

Overview

New York State IT employees reported their personal level of proficiency in 126 skills associated with IT work in state government. (All the skills are listed in alphabetical order in Appendix C). Proficiency was rated by choosing one level from a five-point scale ranging from “none” to “expert.” Overall, the greatest proficiency is concentrated in management skills, system design and development skills, technical support skills, and legacy technologies. Among the top 25 skills, eleven are general management skills such as oral and written communication and supervisory skills. Lower overall proficiency is associated with networking, web-based services, security, and information analysis and use. No skills in these areas appeared in the top 25.

There is little difference among proficiency rating patterns associated with agency size, grade level, or education. However, younger employees tend to have higher proficiency ratings in newer technical skills such as those associated with the Web, while older workers have higher proficiency ratings in management and traditional technical skills such as those associated with system design and development. The most striking differences are associated with job specialties. Within each specialty area, high proficiency exists in a number of skills appropriate to the specialty.

Assessing skill proficiency

A very wide variety of IT skills is needed to support an enterprise as diverse as state government. Each employee usually needs to have command of a suite of skills to accomplish daily work assignments, but no single employee would be expected to be proficient in all 126 skills assessed in the survey. In this study, employees assessed their own skill proficiency by rating themselves using a five-point scale that ranged from “none” to “expert.”

Respondents were asked to reflect on their ability to apply each of the 126 skills in a work environment based on their personal experience and training, even if they did not currently use a particular skill. The proficiency scale and definitions are listed below:

- **None** – not able to apply this skill
- **Basic** – able to handle only the simplest assignments or tasks
- **Intermediate** – able to handle independently many types of assignments or tasks
- **Advanced** – able to handle independently nearly all types of assignments or tasks
- **Expert** – able to handle independently all types of assignments or tasks and serves as a role model or coach for others

Given the number of important variables that influence the state IT enterprise and workforce, no absolute measure of statewide proficiency is possible or appropriate. The skill proficiencies vary widely according to several factors. For example, some skills represent fundamental knowledge areas, such as principles of programming, which are prevalent in all agencies and most jobs. Others are very specific IT tools that are used only in certain situations or organizations, such as Java Studio. In addition, proficiency for each skill varies according to different contextual factors such as job specialty or because a certain agency uses one tool while other agencies use another for similar work. Moreover, the desirable distribution of proficiency levels can vary widely depending on these same factors. For example, for a very high-end technical tool, it may be quite appropriate that a few people have expert proficiency while most employees have little or none. For a different skill, one that is more linked to the essence of IT work such as principles of operating systems or system design and development, we would expect to see a wider distribution of proficiency with some employees at the high and low ends and most people in middle.

Because the proficiency ratings were based on a scale, we were able to calculate mean proficiency ratings for each skill. For purposes of estimating mean proficiency ratings, we omitted responses of “none” for all analyses except those which look at the data by job specialty. No single employee would possess proficiency in every skill. For example, we would expect very few people to report a proficiency in Linux because few state agencies have adopted or explored it. Similarly, a person whose job concentrates on desktop computing may have no need for proficiency in network architectures or mainframe operations. Therefore throughout the report (except for presentations that are based on job specialties) we use a proficiency rating scale of 1 – 4 where 1 = basic and 4 = expert. When exploring job specialties, however, we use the full five-point rating scale where 1 = none and 5 = expert. In these instances we included responses of “none” in our analysis to more accurately capture those instances where employees lack proficiency in skills that are actually relevant to the tasks and work activities they need to perform.

Table 5 illustrates the general proficiency rating data available for each skill. It shows the ten technical skills with

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the highest mean proficiency rating among employees who report having at least basic proficiency. (Table E4 in Appendix E shows similar data for all skills in the survey listed in alphabetical order.)

Table 5. Top ten technical skills by mean proficiency ratings

Skill	N	Mean*	Basic	Intermediate	Advanced	Expert	None
Principles of programming	2,588	2.36	566 (22%)	645 (25%)	722 (28%)	329 (13%)	326 (13%)
Windows operating systems	2,809	2.35	544 (19%)	926(33%)	916 (33%)	283 (10%)	140 (5%)
COBOL	2,781	2.21	589 (21%)	424 (15%)	453 (16%)	249 (9%)	1,066 (38%)
Principles of operating systems	2,759	2.18	710 (26%)	922 (33%)	729 (26%)	217 (8%)	181 (7%)
Support for desktop applications	2,793	2.13	669 (24%)	666 (24%)	506 (18%)	211 (8%)	741 (27%)
Hardware & maintenance support	2,795	2.09	710 (25%)	559 (20%)	477 (17%)	207 (7%)	842 (30%)
Help desk activities	2,803	2.05	792 (28%)	627 (22%)	497 (18%)	196 (7%)	691 (25%)
Systems implementation	2,791	2.04	717 (26%)	822 (30%)	498 (18%)	157 (6%)	597 (21%)
System life cycle planning principles	2,793	2.02	759 (27%)	707 (25%)	506 (18%)	145 (5%)	676 (24%)
Testing & evaluation	2,797	1.98	791 (28%)	866 (31%)	454 (16%)	151 (5%)	535 (19%)
Structured system analysis and design principles	2,793	1.98	743 (27%)	749 (27%)	457 (16%)	125 (5%)	719 (26%)

* Means include those employees who have at least basic proficiency, calculated on a four-point rating scale: 1 = Basic, 2 = Intermediate, 3= Advanced, 4 = Expert. Row totals may not equal 100% due to rounding.

Most of the top skills are broadly distributed across the levels of proficiency. For example, few employees reported having no proficiency in principles of operating systems, while the numbers reported at basic, intermediate, advanced and expert levels resemble a normal distribution with small numbers at the high and low ends, and most in the middle range. COBOL has a different rating distribution because its use is phasing out in most places and many employees have never used it. However, the mean proficiency rating among those who do have the skill is relatively high.

Overall patterns of skill proficiency ratings

The highest proficiency ratings were reported for management and traditional IT skills. The skill with the highest

reported proficiency rating is principles of programming (mean 2.36 on a four-point scale). Among the top ten, the other technical skills are COBOL (2.21), principles of operating systems (2.16), support for desktop applications (2.13), and hardware maintenance and support (2.09). The management skills in the top ten were written communication (2.27), oral communication (2.21), customer service (2.16), leadership (2.14), and supervisory skills (2.12). Of the top 25 skills by mean proficiency rating, ten are management skills.

In the full set of 126 skills, overall mean proficiency ratings range from a high of 2.36 to a low of 1.48 on a four-point scale. On average, employees rated their proficiency level as basic for 30 skills, intermediate for 19, advanced for 10, expert for 3 and no proficiency for 62 skills. However, assessing all 126 skills by comparing only the mean scores masks important contextual factors that affect proficiency ratings. The next sections explore these contextual factors in more detail.

Skill proficiency rating patterns by job specialty

Not all skills are needed by all information technology employees. Instead, specific skill sets are associated with the type of work an employee performs. We therefore analyzed skill proficiency ratings within job specialties. Table 6 lists the high proficiency skills reported by respondents in each job specialty area. These are the skills whose mean proficiency ratings were the equivalent of “intermediate” (a mean of 3.0 on a 5-point scale) or higher in the survey results.

Overall, New York State’s IT employees report high levels of proficiency in many skills that seem essential to their job specialties. For example, technology managers have high proficiency ratings in management competency skills such as supervision, leadership, and communication. Database administrators and analysts reported their highest proficiency ratings in skills associated with systems and database techniques, while programmers report high proficiency ratings in key programming and systems principles. Other technical specialists have high proficiency ratings in areas such as support and maintenance. (See Table E5 in Appendix E for a complete list of skill means by job specialty.)

Table 6. Top 10* skills with high proficiency ratings by job specialty (listed in order of mean proficiency ratings, starting with highest)

Skill Proficiency Ratings

Technology managers	Database specialists	Data communications & telecommunications specialists	Operations specialists
<ul style="list-style-type: none"> • Supervisory skills • Leadership • Written communication • Managing agency staff • Planning & evaluation • Oral communication • Principles of programming • Organizational awareness & business knowledge • Project management • Managing consultant staff 	<ul style="list-style-type: none"> • Principles of programming • Database design & development standards • Database applications development techniques • Written communication • COBOL • Windows operating system • Structured system analysis & design principles • System life cycle planning principles • Testing & evaluation • Oral communication • Principles of operating systems 	<ul style="list-style-type: none"> • Windows operating system • Principles of operating systems • Network configuration • Written communication 	<ul style="list-style-type: none"> • Mainframe operations • Principles of operating systems • Windows operating system • Supervisory skills
Programmers	Other Technical Specialists	Business Specialists	Systems specialists
<ul style="list-style-type: none"> • Principles of programming • Windows operating system • Written communication • Principles of operating systems • Oral communication 	<ul style="list-style-type: none"> • Windows operating system • Principles of operating systems • Support for desktop applications • Help desk activities • Hardware maintenance & support • Customer service 	<ul style="list-style-type: none"> • Written communication • Oral communication • Leadership • Supervisory skills • Customer service • Windows operating system 	<ul style="list-style-type: none"> • Principles of operating systems • Principles of programming • Windows operating system • Written communication • Oral communication

** High proficiency is defined as a rating of 3.0 or higher on a 5-point scale. Not all specialties had 10 skills that met this criterion.*

Skill proficiency rating patterns by grade level, age, and size of agency IT staff

As would be expected, those in upper and middle management levels reported higher proficiency ratings in a larger number of management skills than those at the entry or journey levels. Entry level employees have higher proficiency ratings in operations support activities, consistent with observations that jobs allocated to G-22 and below tend to perform help desk, call center and desktop support tasks.

Age-related differences are also apparent. Younger (39 and younger) employees tend to have higher proficiency ratings in newer skills such as those associated with the Web and information analysis. This may be related to another pattern in which respondents with more private sector experience, who also tend to be younger, reported higher proficiency ratings in the same areas. Older employees (40 and older) have higher proficiency ratings management skills and mainframe-oriented technologies.

There were no substantial differences among small, medium, and large agencies with respect to the level or

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pattern of employee proficiency ratings.

Use and importance of skills

The survey also asked employees the extent to which certain skill groups (such as management, security, or information analysis) were important to their current work and the extent to which they currently used these groups of skills. Responses show expected patterns. People in the different job specialties were more likely to say that skills pertaining to their specialties were both more used and more important to their jobs. Older workers and those in higher grade levels were more likely to emphasize the use and importance of management skills than younger workers.
