. Presently, Module I of the PMA contains courses from the first three categories, and Module II of the PMA contains courses on skill enhancements. Table 1-1 below shows the modules, areas of emphasis and purpose of each area of emphasis.

Table 1.1: PMA Modules (Weeks) Corresponding to Topic

Groupings and their Task Force Definitions

	Topic Grouping	Definition of Topic Group defined by PM Task Force 1993
Module I	Philosophy	Help PMs learn and understand values, goals, and objectives of Mn/DOT in order to develop a basis on which to build own positions or opinions.
Module I	“How to”	Instruct PMs on processes of getting things done in Mn/DOT
Module I	Roles and Responsibilities	Outline accountabilities and expectations for PMs.
Module II	Skill Enhancements	Provide PMs with instruction in handling everyday problems that the PM faces.

The design of the PMA is directed towards the development of training topics that represent Mn/DOT philosophy, processes, and activities. A topics design approach is efficiently achieved, however, it seldom produces measurable business results when performance goals are not clearly stated, reinforced, and later evaluated. (Rummler, G.A., & Brache, A.P. 1995)

The PM Task Force listed the following implementation strategies to implement PM Task Force recommendations (Gerdes et al 1993: 47):

1. Assign a project management champion who can continue where the Project Management Task Force ends. The champion must be capable of effectively elevating project management issues and commitments to upper management staff.
2. Appoint a standing committee of Project Managers, from around the state, which meets at least twice yearly. This group should continually examine project management issues and should recommend or initiate project management quality improvement efforts within the department.
3. Organizational refinements, communications and recognition which reinforce and elevate the importance of Project Managers in the Department.
4. Comprehensive, on-the-job training coupled with a comprehensive and broad project management training curriculum.

5. Aggressive development and completion of quality improvement projects which improve project management throughout the Department.

During the implementation stage of the PMA, the task force consulted with the State of Minnesota's training official and decided that two weeks of dedicated instruction was necessary to cover all the training topics (Grove 1993). In order to allow participants to catch up on work and not lose the skills gained in the first module, a separation of no more than one month was suggested. Beginning with the 1993 Task Force report, a curriculum program was developed using a set of recommended training topics. Using the training topics as a point of reference, the curriculum has gradually developed into the current two-module format, illustrated on the following page.

Table 1.2: Topics for the Project Management Academy since 1998*

	Module	Winter 2002		Summer 2001		Winter 2001		Winter 2000	
		M1	M2	M1	M2	M1	M2	M1	M2
	Instructor	Feb 4-8	Feb 19-22	July 23-26	Aug 13-16	Feb 5-8	Feb 26 - Mar 1	Dec 13-16	Jan 10-13
Project Delivery Process	L. Filter					x			
Strategic Directions	Ekern							x	
Facilitating Effective Meetings	S. Zehr	x		x		x			
	Tolbert							x	
Project Management	K. Smith	x		x		x		x	
Project Formulation & Decision Making	K. Smith	x		x		x		x	
Project Development Process	K. Smith	x		x		x		x	
Project Scheduling	K. Smith	x		x		x			
Project Development at Mn/DOT	Pafko/Dalton			x		x		x	
	Dalton/Larson		x						
PM Roles & Responsibilities	Weingartz	x		x		x			x
Project Recordkeeping	Norris			x		x		x	
	K. Sannes		x						
Time/Stress Management	S. Birkland		x	x		x			
	D. Olson							x	
Conflict Management/Negotiation	T. Fuitak	x		x		x		x	
Communication & Presentation Skills I	L. Vatne	x		x		x			
	Tolbert							x	
Leadership: A New View	R. Terry	x			x		x		x
Team Building	R. Bisek	x			x		x		x
Conflict Management/Negotiation	VanDenhoek				x		x		
	T. Fuitak		x						x
Context-Sensitive Design	Braun				x		x		
	J. Reiersen								x
	S. Bradley		x		x				
Overview of PPMS in Mn/DOT	Weingartz/Bousquet		x		x		x		x
Intergovernmental Partnerships	J. Ekern		x		x		x		x
Managing Consultants	Moline/Blacik		x		x		x		
Professional/Technical Contracting	J. Blacik								x
	Helbach				x		x		
Presentation Skills II	L. Vatne	x			x		x		
	Tolbert								x
Public Involvement	Lindberg/Larson				x		x		x
	Jacobs		x						
Non-Traditional Stakeholders	Lindberg/Larson				x		x		
Environmental Justice	Lindberg/Larson				x		x		
ATP Process/Federal Aid Process	Zemotel/VanDeSteeg		x		x		x		x
Working With The Media	L. Kender		x		x		x		x
Cost Sharing Policy	M. Kelley-Sonnek		x	x					

Frequency in Academies		
	4	Modules
	3	Modules
	2	Modules
	1	Module

- Managing Consultants and Professional/Technical Contracting are in the same session. Plus, the Public Involvement, Non-traditional Stakeholders and Environmental Justice are the same session.

Evaluation of Content and Participants' Comments from the Past 4 Years of the Project Management Academy (PMA)

PMA Module I Structure

Over the past ten years, the PMA has gradually transitioned to a two-module structure, composed of one-week intervals (or modules) that detail job specific project management skills and general practices that affect project managers in Mn/DOT. Each module comprises sessions devoted to particular topics. During the initial academy design, external instructors were allowed to select their presentation slots. It is only in the last three years that module 1 has shifted to focus on the “softer” project management skills. The first module currently includes the following sessions:

Communication & Presentation Skills I
Conflict Management/Negotiation
Facilitating Effective Meetings
Leadership: A New View
PM Roles & Responsibilities
Presentation Skills II
Project Development Process
Project Formulation & Decision Making
Project Management
Project Scheduling

The skills or competencies taught in the first module focus on project planning, scheduling, budgeting, and inter/intra-personal skills. The first week is devoted to introducing general project management techniques by explaining what and how to apply each of the above topics. The participant evaluation forms consistently reported high marks for the faculty, averaging between 4.3 and 4.6 out of 5.0. The morning and afternoon sessions reported the same distribution in scores. Over the past four years, three topics have been integrated into other topic areas from the first module, Strategic Directions, Project Delivery Process, and Cost Participation. Participants liked the interactivity and the broader perspective that they saw in many of the courses in this module. The most common issue that participants had with Module I was that they wanted clearer links to help them apply the content to their own context within Mn/DOT.

PMA Module II Structure

The second week of the PMA is devoted to learning the tasks and programs that are used at Mn/DOT. Participants are exposed to specific topics targeted to their job tasks, including the following:

The ATP Process/Federal Aid Process
Conflict Management/Negotiation
Context-Sensitive Design
Cost Sharing Policy
Intergovernmental Partnerships
Managing Consultants
Overview of PPMS in Mn/DOT
Project Development at Mn/DOT
Project Recordkeeping
Public Involvement
Time/Stress Management
Working With The Media

As can be seen in the list above, the majority of these sessions do not appear to be topics limited to Mn/DOT employees, however as a government entity, there are nuances to the organization that require specific training in many of these areas. Since Module II focuses on the more technical or hard skills, it was observed to be far less interactive. The participants reported marks almost as high as those observed in the first module, averaging between 3.9 and 4.5 out of 5.0. The morning and afternoon sessions also reported similar scores. Participants appreciated the variety of experience that the presenters within Mn/DOT brought to the academy. In addition, participants, in both the focus groups and written comment sheets, often felt that there was too much of the “classroom” experience and commented that even though they are sometimes uncomfortable with interactive learning, they would have liked a lot more interactive learning in this module.

Participants’ Evaluation of the Academy Curriculum

For our assessment of the academy as a whole we used:

- Academy participation;
- Participants’ evaluation forms and ratings summary reports; and
- Alumni focus groups.

The comments and focus groups revealed patterns in participants’ reactions to the academy. These reactions appear both in evaluations done at the time they were participants and in the follow-up focus groups. Overall, the participants reported that the academy was successful in exposing them to new management techniques; however, they frequently expressed concerns about the academy’s underlying organization. The major themes participants commented on include:

1. The academy’s central message;
2. The instructional focus and format; and
3. The diverse participant profile.

The academy's central message

Many participants commented in the evaluations that they were not aware of why they were attending the academy. One participant described the academy as needing a “central message.” While not directly addressing that topic, participants noted that presenters are often unaware of what each other teaches. Consequently, there were no connections or transitions between topics. The connections are important because without them, as participants reported, presenters occasionally gave conflicting information.

Since one of the goals of the academy is to train future project managers, there is a need to establish roles for project manager. The Focus Group participants felt unsure about their roles and responsibilities as project managers, and often were not clear about whether they really were project managers. One participant commented:

“... I'm a little hung up...thinking to myself if I'm a project manager. What do you guys think? [a project manager] is tracking many, many things on many different projects and that to me would be the true sense of project manager...I put out a soils letter... I do I guess manage people and information as that comes in as I develop that, so my project is this document. Where his [a project manager] project is the actual project itself...I think that's what I was hung up on...I was in project development actually when I took this class....”

While the PMA's underlying training philosophy emphasizes a holistic approach (Gerdes et al, 1993), the academy sessions function as individual entities, not as an integrated learning experience. Participants have noted the split emphasis of the two different modules of the academy. While some participants feel they learn better with separation of theory and contextualized practice, presumably participants with experience, they see themselves as responsible for making their own connections. The participants commented that because they did not have the chance to directly apply the information from the academy sessions, they were unable to make connections to their practice in the workplace.

As participants complete the PMA, many leave with the same question, what was the point of the Project Management Academy? While some participants will eventually incorporate the skills learned at the PMA into their repertoire, others will require further training in the future. The relationship that the academy has with Mn/DOT as a whole produces different outcomes among the participants.

Instructional focus and format

The second topic of concern was the faculty's instructional focus and format. Participants reported confusion on a wide variety of topics because the faculty was not aware of the participants' backgrounds. Participants also reported either having trouble with following some topics or with understanding why a topic that they felt was common knowledge was a presentation focus. Participants enter the classes with different backgrounds, consequently, some participants require additional instruction or more detailed explanations than others. While the knowledge gap is expected in any classroom, in the PMA it can mean the difference in training between a Grad Trainee/new employee and a senior engineer/associate with or without

project management experience. In the comments, the participants report that the faculty is not prepared for the varied levels of competency and so the format of the sessions is not set up to maximize participant learning outcomes.

Participants also reported that there was a need to focus more on how to perform/implement best practices and techniques. Currently, many of the faculty focus on describing/detailing best practices but do not explain how to implement the practices. An example from the team-building session is that successful qualities of teams are explained, but there is little explanation of how to build the team to be successful or how to each of the five roles in team building.

There were also comments on how instructors presented their material. Participants expressed their concern that many instructors were “presenting” instead of “teaching” the topics. Instructors often did not include enough hands-on exercises, and primarily taught through straight lecturing. The lecturing model illustrates the first mode of learning, *learning before doing*. Relying predominantly on learning before doing, the academy misses the opportunity to use multiple modes of instruction to better help participants build their understanding through activities and interactions where knowledge resides. Two other modes of learning include *learning while doing*, and *learning after doing*. Instructing participants through learning while doing, as well as learning after doing, are as important to effective instruction as the first learning mode, learning before doing. (Collinson & Parcel 2001: 33). Both acknowledging that some of the participants are *learning after doing*, and giving participants more opportunities to *learn while doing* can add value to the PMA.

The diverse participant profile

The third and main concern of the participants was the diversity of the academy’s participants in terms of job function and experience. As indicated above in the mismatch of instructor expectations and participant experience levels, the fact that participants were so different was in itself confusing to many participants. Participants are unaware of the selection process or qualifications for the class, and that makes it difficult for them to develop relationships with other participants. Another frequent comment was that not everyone in the class is an engineer. Too often faculty allude to engineering tasks only and that makes the non-technical participants to sometimes “tune-out” for the remainder of the session. Since Mn/DOT is a multi-disciplinary organization, project managers do not only manage highway projects or design bridges, they also work with the public and consultants. The academy therefore needs to use multi-disciplinary learning experiences. While there are significant advantages to learning from participants that have varying backgrounds and training, participants reported that Grad Trainees need more experience before a course of this caliber is appropriate for them. The contrast in reactions between these two employee groups is demonstrated through the following comment, which is representative of the overall reactions of participants throughout the focus groups.

A Grad Trainee academy participant commented during a focus group session:

“I personally haven’t used it a whole lot yet but now I’m starting to right now actually because I’m moving into project manager for construction, so I think it’s definitely good stuff for me to draw from now and in the future but I haven’t used it a whole lot so far.”

Also, the veteran employees often respond that the course is too much of an overview process, and not applicable, as affirmed by one long time Mn/DOT employee:

“...I’ve got all these gray hairs in my beard and I’ve been around here for a while so and I know the processes very well and the way things go together. So, it’s been more just trying to keep ahead of the projects more than using processes that we learned.”

Implications From PMA Evaluation Findings

One question that we posed after reviewing the evaluations was: “Is the reliance on topics in each module a remnant of the functional organization structure?” We surmise that while it was the intent of the 1993 Project Management Task Force to incorporate a matrix or projectized structure in the academy, the design was still impacted by the functional structure of Mn/DOT at the time. In fact, the Task Force acknowledged the need for Mn/DOT to move from a functional organization to a matrix or projectized organization, (Gerdes et al 1993: 35), but the current training model doesn’t appear to encourage this move. The initial PMA intent was a strong starting point for the hybrid matrix-projectized learning structure, but it appears to have been de-emphasized through the topics approach for the courses (36). Although the academy is only one of the 12 Task Force recommendations to make this move, the topics approach keeps the academy from contributing as much as it could, if it were framed with an outcomes approach.

The three main areas that participants commented on, the academy’s central message, instructional focus and format, and the diverse participant profile, each reveal gaps in the outcomes of the PMA that can be filled through incorporating current best practices literature for both project management itself, and its training practices. The comments focused on communicating the PMA’s central message reveal gaps in *alignment between the PMA and Mn/DOT’s organizational mission and goals* as well as gaps in *making the connections* from topic to topic and topic to practice. The comments focused on instructional focus and format reveal a gap in *incorporating ways knowledge is managed* at the organizational, project, and individual levels. Finally, the comments focused on the diverse participant profile reveals gaps in both making connections between the expertise the participants bring and the content, as well as gaps in *clarifying the audience* of academy to help instructors plan.

Best Practices Literature That Can Help Fill the Gaps

Aligning the PMA With the Goals and Mission of the Organization

Aligning the PMA to organization-wide initiatives will help Mn/DOT leverage and reinforce the training occurring in other forums throughout the organization. Aligning the academy and other training initiatives with each other as well as with the mission of Mn/DOT is an essential part of cultivating an effective learning environment.

As the PMA Task Force report acknowledges, the research in best practices shows that project teams are the driving force in the organization, and in order for the organization to achieve its goals, the teams need to be working towards them (Ammeter & Dukerich:2002, De Wit :1988, Vanhaverbeke & Torremans:1999). In addition, clear goals and directions at the project level are highly correlated with project success. (Pinto & Slevin 1989) The combination of clear goals at both the project and organizational level can be achieved through training aligned with organizational goals. The success of project teams can be attributed to many factors, particularly those that relate to the organizational level. Organizational success factors include team orientation, team building, and high-level support (Ammeter & Dukerich 2002:5). Training aligned with organizational goals provides a solid foundation for teams that are oriented to, built for, and supported by the organization that in turn leads to project success.

Further support for the importance of aligning organizational goals with project teams comes from the best practices literature over the past 15 years, which sends a consistent message that successful teams begin with aligning project and organizational goals. A successful project can be determined by the planning and effort involved in including team orientation, team building, and high level support (De Wit 1988, 165). It is critical that a project team's structure and objectives are aligned with the organizational core (Vanhaverbeke & Torremans 1999:44). Without the alignment, the organization is unable to provide effective support or cultivate a high performance learning environment. One of the results is that in project team development, without an accurate inclusion of the organization, it is nearly impossible to ensure exceptional levels of performance (Ammeter & Dukerich 2002:3). Project success is also attributed to the project manager's conceptual and organizational skills (Elba-Saba 2001, 2). As the project manager envisions a project, she/he relies heavily on organizational goals and resources. Therefore, the relationship between the individual project and parent organization is significant.

The training topics defined by the Project Management Task Force (Gerdes, et al: 1993) provide a solid starting point for developing course objectives; however, the performance outcomes for each topic appear to be less defined (37-41). For example, what will project managers do as a result of understanding "planning and cooperative multimodal decision-making" (37). Is a performance change desired? If yes, how will the change be measured and reinforced? A topics design approach is indisputably efficient and quickly achieved, yet it may not produce measurable business results if performance goals are not clearly stated, reinforced, and later evaluated (Rummler & Brache, 1995: 206).

Making Connections

Making connections includes helping participants connect information from different sessions together, connecting the design of courses Mn/DOT practices, and connecting learning outcomes to immediate field and office applications for the participants. These connections will help participants maximize both the long- and short-term impacts of the training.

In order to make connections, one of the first steps is to switch the underlying structure of the academy from a topics focus to an outcome focus. For example, conflict management is a topic that is presented in the PMA. When we switch from a topics focus to an outcome focus we need to ask "What outcomes are desired upon completion of this segment?" In other words, "what will

the project manager think and do differently?”, and “how will the performance change be measured?” Asking these questions will help designers of the training make more explicit connections from theory to practice for the participants. Making the connections clearer can also help Mn/DOT define expectations and “desirable outcomes” of project management training to promote “concern for goals as well as procedures (Knox 1993: 214).”

Additionally, connections were missing *within* the context of some topics. Content parts were not linked to the “whole” to achieve complete understanding (Swanson & Law 1993: 47). A focus group participant (project manager) commented:

“Yeah I remember the managing consultants one. It was mainly going through a lot of forms, and so that’s where there was the nuts and bolts stuff but... never the big picture to put it together. I still sat there wondering, how I was going to initiate a contract, what’s my first step even.”

The PMA is a place where project managers can begin to learn about the connections between Mn/DOT project tasks and processes. Clarity about the connections between the tasks allows project managers to establish precedents. Establishing precedents in turn allows for separating tasks into critical and non-critical tasks so that projects can effectively use float to keep their projects on track. In the typical functional organization, the project focus is on schedule, budget, and performance. The processes are fragmented into tasks that can be completed by individuals and coordinated by management (Vanhaverbeke & Torremans 1999: 43). These organizations rarely invest in improving the design and development process (Vanhaverbeke & Torremans 1999: 41). This approach results in fragmenting the tasks in a way that renders each one a critical task. When all tasks are critical, projects lose the ability to use float to maintain their resource allocations and schedules. Float is important because it allows the team to determine precedents when completing project components. Without the ability to distinguish between critical and non-critical tasks, resources are improperly distributed, thus impacting project success.

Making connections between project tasks is only possible when project managers have organizational cultural competence. One’s ability to develop relationships and make connections with foreign concepts is often hindered by the assumptions that we make (Bennett 1995: 293). When project managers’ assumptions are not in alignment with the organizational culture, they may be blinded to critical connections between project tasks. Consequently, developing organizational cultural competence is an important quality that both project managers and their team members will need to make the connections necessary to function appropriately. An example of the importance of organizational competence is in construction partnering. In a project’s construction phase, a hierarchical structure is often established with different partners holding diverse skills and knowledge. In order to effectively manage the relationships between the involved parties, a project manager must recognize the needs and viewpoints of each participant (Cheng 2002). Therefore, having organizational cultural competence is critical to a project’s success.

As part of helping project managers and their team members develop organizational cultural competence, developing the “ability and willingness to learn” needs to be incorporated into the learning experience (Dalton 1998: 395). In order to foster willingness to learn, training needs to integrate participants’ current workplace and field experiences so they can make clearer connections. Because learning is unique to an organizational culture (Dalton 1998: 397), training needs to combine knowledge from both inside and outside experts.

In construction projects, project managers and team members often deal with a variety of organizational cultures through the variety of stakeholders in the project. In order to work effectively across organizational cultures, participants must first understand how to learn in their culture before they will be able to learn and function effectively across other organizational cultures (Dalton 1998: 398). Functioning across organizational boundaries is important in order to understand and meet the needs of all the stakeholders. Without cross-organizational competence, a project’s goals and mission can be compromised; therefore training that explicitly recognizes organizational culture as a shared framework encourages project managers and team members to be open to the multiple organizational cultures they deal with throughout a construction project.

During the development stage of the PMA (early 1990s), it was standard business practice to focus a training exercise on competencies. While the focus in the 21st century is still the same, the methods used to achieve that outcome have been improved. The PMA was designed with a topics core, which is the basis of a functional organization. The academy’s focus on topics allows an evaluator to assess the participant by a common set of competencies, assuming that uniform learning exists. However, the functional structure relies predominantly on one mode of learning – learning before doing. Two other methods of learning are critical to success 1) learning while doing and 2) learning after doing.

During the early 1990s, Mn/DOT considered moving from a functional/hierarchical organization to a hybrid matrix-projectized structure (Gerdes et al 1993). Since Mn/DOT [2004] is predominantly a functional/hierarchical organization, the PMA needs to explore how to incorporate the three learning modes and gain a better understanding of who/what/where the knowledge resides in Mn/DOT. An example of a better understanding is the following:

“One of the problems with an industry as dynamic as construction is that no two projects are alike. However, there are often many similarities between projects that could be harnessed to increase efficiency and decrease cost and budget. The difficulty arises because a system for knowledge transfer is required, which often exists in some unrecognized form in an organization. Once a recognizable structure is in place, the project would then be able to incorporate elements and learning from past projects and become *more* successful.” (Davenport & Prusak 1998).

Incorporating Ways Knowledge is Managed

Knowledge is managed through communities of practice, people interacting with information networks, and veterans sharing their experiences. Lack of knowing where knowledge resides was cited in focus groups as the most common roadblock to effectiveness on the job. The academy contains some pieces that work well with ways that knowledge is managed by incorporating Mn/DOT veterans as presenters. However, incorporating all three ways that knowledge is managed-- communities of practice, people interacting with information networks, and veterans sharing their experiences—will strengthen the academy by systematically addressing where participants need to go to find knowledge as they do their jobs in Mn/DOT.

Communities of practice

Communities of practice (COPs) are usually self-organized groups of individuals who share common work practices, interests, or goals (Davenport & Prusak 1998: 38). COPs provide support structures that enable people to share data and information along with the knowledge to contextualize and operationalize them.

Since knowledge can exist in many forms, most individuals do not realize that they are using or sharing knowledge. Interaction with space for student response and reflection is a way to bring participants to a place where they can engage in creating their own knowledge, and begin to build communities of practice. Communities of practice go beyond social connections by providing structured ways of building and accessing knowledge over time. Communities of practice set up their own structure to respond to participants' needs to accomplish their work.

Faculty can encourage students to recognize and begin to participate in COPs by explicitly addressing knowledge as separate from data and information. Davenport and Prusak(1998) offer definitions to distinguish these words as concepts with increasing levels of importance to the organization. They define data as a set of discrete, objective facts around an event. Then information moves one step beyond data in its importance to the organization through its definition as “data that makes a difference.” Finally they describe knowledge as “a fluid matrix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information.” COPs are being recognized as sinks (or depositories) of not only data and information, but especially knowledge. A few multinational corporations are recognizing and harnessing the unique problem-solving abilities of these communities (39). Davenport and Prusak’s distinctions are valuable for faculty planning their sessions because using data, information, and knowledge consistently with these definitions in mind will provide continuity in the PMA context for the participants.

Clarifying the Audience

Clarifying the audience means acknowledging the different disciplinary backgrounds and experience level of participants for both instructors and participants themselves. When different disciplinary backgrounds and levels of experience are explicitly recognized, group participants have an increased ability to expand their frameworks and learn from their colleagues (Thompson 2000).

In order for people to function effectively in either a training or work environment, they need to understand the context(s) that other people bring to the interaction. Acknowledging multiple contexts is not only important from an organizational perspective, but also from an interpersonal point of view.

Experience in understanding multiple contexts that people bring enhances interpersonal relations. Many of the project management researchers cite interpersonal relations as one of the keys to project success. For example, Kloppenborg & Petrick (1999) state that project teams often encounter obstacles during a project's life cycle because of interpersonal issues. While there are numerous factors that can lead to interpersonal problems, the commonly cited one is the "Huh?" factor, often expressed as "I just don't understand why she/he is saying that." During the team selection phase, members are evaluated on the basis of competencies (skills and knowledge) and attitudes appropriate for project completion (9). However, in order for team members to commit to the goals of a project, they must also have an opportunity for group character and virtue development (10). Thompson (2000) also finds that when individuals enter any group/team environment, they bring a set of information silos (sets of agendas, opinions, and facts) with them that can obscure actual issues and key pieces of information. Teams require the opportunity to formulate informed decisions about teammates and have the opportunity to complete tasks that are of importance to the entire team. Essentially, teams require the ability to develop a set of norms or standards. It is critical to the project that these standards are developed or the project will fail. The training environment is one place where these norms begin to develop, and explicitly recognizing participants' multiple backgrounds fosters personal relationships and shared value development.

The PMA provides the opportunity to emphasize essential aspects of high performing teams, such as team norms that participants can take back to implement or refine with their Mn/DOT teams.

Recommendations

The goal of the research provided above is to enhance the current Project Management Academy. As Mn/DOT continues to expand its services beyond design and development and into management and consulting, the project manager no longer functions strictly as an engineer. As the expansion proceeds and Mn/DOT invests in hybrid matrix organization [with greater emphasis placed on projects], the PMA will need to be tailored to reflect that change. Mn/DOT can reflect these organizational changes and fill the gaps pointed out by our evaluation of the PMA through:

- aligning the PMA with Mn/DOT's organizational mission and goals;
- making connections;
- incorporating ways knowledge is managed; and
- clarifying the audience.

This section names training practices that Mn/DOT could use to enhance the academy, and presents ways that these practices could be implemented to make the PMA a stronger academy. Our recommendations are based on connecting the Project Management Literature findings, the PMA evaluations, and currently accepted best practices for training:

Best Practices in Training

The National Research Council (NRC) conducted two major synthesis projects on enhancing human performance (Druckman & Bjork, 1999; 1994). Both these projects emphasized training. Based on our review of this NRC work and our work with faculty development in cooperative learning, that is, the use of high-performance student teams, we found that effective training practices require (Johnson & Johnson, 1994, 1995; Johnson, Johnson & Smith, 1998; Smith, 2000, 2004):

1. **Focus on teams.** The use of teams in training promotes a variety of outcomes. Not only will the proficiency of individual participants be increased, so will team productivity. While participants work together to complete the training, positive and supportive relationships will tend to develop, even among teachers from different ethnic, cultural, language, social class, ability, and gender groups. Working together and developing positive interdependence also contributes to increased psychological health, self-esteem, and social competencies. Finally, completing a training program together can change a team's norms, roles, communication patterns, and decision-making procedures.
2. **Have the participating participants actively use the procedures through micro-teaching and guided practice.** In mastering procedural skills, listening and watching are ineffective compared with doing.
3. **Distribute training across a number of sessions.** Typically, massing training sessions will result in better performance in the short term (during the training) than will the spacing of practice, but much poorer performance in the long term.

4. **Emphasize conceptual understanding of the nature of the learning and the basic elements that make it work.** Emphasizing conceptual understanding increases retention, transfer, and long-term implementation.
5. **Have participants overlearn a basic set of procedures.** The more participants plan and implement a variety of implication and application ideas over a period of time the better.
6. **Make the training challenging.** Training can be made more challenging by increasing the cognitive demands required for understanding project management concepts and principles through such procedures as having participants practice under varied conditions and sequences. Generally, the more cognitive processing required, the greater the retention and transfer.

Table 1.3: Aligning the PMA with Mn/DOT’s Organizational Mission and Goals

Training Practice	Suggestions for Implementation
<p><i>Linking content to job descriptions (already defined by Mn/DOT)</i></p>	<p>Using the Mn/DOT Individual Competencies as a guide for course development, and making these competences available to outside instructors.</p> <p>The individual competencies that universally apply to all Mn/DOT position descriptions - leadership, learning & strategic/systems thinking, organizational knowledge, quality management, people management, and technical knowledge reinforce the PMA’s direction and also reinforce performance expectations.</p>
<p><i>Revisiting the five implementation strategies recommended by the PM Task Force</i></p>	<p>The five implementation strategies provide a comprehensive picture of working towards Mn/DOT’s “constancy of purpose” included in (Gerdes et al.: 47).</p> <p>Develop an on-the-job training strategy (i.e., coaching, work assignments, etc.) that is in step with the PMA curriculum to reinforce program goals.</p> <p>Incorporate activities from the other four implementation strategies if still relevant. For example, if there is a group that examines project management initiatives, reserve time for critical issues discussion during the academy.</p>

Table 1.4: Making Connections

Training Practice	Suggestions for Implementation
<i>Frame the instructor guidelines for the academy</i>	Include more information about the overall goals of the academy for the instructors, and request instructors to submit information sheets about their courses with educational outcomes for their classes. Then Mn/DOT coordinators could clarify any apparent gaps between the instructor's goals and the academy's goals.
<i>Emphasize academy goals for the participants</i>	Include goal statement for the PMA in the written materials, and have a speaker who presents these goals in the introduction and conclusion sessions.
<i>Provide faculty with more information about participants</i>	Give information about the different jobs of the participants and the general roles that each plays in the organization, and the differing levels of experience to expect in classroom so faculty can leverage participant experience where appropriate.
<i>Provide immediate links between theory and practice</i>	Individual sessions that focus on theoretical topics should be immediately followed by an application session so students can experience what they've learned.
<i>Incorporate more Experiential/Role Playing activities</i>	Training should revolve around separate learning modes: concrete experience, observation and reflection, formulation of abstract concepts and generalizations, and testing implications of concepts in new situations (teach around the cycle).
<i>Integrate the instructional design by adopting a systems approach</i>	Refine/Analyze the academy's content to meet desired outcomes, reinforce ideas and build practice. Structure lessons according to the best delivery format, including more interactive learning and allowing for learner feedback.

Table 1.5: Incorporating ways knowledge is managed

Training Practice	Suggestions for Implementation
<i>Incorporate Distributed Learning into the module structure</i>	Divide the academy into four modules taught over a six-month period: 1) One-week module 2) Three-day module one month later 3) Two-day module two months later 4) One-day module three months later.
<i>Explore non-traditional learning environments</i>	Include more sessions that incorporate personal interaction, i.e. taking meals together.
<i>Work with learners' needs by taking the Learning Curve into account when planning</i>	Decrease student full-time job workload outside of the academy during their involvement, so they can focus on learning.
<i>Use a Technical Coordinator to manage course content</i>	Appoint an individual to track course content and update according to evolving practices in Mn/DOT and management field and ensure connectedness of presentations at the academy.
<i>Set the stage for communities of practice</i>	Explicitly address knowledge as separate from data and information consistently throughout the courses.

Table 1.6: Clarifying the Audience

Training Practice	Suggestions for Implementation
<i>Identify target audience</i>	As an academy mission is developed, an appropriate target audience should also be selected. There is a need to identify who should participate in the academy.
<i>Identify target audience for instructors</i>	Send instructors a letter reminding them of the diverse backgrounds and disciplines of the students.
<i>Identify target audience for participants</i>	Ask instructors to take an informal survey of the participants' backgrounds at the beginning of their session to help them acknowledge the range of experience and disciplines of the audience. Also ask instructors to build upon audience knowledge and backgrounds with group and other interactive activities.

Conclusion

In conclusion, the three gaps found in the academy,

1. the academy's central message;
2. instructional focus and format; and
3. and the diverse participant profile

each reveal four main categories of recommendations that can help enhance the effectiveness of the academy:

1. Aligning the PMA with the goals and mission of the organization;
2. Making connections;
3. Incorporating ways knowledge is managed; and
4. Clarifying the audience.

Each of the gaps is analyzed from literature in best practices in project management, training, PMA material, and focus group and participant evaluations. The recommendations are intended to serve as a foundation for enhancing the Mn/DOT Project Management Academy.

Chapter II: Developing Project Management Expertise – Task Two Report

Introduction and Task Two Purpose

In Chapter I, the Task One Report, we reviewed the history of the Project Management Academy (PMA), correlated our findings with the current project management literature, and presented evaluations of the academy from participant evaluation sheets and focus group interviews. From this information, we presented a series of recommendations for the academy. At the Task One Report presentation, Mukhtar Thakur, the Director of Research, summarized a set of questions for further inquiry that guided the Task Two and Three revisions.

Following our presentation of the Task One Report, Tasks Two and Three were renegotiated with the Technical Liaison, Mollie Zauner. The renegotiation resulted in agreement on the following revised Tasks:

1. Work with Mn/DOT Office of Workforce Development to determine whether quantifiable data has been collected on the effectiveness of project management training.
2. Investigate training and professional development expenditure percentages in DOTs, other governmental organizations and private organizations.
3. Review our focus group transcripts for responses that address the new questions.
4. Review focus group transcripts to identify participants for potential follow-up interviews.
5. Conduct 5-10 follow up interviews.
6. Create and present a brief report on the remaining tasks.
7. Submit a Final Report that includes an Executive Summary, revisions from Task One, Task Two, and Graduate Thesis.

This renegotiation helped us better fit the research to the needs of Mn/DOT as expressed in the task one meeting, and helped us overcome scheduling and timing obstacles that had come up with the Advanced Project Management Program initiative being delayed until a time when the researchers were no longer available. The initial Tasks Two and Three, as well as the deliverables were:

Task Two: Advanced Project Management Program

- a. Focus Groups for Identifying Critical Success Factors. Deliverable: Presentation and short interim report on critical success factors from PM's identified by Mn/DOT staff, and how participants acquired project management skills with implications and recommendations for developing the Advanced PM academy.
- b. Develop initial course for the Advanced PM academy. Deliverable: Presentation and short interim report on one course session for an initial group of 20 for the Advanced PM academy.
- c. Focus Groups for evaluating initial run of the advanced project academy and identifying communities of practice and how they work for members of the advanced PM academy audience.

Deliverable: Presentation and short interim report on current PM framework for target audience of Advanced PM academy and evaluation after time in the workplace to apply concepts of initial Advanced PM course.

Task Three: Project management practices within Mn/DOT

- a. Observing Information flow over time through ongoing observation of communication and decisions about projects in the conception and planning stages.

Deliverable: Summary of information flow and decision making patterns over time, with recommendations for building communities of practice to support the advanced project management academy.

Tasks Two and Three were renegotiated with the Technical Liaison, Mollie Zauner, due to Task One preliminary findings, timing, and shifting priorities within MnDOT. Specifically, the Advanced Project Management planning was well underway and the timing didn't support much input from us, timing also prevented access to Advanced Project Management Academy participants for focus groups, and difficulty accessing personnel for follow-up interviews or on-site observation. Finally, as mentioned above, Research Director Muktar Thakur outlined a series of research questions at the Task One Report presentation that seem to resonate with the broader group, so we proposed addressing Muktar Thakur's questions.

After we completed this phase of the project, we discovered a comprehensive review of the Arizona Department of Transportation's (ADOT) project management practices and processes (Dye, 2003). Comparison of Mn/DOT's practices and processes for project management with ADOT's provides a refreshing reminder of the progressiveness of Mn/DOT

Training and Professional Development Expenditures

We reviewed statistics for training and development expenditures across various industries in 2002, found data to address the effectiveness of PM training, and conducted in-depth follow-up interviews for selected focus group participants. The information in this report provides data to help Mn/DOT see average spending for training of this nature, and training trends to help see how the PMA compares to similar training initiatives.

Expenditures for training are summarized in the 2002 *ASTD State of the Industry Report* (Van Buren and Erskine, 2002a). The following table reflects the dollar amount spent on training and other key measures in 2000 for selected industries.

Table 2. 1: Expenditures for Training for Selected Industries

<i>Industry</i>	<i>Total Expenditures (\$ millions)</i>	<i>Total Training Hours per Eligible Employees</i>	<i>Total Expenditures as % of Payroll</i>	<i>% of Eligible Employees Trained</i>	<i>Payments to Outside Companies as % of Training Expenditures</i>	<i>Percent of Training Time via Learning Technology</i>
<u>Technology</u>	982	23.2	2.5	75.3	27.2	9.8
<u>TPU</u>	776	32.6	2.7	83.5	16.7	13.7
<u>Trade</u>	366	23.0	1.4	77.1	16.2	4.1
<u>Services</u>	665	25.1	1.9	69.8	20.9	6.4
<u>Health Care</u>	338	18.7	1.0	89.8	12.1	6.9
<u>Government</u>	643	21.7	1.7	82.7	28.3	7.7

-Data from *The 2002 ASTD State of the Industry Report*

Transportation and Public Utilities (TPU) are listed as "The Rising Stars of Instructional Technology." These industries comprise power, water, and gas utilities; trucking and warehousing companies; airlines and railroads; water transportation companies; and parcel services. Across most measures, these companies spend a large amount on training and this industry is investing in training technologies. They have a very high number of hours dedicated to training each employee. TPUs are most likely to experiment with a variety of multimedia, instructional and delivery systems to a broad audience.

Government, which includes DOTs, has 21.7 training hours per eligible employee (about 66% of TPUs) and devotes 1.7 percent of payroll to training (about 63% of TPUs).

Effectiveness of Project Management Training

The Mn/DOT Project Management Academy (PMA) was consistent with training effectiveness as it is defined by the ASTD Learning Outcomes Report (Van Buren and Erskine, 2002b) in terms of the self-reported scores for skill change and utility. These ratings are consistent with national training efforts reviewed by the ASTD across all types of training. According to Van

Buren and Erskine, the overall scores for skill change and utility range between 4.2 and 4.3 (out of 5), which are consistent with the Mn/DOT PMA ratings.

Approximately 85% of the training courses surveyed were evaluated through self-reporting, as is the case with Mn/DOT's PMA. Of the training courses included in the survey, 20 percent were evaluated by observation, and 6% were evaluated by focus groups. With follow-up evaluations designed to measure the impact of the training in the ASTD Learning Outcomes Report, learners across all courses reported that, after training, their performance on tasks related to the objectives of the courses rose 36 percent and their overall job performance rose 31 percent. The focus groups we conducted did not include enough PMA participants to allow us to use quantitative measures to correlate with the ASTD follow-up impact evaluations. However, we did do a series of 4 follow-up interviews with participants from the Focus Groups to look for examples that illustrate how they applied the information learned in the PMA and examples of observed experiences that they felt they illustrated lack of the understanding gained through the PMA, and thus underscore the need to both continue the PMA, and continue the process of iterative improvement that is essential to continuing top-notch training. These positive and negative examples do not contain specific details which would allow the respondents to be identified within the organization. However, they do make the case for the importance not only of the training material contained in the PMA but also for the connections between training topics that participants are making through the social structure of a two-week intensive learning experience.

The most comprehensive assessment we found of a project management training program in a similar organization to Mn/DOT was the City of Los Angeles, Bureau of Engineering, which completed a nine-month training effort including over 30,000 hours project management training for over 1000 employees (Kuprenas, Madjidi, and Alexander, 1999). Kuprenas, et.al. (2000), reported similar methods (surveys, focus groups and interviews) and findings (satisfaction, retention of concepts and material, and utilization of the concepts) to those we found.

Mn/DOT PMA Follow-Up Interviews

In the re-conceptualization for tasks 2 and 3 we did in-depth interviews to find concrete examples of ways in which PMA material could be directly applied to PM practices that saved Mn/DOT time and money.

Task 1 Focus Group participant's transcripts were reviewed for participants who engaged in the focus group process and seem to have more specific information that could be accessed given more time. Selection criteria included representative sampling of the regions, e-main invitations were sent to 12 but the response rate was very low. Bob McPartlin personally encouraged colleagues to participate and the four people who responded were interviewed. The following are four examples where using information from the Academy had a direct effect on helping people be more effective as PMs. We also will describe examples where not applying principles from the PMA created costly situations.

Interviewees used the information both from the Mn/DOT-specific piece of the academy and the general skills piece of the academy by:

1. Using transcripts which include information about people involved in projects, decisions made, and dates.
2. Including all people with roles and responsibilities that related to the project in initial project meetings.
3. Acknowledging and being sensitive to local issues, such as a bike groups request for a bike tunnel that would increase biker safety.
4. Understanding cost sharing principles, and how to communicate them to cities.

In the interviews, knowledge from the academy was credited as being helpful, and one interviewee even quantified the knowledge gained in these specific areas as helping them work “20% more efficient per day.” All of these comments were explained through stories about projects. For example, one of the interviewees felt that working with a bike group to create a bike tunnel improved relations with the city and helped other projects with that city run more smoothly. Another interviewee commented that they documented projects in the ways suggested by the academy, and it saved them an enormous amount of time. Another told about a project that was started “on the right foot” after he/she learned about the project roles and responsibilities through the PMA so that he/she could make sure all of the stakeholders for that project were present at the initial meeting. This person was able to get the timeline done for the project during the course of the initial meeting. The interviewee said that:

“Because I understood the roles and responsibilities, I was able to get everyone on board. We were able to settle that right there at this one meeting and the whole project flows out of this one meeting so that you know everyone is on board and understands. What was important was to have that class and know this is our structure and this is who we expect to pull everything together.”

Thus, the concepts from the PMA helped the interviewee understand the roles and responsibilities of all the stakeholders specific to this project, and thus the interviewee was able to make sure no one was overlooked at a key point in the project planning for this project. The interviewee presented this as an example of how he/she applied PMA-acquired knowledge directly to his/her work on a regular basis. Being able to apply the knowledge from the PMA to the work context is an example of level 3 learning that is coming out of the PMA directly (Kirkpatrick, 1994). Kirkpatrick’s four levels of evaluation are as follows: Level 1 – reactions, Level 2—learning, Level 3 – transfer, and Level 4 - results

The interviewees were also asked to explain situations that could result if they didn’t have the information they learned in the PMA, in order to help get at an understanding of the cost-benefit ratio for the PMA. As engineers work with complex concepts such as cost-sharing, they face a number of issues addressed directly in the PMA such as understanding the cost-sharing rules, communicating in a timely and effective manner about those rules to cities involved in a project, and presenting information at public meetings to all affected constituents. If the cost-sharing information were not effectively communicated to the city, the interviewee estimated that more than \$30,000 in consultant fees could be added to a project cost simply in the act of dealing with a miscommunication and the resulting political disagreement with the city. The interviewee felt

that the PMA information and time in the academy devoted to processing and understanding cost sharing was essential to being able to handle these types of situations in an effective manner.

In summary, the PMA information impacts projects and the effectiveness of Mn/DOT PMs as they work with each project on a project by project basis, and often on a daily basis as well. Having the connections about how to apply the information for their duties as PMs really has helped the interviewees work more effectively in their roles within the organization, especially in the areas of understanding cost sharing principles, being sensitive to local issues, including all stakeholders in initial project meetings, and using project documentation processes.

Training Trends

Training trends reflect changes in the social, political, and economic contexts in the U.S. These trends reflect the social, political and economic forces that affect the environment in which Mn/DOT operates, and thus have an indirect effect on the expectations for Mn/DOT's performance. As the expectations for performance change, the need for training to support both individual learning and institutional changes increases. Thus the following trends demonstrate the increasing need for training programs such as the PMA to help Mn/DOT adapt to changes in the environment.

The 2002 *ASTD State of the Industry Report* listed the following top ten trends:

1. Money: Increasing pressure from shareholders for short-term profits means that there is greater pressure on employees to produce results and on training to show a return on investment.
2. Diversity: The growing cultural diversity of organizations means a greater need for people with different backgrounds to work together and find better ways of balancing the "local" with the "global."
3. Time: The increasing expectation for just-in-time products and services is resulting in shorter time frames for learning, often facilitated through technology.
4. Work: With the rise of virtual work and virtual workplaces, people are increasingly physically disconnected and have to learn to work in new ways.
5. World: Changes in distribution of the world's population – in geography, economic standing, age, and race – pose new challenges for organizations as they seek the right human capital to succeed.
6. Meaning: In a world where things seem to be constantly changing, people are increasingly looking for work that has meaning and nurtures them spiritually.
7. Change: As the pace of change appears to quicken, people become increasingly resistant to change and question whether technology is advanced too quickly.
8. Knowledge: As the knowledge sector accounts for ever larger percentages of the world economy, what people know and what people do are growing in importance.
9. Technology: Technology is increasingly being used to automate work, changing the types of skills people need and transforming how they learn.
10. Careers: The changing relationship between employees and employers and the rise of the free agent worker challenge the traditional notions of a career.

The report also provided eight perspectives on the trends. We have chosen to present the three perspectives that relate to Mn/DOT’s situation: Public/Non-Profit sector practitioners, Senior Managers, and Training Providers. A summary of the key trends, with current responses and predicted future responses, is shown below in Table 8.

Table 2. 2: Responses to Training Trends by Stakeholders related to Mn/DOT’s Context

Stakeholders	Top Trends	Current Stakeholder Responses	Future Stakeholder Responses
Public/ Non-Profit Sector Practitioners	<ul style="list-style-type: none"> *Widening gap between practice in private and public sector *Changing age distribution of the workforce *Growing levels of bureaucracy 	<ul style="list-style-type: none"> *Improving technology to enhance e-learning opportunities *Creating mentoring opportunities for younger generations *Offering more training on change management 	<ul style="list-style-type: none"> *Increase resources devoted to externally-provided continuous education *Engaging in more effective succession planning *Training people to think systematically
Senior Managers	<ul style="list-style-type: none"> *Increasing pressure for shareholder value *Growing pressure for “just-in-time” 	<ul style="list-style-type: none"> *Managing through balanced scorecards with “people” measures *Increasing use of technology to allow people to learn anytime, anywhere *Managing knowledge and relationships in the organization 	<ul style="list-style-type: none"> *Re-inventing everything! *Helping people achieve a better work-life balance *Hiring more good knowledge workers *Fostering more employee commitment
Training Providers	<ul style="list-style-type: none"> *Learning growing as a driver of shareholder value *Growing level of diversity *Changing landscape of training providers 	<ul style="list-style-type: none"> *Demonstrating ROI of training *Examining impact of cultural diversity *Increasing use of technologies for learning 	<ul style="list-style-type: none"> *Identifying new markets and opportunities *Better detection of signals in the marketplace; listening to the periphery *Delivering more “just-in-time” learning

From the perspective of Public/Non-Profit sector practitioners, the trends that are most important include the widening in the gap between practice in private and public sector, changes in the age distribution of the workforce, and growing levels of bureaucracy. The current responses to these problems are enhancing e-learning opportunities, creating mentoring opportunities, and offering more training on change management. ASTD predicts that future responses will include shifting to continuous education that can be supplied by external units, engaging in more effective succession planning to ensure smooth shifting of responsibilities and knowledge as the aging workforce retires, and training people to think systematically in ways that support the organization’s directions. Because some of these trends affect Mn/DOT, it is important to consider to what extent training is on par with current responses and plan for the appropriate future responses in ways that fit with the community-focused model of learning found to be key

in transferring knowledge by this project. We will revisit concrete ways of addressing these trends in the detailed list of design choices for the PMA at the end of this report.

From the perspective of Senior Managers, increasing pressure for shareholder (or in the case of public institutions, taxpayer) value and just-in-time performance are currently leading to general responses such as added people measures to balance scorecards, and increasing the use of technology to allow “anytime, anywhere” learning, and efforts directed at managing knowledge and relationships in the organization. ASTD predicts that future responses will lead to reinventing systems in ways that enhance performance by focusing on helping people achieve a better work-life balance, as well as hiring more skilled knowledge workers, and fostering more employee commitment in order to achieve increased value and “just-in-time” performance.

From the perspective of Training Providers, the key trends are the growth of learning as a driver to increase value, an increasing level of diversity throughout organizations and their clients, as well as the changing landscape of training providers, technologies, and organizations. The current responses of training providers to these challenges include demonstrating the return on investment of training, examining the impact of cultural diversity on training effectiveness, and increasing the use of technology-based learning. ASTD predicts that training providers will expand their roles by identifying new markets and opportunities for training with their organizations, “listen to the periphery” to better understand the signals in the marketplace that affect training, and deliver more just-in-time training.

The trends and perspectives outlined in the ASTD 2002 report are remarkably consistent with recent Trade Journal articles (for example, James Krug’s “Preparing for the new workforce” in *CE News*; Krug, 2003) and the research literature (for example, Peter Smith’s “Workplace learning and flexible delivery” in *Review of Educational Research*; Smith, 2003). The current responses identified by ASTD are reflected in current Mn/DOT training initiatives. The PMA specifically reflects the ASTD future trends of providing continuous education through the combination of the academy itself, the advanced PMA academy, and the mentoring and rotation programs for recent hires. The relationships created through participation in the academy and other MnDOT training activities are channels that can aid knowledge transfer, supported by the literature about ways in which knowledge transfer occurs, essentially person-to-person. In order to continue supporting this knowledge transfer, and increase both the value and performance, Mn/DOT has the opportunity to make some design choices for the PMA, and their training initiatives. Our recommendations are based on the recurring themes from both the literature and the stories that focus group participants told about the connections they made between information and how that information is used in context through learning from the people around them. This learning can be enhanced to the predicted ASTD level of future stakeholder responses by increasing the systematic approach of employees to support directions set by senior managers designed to increase both value and performance.

Recommendations

We recommend that the PMA be revisited, and examined through the structure for design choices laid out in Table 9. We believe that the choices in the right hand column are a natural progression from the current design, and will address the issues discussed in the training trends section, such as how to increase both value and performance, while providing a structure that supports just-in-time learning and knowledge transfer between employees. The left hand column represents the choices that currently are built into the academy structure. These choices are a logical place for any academy to start, and have contributed to the academy’s success over the past decade. However, due to the changing nature of the context within which Mn/DOT is working, and the trends which demand a higher value and just-in-time performance, we recommend that the academy take the next step, and grow into a learning experience structured in ways that address the ASTD predicted future responses, as well as the ways in which the literature clearly demonstrates that knowledge is sticky, and passed from experienced person to inexperienced person through anecdotes and connections.

Table 2. 3: Design Choices for PMA

Type of Choice	Choices Implicit in Current Academy Design	Recommended Choices to Enhance and Update the Academy
How to structure the academy	Organized by Information	Organized by Knowledge
How to connect the ideas presented	Implicit connections which are built by participants as they bring the information back to their own contexts within the organization.	Explicit connections which are deliberately co-created by participants and instructors working together.
How to involve the participants in active learning	Learners make individual choices about whether and to what extent to engage in the material presented.	Learners work both individually and in teams in order to engage the material.
How to structure the information inside of the individual sessions	Independent elements developed by instructors working separately.	Coordinated elements developed by instructors’ collaborating and sharing extended examples throughout the academy.

Mn/DOT has been a pioneer in providing project management training through the PMA. Given the complexity of projects and the dynamic project environment, developing project management expertise cannot rely solely on a two-week academy. Mn/DOT is addressing these needs in part by creating an Advanced Project Management Academy. Our view is that since project management operates within an organizational context, it must be designed and integrated into the organizational structure. Project management professional development also must be integrated into the fabric of the day-to-day operations on Mn/DOT. Karen Ayas argues that in order to maintain a competitive advantage and permanent success in project management, a professional element (involving a shift in management philosophy and practice) is required (1996). This shift focuses on an information-based knowledge-creating structure, where all project team members have the opportunity for continual learning (Ayas 1996: 131). Our recommended Design Choices, listed in Table 10, provide suggestions for operationalizing Ayas's ideas. Operationalizing these suggestions throughout Mn/DOT will be a long process. The first step we recommend is to incorporate extended examples and/or simulations into the current PMA. Knowledge structures are built through our interactions with the people around us, and the current PMA offers enough person-to-person contact to serve as a starting point for Ayas' information-base knowledge-creating structure.

In order operationalize continual learning for project managers and their teams, beginning with an academy that is structured by knowledge rather than information will help project managers develop their own foundation of knowledge, which they can subsequently share with their teams. A knowledge-based structure implies that the links between theory and practice are explicit in the academy curriculum, and that participants are involved in a process of both understanding information and producing their own knowledge structures by applying that information to contexts. One example of this would be integrating an extended example of a Mn/DOT project that runs through the curriculum, and creating a set of realistic problems for the academy participants to solve related to this project. Each session could deal with a different aspect of the project related to the content goals for that session. In the act of solving the problems by applying the information to which they have just been exposed, academy participants will be creating their own knowledge structures to help them with problems that they will be solving in their project teams.

Knowledge structures are built through a combination of information and practice that reinforce each other. With an extended example and problem solving structure, the participants will be able to participate in both kinds of learning together to help them build their own knowledge structures and develop their problem solving skills. Another way that the academy could be structured by knowledge would be to incorporate simulations of actual projects which require the participants to make connections between the different types of information learned in order to participate.

The incorporation of either an extended example or simulations into the academy would help instructors work together with each other and the students to "unpack" the connections between the information and skills that each instructor offers and the ways in which those skills can be effectively applied in context. Working together with participants to unpack implicit connections in order to debrief their problem solving or simulation work adds the dimension of teamwork to the knowledge structure development process in which learners are participating.

In addition, the use of extended examples or simulations in the design would require instructors to coordinate their material across the academy.

Future steps would include building more support for the existing communities of practice within Mn/DOT, offering regular opportunities throughout the year for employees to come together and learn from each other through participating in problem-solving teams and simulations or getting help with real problems that different project managers may be facing. Working together on problems, and facilitating interpersonal conversations and knowledge sharing across all phases of projects from pre-planning through implementation and repair will allow Mn/DOT to leverage the knowledge base already within the organization, with exponential gains acquired through people working together and making connections between their knowledge structures and experience. Our literature search and focus groups research reinforce each other by demonstrating that *knowledge is “sticky”* (Brown and Duguid, 2001) – it moves directly from person to person, not person to database to person or person to document to person. Setting up and integrating opportunities for knowledge growth throughout Mn/DOT will enable Mn/DOT to leverage the knowledge resources currently present within the knowledge structures and practices of experienced Mn/DOT personnel. The first step to leveraging this knowledge is restructuring the PMA. The effects of a restructured PMA will be to help make connections between information and application more explicit for everyone, help expose people to the entire project process, set up a situation that enables people with PMA training to begin from an integrated perspective, and model the team work that supports Mn/DOT’s success.

Chapter III: Recommendations for Mn/DOT to Enhance the Project Management Academy (PMA)

We established through focus groups and interviews that the PMA is an effective approach for developing project management expertise and that participants do use the concepts they learn in their daily work. We provide recommendations to help Mn/DOT further leverage the resources used in the academy. Design choices for the PMA are listed (and elaborated in the Task 2 report). We include both current choices implicit in the PMA design and recommended choices for enhancement. These recommendations are based on our comprehensive survey of the literature and analysis of the PMA through review of content and participant survey, focus groups and interviews. Steps for implementing the design choices are listed, and the document concludes with the basis for these recommendations correlated with detailed suggestions for implementation (which are elaborated in the Task One Report).

Table 3. 1: Design Choices for PMA

Type of Choice	Choices Implicit in Current Academy Design	Recommended Choices to Enhance and Update the Academy
How to structure the academy	Organized by Information	Organized by Knowledge
How to connect the ideas presented	Implicit connections which are built by participants as they bring the information back to their own contexts within the organization.	Explicit connections which are deliberately co-created by participants and instructors working together.
How to involve the participants in active learning	Learners make individual choices about whether and to what extent to engage in the material presented.	Learners work both individually and in teams in order to engage the material.
How to structure the information inside of the individual sessions	Independent elements developed by instructors working separately.	Coordinated elements developed by instructors collaborating and sharing extended examples throughout the academy.

Table 3. 2: Recommended Steps for Implementation

<p>1.</p>	<p>Orchestrate coordination among the instructors and the academy designers to avoid fragmented presentations, and plan for presenting explicit connections between the information presented in each course.</p>
<p>2.</p>	<p>Integrate extended case studies and problems that are dealt with across the courses and help participants put the information presented into realistic contexts. (i.e. use a common project or problem that runs throughout the academy and is complex enough for the integration of the concepts being taught).</p>
<p>3.</p>	<p>Organize the participants into cohort groups of 4-5 members that stay together throughout the training and are linked together in a web-enhanced learning environment both during and after completion of the PMA.</p>
<p>4.</p>	<p>Ask instructors to form temporary teams throughout the sessions to include the broader group in the professional networks that participants are developing.</p>
<p>5.</p>	<p>Continue to monitor best practices through focus groups, surveys, technology and literature scans. Continually refine the academy to reflect the state of the art.</p>
<p>6.</p>	<p>Continue to evaluate participants' use of PMA concepts to encourage reflection and demonstrate the value of the program over time—checking in with past participants on a biannual basis for at least 10 years in order to document the long term impact for the organization. This should include surveys as well as individual interviews and/or focus groups.</p>

Basis for Recommendations

The goal of The *Developing Project Management Expertise* Project was to enhance the current PMA. Mn/DOT can reflect these organizational changes and filling the gaps pointed out by our evaluation of the PMA through:

- aligning the PMA with Mn/DOT's organizational mission and goals;
- making connections;
- incorporating ways knowledge is managed; and
- clarifying the audience.

Our specific recommendations are summarized in Tables 12-15 below.

Table 3. 3: Aligning the PMA with Mn/DOT’s organizational mission and goals

Training Practice	Suggestions for Implementation
<i>Linking content to job descriptions (already defined by Mn/DOT)</i>	<p>Using the Mn/DOT Individual Competencies as a guide for course development, and making these competences available to outside instructors</p> <p>The individual competencies that universally apply to all Mn/DOT position descriptions - leadership, learning & strategic/systems thinking, organizational knowledge, quality management, people management, and technical knowledge reinforce the PMA’s direction and also reinforce performance expectations.</p>
<i>Revisiting the five implementation strategies recommended by the PM Task Force</i>	<p>The five implementation strategies provide a comprehensive picture of working towards Mn/DOT’s “constancy of purpose” included in Appendix D (Gerdes et al.: 47)</p> <p>Develop an on-the-job training strategy (i.e., coaching, work assignments, etc.) that is in step with the PMA curriculum to reinforce program goals.</p> <p>Incorporate activities from the other four implementation strategies if still relevant. For example, if there is a group that examines project management initiatives, reserve time for critical issues discussion during the academy.</p>

Table 3. 4: Making Connections

Training Practice	Suggestions for Implementation
<i>Framing the instructor guidelines for the academy</i>	Include more information about the overall goals of the academy for the instructors, and requesting instructors to submit information sheets about their courses with “educational outcomes” for their classes. Then Mn/DOT coordinators could clarify any apparent gaps between the instructor’s goals and the academy’s goals.
<i>Emphasizing academy goals for the participants</i>	Include goal statement for the PMA in the written materials, and have a speaker who presents these goals in the introduction and conclusion sessions.
<i>Providing faculty with more information about participants</i>	Give information about the different jobs of the participants and the general roles that each plays in the organization, and the differing levels of experience to expect in classroom so faculty can leverage participant experience where appropriate.
<i>Providing immediate links between theory and practice</i>	Individual sessions that focus on theoretical topics should be immediately followed by an application session so students can experience what they’ve learned.
<i>Incorporate more Experiential/Role Playing activities</i>	Training should revolve around separate learning modes: concrete experience, observation and reflection, formulation of abstract concepts and generalizations, and testing implications of concepts in new situations (teach around the cycle).
<i>Integrating the instructional design by adopting a systems approach</i>	Refine/Analyze the academy’s content to meet desired outcomes, reinforce ideas and build practice. Structure lessons according to the best delivery format, including more interactive learning and allowing for learner feedback.

Table 3. 5: Incorporating ways knowledge is managed

Training Practice	Suggestions for Implementation
<i>Incorporate Distributed Learning into the module structure</i>	Divide the current academy topics into four modules taught over a six-month period: 1) One-week module 2) Three-day module one month later 3) Two-day module two months later 4) One-day module three months later.
<i>Explore non-traditional learning environments</i>	Include more sessions that incorporate personal interaction, i.e. taking meals together.
<i>Work with learners' needs by taking the learning curve into account when planning</i>	Decrease student fulltime job workload outside of the academy during their involvement, so they can focus on learning.
<i>Use a Technical Coordinator to manage course content</i>	Appoint an individual to track course content and update according to evolving practices in Mn/DOT and management field and ensure connectedness of presentations at the academy.
<i>Set the stage for communities of practice</i>	Explicitly address knowledge as separate from data and information consistently throughout the courses.

Table 3. 6: Clarifying the Audience

Training Practice	Suggestions for Implementation
<i>Identify target audience</i>	As an academy mission is developed, an appropriate target audience should also be selected. There is a need to identify who should participate in the academy.
<i>Identify target audience for instructors</i>	Send instructors a letter reminding them of the diverse backgrounds and disciplines of the students.
<i>Identify target audience for participants</i>	Ask instructors to take an informal survey of the participants' backgrounds at the beginning of their session to help them acknowledge the range of experience and disciplines of the audience. Also ask instructors to build upon audience knowledge and backgrounds with group and other interactive activities.

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