

Project Manager Skill Development: A Survey of Programs and Practitioners

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Abstract: This article reviews project management education, from graduate and certificate programs to organizational programs. It includes survey results of current practitioners with regard to project management training. It has been found that there are both graduate and certificate programs that cover the recommended project knowledge areas. Less than half of the organizations in the survey had any type of project management training program and 41% of project managers felt their organizations prepared them for their role. From those project managers who had been trained, 73% felt the training prepared them for their role. Recommendations are provided for employees, employers, and academia to help bridge the gap between current training and skills necessary for project managers. An overview of one program that has been developed is provided.

Keywords: Project Management, Project Manager Training, Education, and Development

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Project managers have long been trained on the job with little formal training within the discipline of project management. Often a project manager is promoted to the position based on the individual's technical ability, but he or she is lacking the necessary cross-functional team management skills (Nellore and Balachandra, 2001). The project manager is then expected to learn about project management while on the job. Tippett and Peters (1995) noted from their survey results that "only about half of the respondents indicated that their project managers had any type of management training prior to

taking on their management responsibilities." In another study, Crawford and Gaynor (1999) found that only 12.4% of their sample had any kind of certification or registration in project management. The lack of training and organizational support is driving another concern that "the brightest practitioners have a fear of trying the project management route" and "the individuals fear and are often ill prepared to take on the responsibility of managing a project and the team (Pressman, 1998). Pressman notes that the consequence of "poor project management is the number one cause of project failure," and correcting the situation "requires training in advance to get the job done."

While experience is often quoted as being the best teacher, companies must recognize the need to enhance on-the-job training with formal project manager development. Today a number of educational programs are available to teach the fundamentals of project management. Given the various training opportunities available, companies must be diligent about the training in which employees enroll to ensure alignment with the business.

The training should be based on competencies required for successful project management. An available and recommended competency model is the Project Management Institute's (PMI®), "Project Manager Competency Development (PMCD) Framework" (2002). "The PMCD Framework is based on the premise that competencies have a direct effect on performance," (2002, p. 1). The PMCD Framework identifies three main areas of competencies required of project managers as knowledge, performance, and personal. The PMCD Framework is based on the nine knowledge areas from the *PMBOK® Guide* (PMI, 2000), as well as core personality issues, and factors in the workplace that apply to managing projects and organizational awareness (2002).

This article includes a review of project management training, from graduate programs and certificate programs, to a benchmark of organizational programs and the results from a survey of practitioners. Recommendations are provided for the

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employee, employers, and members of the training and academic community to prepare employees for this all-important role of project manager within the organization. An overview is provided of one program that has been developed from this research.

Method

In an effort to evaluate project manager training and development programs, three approaches were taken. First, a review was compiled of project management curriculum from 30 graduate programs and 120 project management certificate programs. While Turner and Huemann (2000) highlighted various Master's degree programs around the world, as well as certificate programs to relate formal education to competence, this study focuses on U.S.-based graduate programs. The graduate programs were selected based on a review of institutions offering degrees such as the Master of Science in Project Management (MPM), the MBA, the Management of Technology (MOT), Engineering Management (MEM), Systems Engineering and Industrial Engineering. The certificate course curriculums were researched from college affiliations, advertisements in professional society magazines and journals, and from a Web search. The program course listings and course descriptions were analyzed.

Second, companies were benchmarked using a standard evaluation to determine their development program for project managers. Twelve companies were contacted and seven agreed to participate. These companies were selected in accordance with guidelines from Camp (1989) for direct competitor and industry leader benchmarks. The external organizations were selected with the following criteria: (1) recognition as industry leaders for project management development, (2) recommendations from individuals having knowledge of the company's project management initiatives, (3) professional contacts from conferences in which companies presented papers dealing with project management, and (4) a literature review of publications on project manager development to gather company contacts. The company representatives were knowledgeable in the project management maturity and training program within the companies. The individuals ranged from vice presidents in the project office to individual project managers. A standard set of questions was asked of each representative.

The third method was a survey to evaluate the state of project management training from the practitioner point of view. The survey consisted of 19 questions for demographics, educational background, years of experience in project management, type of certifications, and project management-specific coursework from short-courses, universities, and company training programs. Aside from demographic data collection, four questions used a Likert 5-point scale, seven were forced answer, and a final question was open-ended. The targeted audience was employed graduate students and working professionals who were considered users of the project management discipline. Participants were randomly selected by their involvement in project and engineering management professional society activities such as conferences and chapter meetings, and from the membership databases of PMI, IEEE, and ASEM. The survey was distributed from a Web link and responses were collected via email.

Results

Graduate Programs. The first review was for the university graduate courses in project management. Many colleges and

Exhibit 1. Typical Graduate Courses in Project Management

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- Introduction to Project Management
 - Project Planning and Scheduling
 - Organization, Management, and Leadership
 - Project Cost Management
 - Risk Management
 - Procurement and Contract Management
 - Financial Management
 - Economics
 - Probability and Statistics
 - Legal and Ethical Issues
 - Conflict Management
 - Project Communication
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universities offer courses in specific project management coursework with many of the course descriptions around similar topics. Exhibit 1 lists examples of typical courses found in the curriculums reviewed. For the degrees in project management, the curriculums reviewed covered the nine knowledge areas as defined by the *PMBOK® Guide* (2000) from PMI. For the other degree programs reviewed that included applicable coursework in project management topics, the courses in leadership, finance, and overview courses in project management provide good coverage of the nine knowledge areas.

As for building a competency in these areas according to PMI's PMCD Framework (2002), the specific courses and programs of study from any graduate degree program need to be reviewed to ensure knowledge and performance competencies are met. Knowledge can be best gauged by testing. Performance can be gauged by practice of the concepts within the curriculum from the use of individual or team projects and case-study applications.

Certificate Programs. The second part of the coursework review was around short-course programs and certifications for project management courses. A single query on a Web search engine for project manager certification resulted in over 311,000 sites! This review distinguishes between a certificate, a certification, and a certificate program. In certain cases, suppliers awarded a certificate for completion of a single one-day course. In other cases, certificates were awarded for completion of each multi-day class in a certificate program, with an overall certificate awarded at the completion of all courses. Other certificates, typically from a university affiliation, are called the Master's Certificate in Project Management.

Of the certifications, PMI's Project Management Professional (PMP®) certification is one of the most widely recognized project management credentials. The PMP certification recognizes academic achievement and applicable work experience, but it is not a training or certificate program.

One hundred and twenty short-course programs were reviewed. For this study, the focus was on certificate programs that offered multiple courses leading to a certificate in project management that covered at a minimum the nine knowledge areas of the *PMBOK® Guide* (PMI, 2000). An objective of this research was to create a project manager development program. To do this, a first-pass hurdle was that the certificate programs

Exhibit 2. Typical Certificate Courses in Project Management

- Project Management
- Scheduling and Cost Control
- Project Leadership, Management, and Communications
- Cost Estimating
- Risk Management
- Negotiation Skills for Project Managers
- Contracting
- Quality Management
- Organizations and Organizing
- Conflict and Negotiation in Organizations

be offered in agreement with a university or college. While programs from independent suppliers may be equal in terms of course offerings, the link to a university or college was a required hurdle. From this, 22 programs were then evaluated in depth by the organization for consideration as part of the project manager development program. The development team ranked the programs for breadth of program across the nine knowledge areas, technical merit, distance learning availability, reputation, practice, applications, cost, and experience of the provider. Exhibit 2 lists courses typical of the higher ranked Master’s certificate programs in project management theory. In general the final listing of certificate program coursework based on the course descriptions aligned with the topics in the graduate programs (Exhibit 1).

Company Benchmarking. Based on the company benchmarking, organizations utilize different approaches toward project management training. One organization had a formal training program built around a Master’s Certificate, an external certification requirement, and internal customized training.

Exhibit 3. Summary of Key Company Benchmark Criteria

	Organization Type	Public, Private or Government	Official PM Titles	Type of Internal Program	Continuous Training Cycle?	Internal Cert.	PMI PMP® Cert. Required	PM Career Path
1	Technology and Services	Public	Yes	Internal Program + Master’s Certificate + PMI Certification	Yes	Yes	Yes	Yes
2	Information Technology	Public	Yes	Master’s Certificate	No	Yes	No	Yes
3	Technology	Public	Yes	Master’s Certificate	No	Yes	No	Yes
4	Government	Government	Yes	None	No	No	No	No
5	Technology	Public	Yes	None	No	No	No	No
6	Technology	Public	Yes	None	No	No	No	No
7	Retail and Consumer Goods	Private	No	None	No	No	No	No

Other organizations utilized an external certificate program, while four of the seven had no structured approach. Only a single company within the sample had a continuous internal certification cycle and a requirement to maintain the PMP certification from PMI. One point of interest was that six of seven companies had an official project manager title, yet only three out of the seven had a published project manager career path. The career path question asked participants if there were specific job titles, job codes, and a career progression specifically for project managers in their organization. It was discovered that while there was an official project manager title in companies 4, 5, and 6, the job title was part of the technical career ladder. A summary of the company benchmark results are given in Exhibit 3.

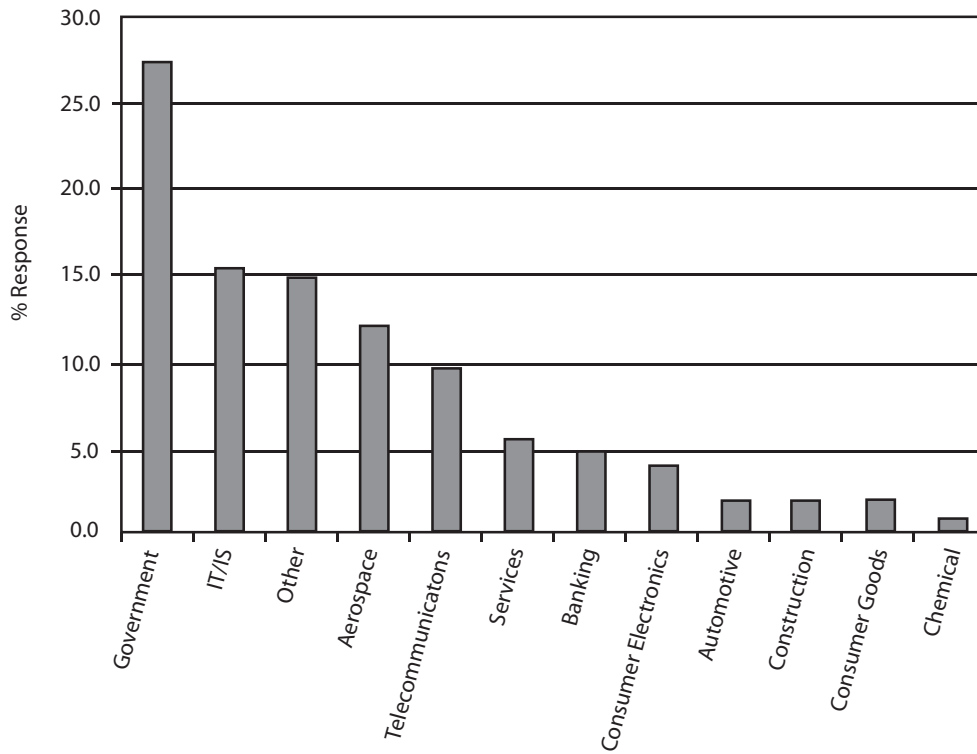
Web-Based Survey. From the survey there were 123 returns (a 37% response rate). The companies represented were grouped into categories of government, information technology, aerospace, telecommunications, consumer electronics, services, banking, automotive, construction, chemical, and other. Exhibit 4 shows the breakout across these organizations.

The reliability of the Likert-scaled questions exceeded the threshold recommended by Nunnally (1994) with an alpha of 0.78. From a factor analysis, these same questions loaded on a single factor. This is consistent with the development of the construct to measure project management training.

Of the respondents, 35% had over 15 years experience in project management. Twelve percent had a degree specific to project management, while over 87% had degrees in other disciplines, with 55% being from the engineering and sciences. Of the respondents 51% had an engineering or science masters level degree. This appears to support the early observation from Nellore and Balachandra (2001) that most people are promoted to project management positions based on their technical careers and preparation.

Most organizations are not requiring training, as 73% of the respondents noted that there were zero project management

Exhibit 4. Industry Response Distribution



training hours required per year by their organization (Exhibit 5). Another group of 14.6% worked for companies that required over 31 hours per year for project management training. To put this in perspective, one typical certificate program reviewed had individual courses that were on average four days (32 hours). Thus, over 85% of respondents had less than four days of training per year.

Just over 11% noted their company had either extensive or comprehensive training in project management (Exhibit 6), while 74% noted none to minimal. The comprehensive programs were defined within the survey as covering the nine project management theory knowledge areas, specific project software, peripheral software, company products, and company project methodology. While 74% of the respondents noted their

Exhibit 5. Percent Responses Indicating Required Training Hours per Year

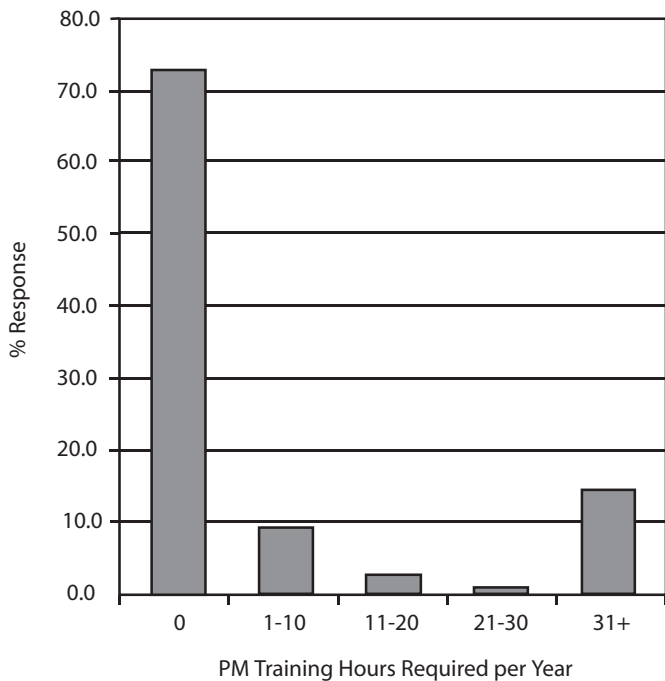
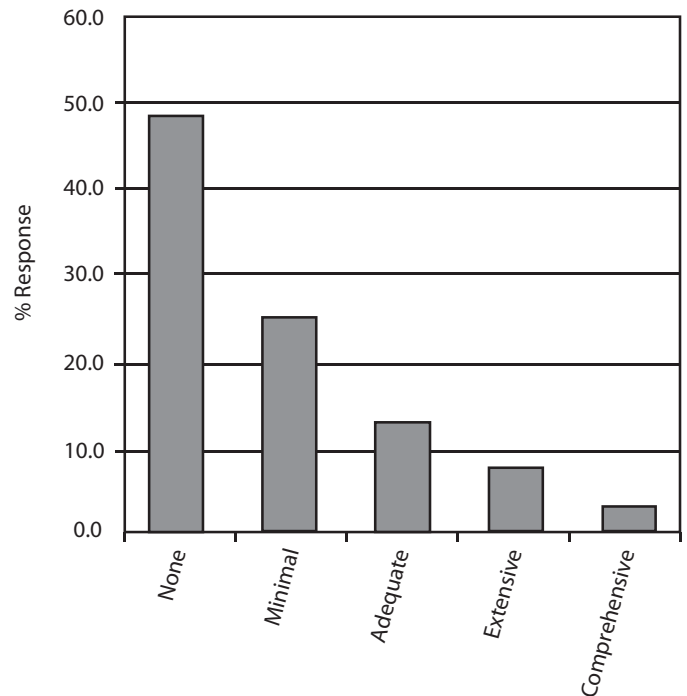


Exhibit 6. Percent Responses Indicating Degree of Training Received from Company



company had none to minimal training, over half (53%) of the respondents reported that their organization had a career path for project management.

In analyzing the data, statistical nonparametric methods were used to test a number of hypotheses across the questions from the survey. The nonparametric methods permit the testing of data where distributions are not known and cannot be assumed (Conover, 1999). The $r \times c$ contingency table tests were used with the null hypothesis of the form, "all of the probabilities in the same column are equal to each other." Exhibit 7 provides a summary of the hypotheses.

In testing the hypothesis that the degree of project manager training programs across industries tested are the same, it is found that we do not reject the null hypothesis at alpha 0.05 for 21 degrees of freedom (p -value = 0.4964). Thus, for the sample analyzed, there was no statistical difference to say one or more identified industries used a method to train their project managers differently from another industry. Based on a review of the raw data, select companies had training programs in place, but this was not dependent on any one industry.

Although the training programs from companies were limited, respondents were involved in taking short-courses and college courses in project management. The satisfaction with the short-course training was tested with the hypothesis, "the feeling of preparedness is the same regardless of the number of short-courses a person has taken in project management," was rejected (p -value = 0.0007). Based on the clustering of responses within the $r \times c$ table for strongly agree and somewhat agree versus the strongly disagree and somewhat disagree categories, it appears that the more training respondents had, the more they felt prepared.

Likewise a similar hypothesis was tested for the college course credits. The hypothesis tested was, "the feeling of preparedness is the same regardless of the number of college courses a person has taken in project management." The null was rejected (p -value = 0.0033) and there is a relation of college courses to preparedness. A review of the $r \times c$ table shows a similar clustering as the last analysis for the agree bins. This is supported by the response that 73% of respondents agree the training they have received to date has helped prepare them, yet only 41% feel that their organization prepares them for their positions.

To further examine the organizational aspects, the hypothesis, "a person feels that the organization prepares them for their role as project manager, regardless of a formal project management training program being in place," was rejected (p -value < 0.0001). Thus, there is a difference in how people feel prepared versus a training program in place. For this hypothesis, there was a direct correlation seen within the $r \times c$ table with the feeling of being prepared or likewise not feeling prepared, with the respondent's assessment of there being a training program in place within their organization.

The final tested hypothesis of, "a person feels that the organization prepares them for their role as project manager, regardless of the number of hours of project management training required per year," was rejected (p -value < 0.0001). One then asks if more required training leads to an increased feeling of preparedness. Six $2 \times c$ contingency tables were completed for this analysis under the same hypothesis. The only case that was statistically significant to reject the hypothesis was for zero hours compared to the bin of 31–40 hours. In all other cases, the data was not significant at alpha 0.05. The main conclusion drawn is the fact that training does not account for all feelings of being prepared by the organization for the project manager position. While training can help, it must be supplemented with other aspects of development. From the comments in the write-in section of the survey, the practitioners felt the organization must also provide experiential learning opportunities and coaching for them to be successful as project managers.

From a certification standpoint, 47% of respondents are pursuing an external certification, 33% of which were for the PMP. The survey results showed that 15% noted that their organization awarded an internal certification for project management. No details on the type or degree of internal company certification were examined independent of existing survey questions for these respondents.

Discussion

Overall neither the benchmarking or the survey provided confidence that a majority of organizations have a comprehensive training program for project managers. This research has shown that very few organizations are developing

Exhibit 7. $r \times c$ Table Summaries, Tested at Alpha = 0.05

Null Hypothesis	Degrees of Freedom	p-value (tested at 0.05)
The degree of project manager training programs across industries tested are the same.	21	0.4964
The feeling of preparedness is the same regardless of the number of short-courses a person has taken in project management.	20	0.0007
The feeling of preparedness is the same regardless of the number of college courses a person has taken in project management.	20	0.0033
A person feels that the organization prepares them for their role as project manager, regardless of a formal project management training program being in place	16	< 0.0001
A person feels that the organization prepares them for their role as project manager, regardless of the number of hours of project management training required per year.	8	< 0.0001

their project managers, with only 41% of project managers agreeing that their organizations prepare them for the role.

One of the consequences of failing to develop your project leaders is a lack of successful projects. The Standish Group reports that only about 28% of IT projects are a success (2001). New product development projects do not fair much better with only one out of four major developments (25%) becoming a commercial success (Cooper, 2001, p. 11; Stevens, 1997).

The role of the project manager has been cited as one of the required project success factors (Standish Group, 1999, 2001). It is reported that “97% of successful projects have an experienced project manager at the helm,” (Standish Group, 2001). To develop skills in a profession, formal education and practice are required (Turner and Huemann, 2000). The organization can support the project manager in developing the required skills to improve the project initiatives of the company by having a program to develop project management competencies. A project manager development program will consider both formal training and experience. The organization must prepare the individual for the job beyond a single faceted training course or academic program.

In offerings from the graduate programs and the certificate program courses, organizations can find coursework that would align to their organizational development needs. Many of the graduate and certificate programs reviewed for this article included coverage of the project management knowledge areas as highlighted in the *PMBOK® Guide* (PMI, 2000) as well as some form of application or practice. Some graduate courses, such as the one described by Brown (2000), use a service-oriented elective course to teach project management concepts. One of the certificate programs included a full five-day course simulating a project environment.

However, just because an employee is enrolled in courses does not guarantee the proper skills and knowledge are being learned that will improve project success. Lueders and Kotnour (2001) described a situation that is very common across many organizations, in that “a project manager may take a hodgepodge of project management classes but these accumulated classes may not provide the project manager with the basis and tools to succeed in the organization or ensure that this particular training would meet the organization’s requirements.” Given that in most instances, the organization is paying for the courses, the organization has a responsibility to ensure the programs in which their employees are enrolled are complete, focused, and relevant to the skill building needs of the individual, while aligned with the business strategy and goals of the enterprise.

While the graduate and certificate programs have merit, they must be supplemented with other educational aspects to have a complete project manager development program. While certain aspects of the profession might be learned in a classroom setting through simulation and with case studies, there are other aspects of the job that require a different type of experience. Particularly hard to train in a classroom are the soft-skill aspects of the job. Just as you cannot teach a person to swim in a classroom, the manager cannot be developed in one (Mintzberg, 1990). Mentoring must also be part of the program. To develop the project manager, the formal training must be combined with experiential learning and aligned with the organizational strategy for projects.

So how can the training in which the employees are enrolled be aligned to meet the needs of the organization? How is the organization and/or the individual to choose what program to attend? How does an employee come up with an individual development plan to build a foundation for project management competence? The answer lies in the fact that both the employer and the employee are partners in this dilemma. The management must commit to the evaluation of courses, invest in the development of supplemental courses to complete the program, and provide meaningful coaching and opportunities to gain experience. The employee for their part must take on the additional required training in the project management discipline to supplement their technical knowledge.

A Development Program Model

Since it is necessary to supply employees in the project management role with the skills they require so that the organization achieves its goals, a program was developed at one company out of this research. The program is based on the PMCD® Framework (PMI, 2002), the *PMBOK® Guide* (PMI, 2000) and the company’s own needs and methodology.

The program is much more than training: it is a development program that also includes practice and mentoring. This particular program was created by both the project managers and executive champions in the organization. The program allows flexibility for personal situations in that there is a choice of either short-course based programs or graduate courses. Typical knowledge courses in the program align with those of Exhibits 1 and 2. In addition, courses are required in project management software, personal skills, and specific company project methodology and proficiency. The program requires the PMP certification from PMI. This provides for a continuous learning cycle because maintaining the PMP is a requirement for internal certification. The recertification as a PMP is monitored and tracked by PMI and thus reduces internal costs. The completion of the company program awards the project manager with an internal certification and recognition.

The developers took into account the demands on the project managers’ time by ensuring the courses are available from either classroom, live e-learning or taped distance e-learning formats. This delivery also benefited the global rollout of the courses to divisions around the world in a cost-effective manner. In conjunction with the program development, the project manager career path established covers education, certification, experience, job responsibility, technical expertise, problem analysis, decision making, planning, guidance, supervision, degree of risk, and advancement criteria.

The benefits to the employers from this employee development “include the value of having qualified staff that are more able to meet business and organizational goals through the successful management and delivery of projects” (Crawford and Gaynor, 1999; Standish Group, 2001). Executive sponsors in the organization now look to staff their projects with project managers who are certified or are pursuing the company’s certification. The project managers also benefit from increased confidence to perform their job with the tools and experiences provided through the program. Project managers are pleased with the offerings and the investment the company is making in their development. The internal certification awards them a level of recognition for their profession.

Recommendations

Academic providers of credit-granting courses as well as the short-course providers should ensure their offerings are aligned with the *PMBOK® Guide's* knowledge areas and competencies, provide for adequate practice, and align to the needs of their customers.

Organizations should consider their development approaches for project managers. A large portion of company resources go into projects. Knowing that having skilled project managers can improve project success should be an easy sell for organizations to invest in developing their project managers. The type of program and the way courses are delivered depend on the specific organizational size and needs. Organizations can find external training providers who can offer development program courses that are aligned to the nine *PMBOK® Guide* knowledge areas. The management can utilize existing competency models for project manager development as a guide for selecting courses and developing a program. Supplemental courses to expand the program for internal skill requirements for company methodology should be added. Management must also still consider the importance of on-the-job training. There must be a method for mentoring and coaching newly appointed and trained project managers.

Conclusions

A review of graduate coursework as well as certificate-based courses in project management shows that offerings are abundant. The benchmarking results show that while organizations are putting project managers in place, and in instances with official titles, very little is being done to develop the skills of their project managers.

Further results from the survey show that few organizations offer project management training programs and even fewer are requiring an internal or external certification. The concern with this approach is that the organization is likely not seeing the benefits from this hodgepodge of training that it could achieve when compared with a more focused and comprehensive approach.

Kerzner's (2003) 16th point to project management maturity is, "(to) institute an all-employee training program with periodic updates based on documented lessons learned." The training of the project managers is essential within this type of program.

The project manager has been likened to the maestro of an orchestra (Abramovici, 2001). To become a maestro takes more than learning to read notes. It takes a tremendous amount of training and discipline to coordinate the efforts of all the individuals who make beautiful music. We would not expect an untrained ear to lead a symphony; why do we expect project managers to deliver successful projects without investing in their development skills?

Organizations need to make the commitment to improve their project manager development. The coursework required is available. The organization must select for their project manager the blend of off-the-shelf courses, internal courses, and experiential learning that is aligned to the goals of the business to achieve sustained project success.

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