Project Design, Research Team, and Methodology

If you torture data sufficiently, it will confess to almost anything.
—Fredric M. Menger

This chapter presents an overview of the study’s project design and research methodology. First, we discuss definitions and framing questions extracted from a very extensive literature that elaborates upon business process improvement and innovation. Second, we describe and define business processes studied and explain why they were selected. Third, we provide a framework for understanding each process’s relative impact on an institution and barriers for improvement. This framework is central to our study and we use it to articulate many of our research hypotheses. And fourth, we present the quantitative and qualitative approaches we used to gather data and conduct our research and analysis.

Innovation and Business Process Performance

Our study focuses on business process performance and only indirectly on innovation. We recognize that in many instances, significant improvement in business process performance is a result of innovation. But improving business process performance is not dependent upon innovation. Nevertheless, studies of innovation inform this study.

There is extensive literature on business innovation (references can be found in Appendix D). R. L. Daft (1978), for example, defines organizational innovation as “the adoption of an idea or behavior that is new to the organization adopting it.” A further and significant distinction is made in the literature contrasting technological and administrative innovation.

Technological innovation looks at the adoption of new technologies such as enterprise resource planning (ERP) systems or course management systems (CMS); at which technologies are adopted, rejected, or accepted within organizations; and at reasons or processes that influence successful or failed adoption. The study of administrative innovation is similar, but focuses on the adoption of new business processes or new ways of doing business. Typically, administrative innovation lags behind technological innovation, which we have repeatedly learned in ECAR studies of ERP, IT security, and classroom technologies.

Noteworthy, too, are studies that concentrate on the use of an innovation rather than the innovation itself, because use produces a better set of measures as to the value of the innovation to the organization. Moore and Benbasat (1991) include these characteristics:
Relative advantage. The degree to which an innovation is perceived as being better than its precursor.

Compatibility. The degree to which an innovation is perceived as being consistent with the existing values, and past experiences of potential adopters.

Ease of use. The degree to which the innovation is perceived as easy to understand and work with.

Result demonstrability. The degree to which individuals can identify and communicate the results or consequences of using the innovation.

Image. Prestige or individual visibility associated with participating in the innovation.

Visibility. The degree to which the innovation is perceived throughout the organization.

Voluntariness. The degree to which the adoption of the innovation was voluntary or required of those affected.

Lastly we reviewed studies of how technological innovation and administrative innovation affect one another. According to Pennings and Buitendam (1987), for example, “the meshing of new technology with organization design, process, strategy, and external relationships appears to be one of the most important issues of the next decade.” Indeed, “the complex issues surrounding the transformation of business at such a fundamental level require the simultaneous development of both business methods and the technology that supports these methods. This is the seedbed for a new discipline that industry and academia are coming to call services science.”

Services science merges technology with business processes and organizations, a combination of recognizing a company’s pain points and an understanding of the tools that can be used to correct them. To thrive in this environment, an IT-services expert needs to understand how that capability can be delivered in an efficient and profitable way, how the services should be designed, and how to measure their effectiveness. (Horn, 2005)

Process Definitions

The activities of a college or university can be broken down into hundreds of individual business processes. Some business processes are narrow and localized in a single department or even one individual’s job. Others cross organizational boundaries and can involve the work of many employees and students.

In 1998, the National Association of College and University Business Officers (NACUBO) published the article “Navigating the Process Labyrinth: A Process Model for Higher Education” (Blustain, 1998), in which the author identified 123 major processes performed at a typical higher education institution. Some were further broken down into four to five subprocesses.

The full range of higher education processes is too broad for us to study. Also, higher education has not invested equally in the improvement of all of its processes. For those reasons, we selected a subset of higher education processes using three criteria for inclusion:

- processes that have been a significant recipient of process improvement attention;
- processes that have been impacted by higher education’s investment in ERP, the Web, and other enabling technologies; and
- processes that are used by most, if not all, institutions.

Not surprisingly, we elected to study major processes in financial management, human resources, student services, and grants management. It was our view that these areas most closely met our criteria. They were the focus of the majority of process reengineering projects. They were impacted all or in part by major ERP implementations.
They have been the areas where institutions have moved aggressively to use the Web to promote self-service for faculty, students, and staff.

In addition, we included the category of management information and analysis. While some might argue that the activities selected are not purely business processes, we felt strongly that they should be included. Institutions are looking to improve management reporting and analysis because many see this area as a major benefit of their technology investments. Further, without effective business processes that can also capture requisite data, effective analysis in support of decision making is problematic.

For each category, we identified a set of major processes and developed a brief definition for each (see Appendix C for definitions). Table 3-1 lists the processes that were included in each category. In all, 48 processes were selected. In naming and defining the processes, we sought to use generic language that would be understood by our respondents.

Table 3-1. Business Areas and Processes

<table>
<thead>
<tr>
<th>Category</th>
<th>Process</th>
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<tbody>
<tr>
<td>Financial Management</td>
<td>1. Develop budgets</td>
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<td></td>
<td>2. Create accounts</td>
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<tr>
<td></td>
<td>3. Track budgets and expenditures</td>
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<tr>
<td></td>
<td>4. Prepare external financial statements</td>
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<td></td>
<td>5. Purchase small-dollar items</td>
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<td></td>
<td>6. Purchase large-dollar items</td>
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<td></td>
<td>7. Pay invoices</td>
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<td></td>
<td>8. Fulfill check requests</td>
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<tr>
<td></td>
<td>9. Receive cash</td>
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<tr>
<td>Human Resources</td>
<td>1. Recruit employees</td>
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<td></td>
<td>2. Hire faculty</td>
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<td></td>
<td>3. Hire staff</td>
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<td></td>
<td>4. Manage compensation</td>
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<td>5. Manage positions</td>
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<td></td>
<td>6. Administer benefits</td>
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<td></td>
<td>7. Manage labor distribution</td>
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<td></td>
<td>8. Record time and attendance</td>
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<td></td>
<td>9. Issue paychecks</td>
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<td></td>
<td>10. Produce payroll reports</td>
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<tr>
<td>Student Services</td>
<td>1. Recruit students</td>
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<td></td>
<td>2. Manage recruiting events</td>
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<td></td>
<td>3. Evaluate applications</td>
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<td></td>
<td>4. Admit students</td>
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<td></td>
<td>5. Administer tuition and fees</td>
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</table>

(Continued)
Process Framework

The business processes selected differ significantly in their purpose and ownership. They also differ in degree of difficulty for improvement and payback for improvement to the institution. As a consequence, we would not expect an institution to try to achieve excellence in all of these processes. For example, some are shaped significantly by external agencies with formats that must be complied with, eschewing any creativity by the institution. For other processes, the potential benefits of high performance may not be worth the cost of improvement.

In recognition of these differences we created a framework to help us differentiate among the processes selected and suggest plausible outcomes. The logic of this model is drawn from the fact that colleges and universities are political organizations often with high managerial ambiguity, unclear goals, and complex decision-making processes that best resemble stakeholder politics (Cohen and March, 1974). The framework employs two dimensions. The first dimension, or continuum, is breadth of political engagement—from low or narrow...
political concern to high or broad political concern. For example, some processes are very relevant to a small or focused portion of the institution, while other processes affect virtually everyone. The second dimension pertains to the strategic impact of the process. At one end of the spectrum are processes that have a low strategic impact. These processes depend, to a large extent, on local “championship”; unless someone takes a stand for these processes, they are likely to draw little attention. At the other end of the spectrum are processes with a high strategic impact. Often, there is high resistance to change these processes, and doing so is often perceived as an opportunity to “bet your career” on a high payoff. These high payoff processes offer an institution a potential for strategic differentiation among competitors if they can achieve high levels of process performance. Advising students is one process that offers the potential for strategic differentiation.

Together these two axes produce the two-by-two matrix presented below (see Figure 3–1). We used the matrix to formulate our hypotheses regarding the process performance we would expect to see in each quadrant of the matrix.

The authors surmised that process performance would prosper chiefly under two conditions:

- Where processes are of narrow political concern (low breadth of political engagement) and where the impact of processes is high. This category consists of “low political engagement, high gain.” Change to processes like these is relatively easy to make. Just do it! (Quadrant 3)
- Processes that are of widespread concern (high breadth of political engagement) are inherently risky to change, and the impact of processes is high. The model predicts that such processes would also receive high performance ratings. We predict larger variances in performance in processes of this type, as efforts to enhance these processes are often “bet your career” kinds of opportunities. (Quadrant 4)

Two other conditions make it less likely to find high process performance:

- Change to processes that are of focused concern (low breadth of political engagement) and of low strategic impact depends to a great extent on local “championship.” The unspoken words here are: “unless someone makes a stand here, there are likely to be bigger fish to fry.” In other
words, in the absence of strong leadership, the owners of institutional processes like these are predicted to make things work as they are. (Quadrant 1)
Processes with a low strategic impact that nevertheless engaged the broad attention of the academy are rarely perceived to be worth the effort. These are processes whose adequate performance can be tolerated and for which reform “could await another day.” (Quadrant 2)

Applying the Framework
We sorted the selected business processes into the appropriate quadrant based on our assumptions regarding their strategic impact and ownership. The quadrants have the following characteristics:
◆ Quadrant 1—low resistance/local return: “make it work”
◆ Quadrant 2—high resistance/local return: “tolerate”
◆ Quadrant 3—low resistance/high return: “just do it”
◆ Quadrant 4—high resistance/high return: “bet your career”
The remainder of this section presents our baseline categorization of the processes in the study.

Finance
The majority of the finance processes map to Quadrant 1. This reflects the heavy regulatory influence on finance processes and the traditional central authority of the chief financial officer over these processes. Quadrant 1 finance processes include:
◆ Create accounts
◆ Prepare external financial statements
◆ Pay invoices
◆ Fulfill check requests
◆ Receive cash
Quadrant 4 contained the second most processes with two. They include:
◆ Develop budgets
◆ Track budgets and expenditures
We placed the last two budget processes in this quadrant because their strategic impact is significant. There are typically numerous shadow systems that support these processes leading to conflicts over budget allocations and reconciliation. And typically far more stakeholders including deans, department chairs, college administrators, and multiple central offices believe they share ownership of these processes.
“Purchase small-dollar items” is placed in Quadrant 2. It is a commodity process with broad political engagement. Finally, “purchase large-dollar items” is placed in Quadrant 3. Because significant institutional resources are expended through this process, it has a greater strategic impact. It tends to be more centrally controlled, especially in public institutions.

Human Resources
Like finance, the majority of the HR processes map to Quadrant 1. These processes are heavily influenced by legal and regulatory requirements and are traditionally controlled by central administration. The Quadrant 1 HR processes include:
◆ Administer benefits
◆ Manage labor distribution
◆ Record time and attendance
◆ Issue paychecks
◆ Produce payroll reports
We mapped four processes into Quadrant 2:
◆ Recruit employees
◆ Manage compensation
◆ Hire staff
◆ Manage positions
These processes are typically diffusely controlled in an institution. Many departments craft local hiring practices and criteria, which may vary significantly. The overall process tends to be a commodity process, but for reasons stated, our hypothesis is that they are more difficult to change.
Finally, we mapped the “hire faculty” process into Quadrant 2. We discounted its strategic impact because the aspect of faculty hiring we included in the study related primarily to the administrative steps to hire rather than to the recruitment and selection of new faculty.

Student Services
Many of the student processes also mapped to Quadrant 1. These include:
- Evaluate applications
- Admit students
- Produce student bills
- Process payments
- Manage receivables
- Process aid applications
- Determine financial need
- Verify aid application
- Package loans
- Produce reports to lenders and agencies
- Maintain grades

Typically such processes are controlled centrally and are more commodity-like. Some, such as the financial aid processes, are regulated by external agencies.

The student area also contains several processes with much broader stakeholder influence on process design and execution. These are Quadrant 2 processes, which include:
- Administer tuition and fees
- Maintain course catalog and schedule
- Process student course enrollments

Quadrant 3 contains two processes that can have a greater strategic impact for the institution, but are controlled by relatively few stakeholders. These include:
- Recruit students
- Manage recruiting events

Likewise, in Quadrant 4 are two additional processes with greater strategic impact, but with broader political engagement. They include:
- Advising process
- Audit degree completion

Grants Management
We placed the process “prepare grant proposals” in Quadrant 2. The preparation of grants must often comply with explicit rules and timelines and conform to agency-determined criteria. At the same time, different funding agencies, both internal and external, create their own processes, rules, and criteria making it difficult to establish a more uniform and easy to use process.

The “track grant budgets” process is mapped to Quadrant 4, although it should evolve and ultimately be placed in Quadrant 3. It has many stakeholders. It is a process that has been addressed both locally and centrally. When a sound central solution is found, the ability to know what the grant holder has to spend and where funds can be reassigned can have a significant impact on grant outcomes. It also enables the institution to better track overall expenditures to lower risk, improve accountability, and to assess the overall impact and magnitude of grant activity for the institution.

“Reporting time and effort” is a highly distributed process with a broad spectrum of stakeholders. It can be difficult to change despite the fact that it is heavily influenced by external regulations. Therefore, we place it in Quadrant 2, but it should evolve to Quadrant 1.

Finally, the processes “provide grant reports to external agencies” and “obtain proposal approvals” are normally centrally controlled, mandated, and prescribed process. Therefore, we place them in Quadrant 1.

Research Team
Robert B. Kvavik and Philip J. Goldstein are the principal investigators for this study. John Voloudakis crafted Chapter 8 on the future of business process performance and, with Richard N. Katz, was instrumental in the development of the survey instrument. Julie A. Ouska and Judith A. Pirani made
significant contributions to the study through qualitative interviews and a review of the literature. Mark Nelson also contributed to the literature review.

Robert B. Kvavik earned his PhD from Stanford University (1971). He is currently professor of political science and associate vice president at the University of Minnesota. He directed the University of Minnesota’s implementation of PeopleSoft Student and Human Resources modules. He has published extensively in his academic discipline and increasingly on the impact and organization of information technologies on institutional services. Kvavik is a nationally known speaker on e-business and IT-enabled services in higher education. He is a principal author of ECAR studies on ERP, IT security, IT leadership, and student use of technology. Kvavik was appointed a senior fellow of ECAR in January 2002.

Philip J. Goldstein earned his MBA from New York University (1995). He is currently an independent higher education consultant and ECAR research fellow. Goldstein spent 16 years consulting to higher education on administrative process improvement and the adoption of new technology. He was a partner at PricewaterhouseCoopers, where his responsibilities included the firm’s ERP practices for higher education. Goldstein was also an administrator at the University of Pennsylvania for two years before being appointed an ECAR fellow in September of 2003. In 2004, he authored ECAR’s study of IT funding.

John Voloudakis earned his MBA from Boston University (1996) and completed his undergraduate studies at Tufts University. He is currently a regional practice leader in management consulting firm BearingPoint’s higher education industry practice and is an ECAR research fellow emeritus. Voloudakis has spent nearly 15 years working with and managing information systems organizations in higher education and healthcare, including five years as an IT manager at Harvard University. He has been a coauthor of or major contributor to a number of ECAR research studies, including studies on ERP, IT security, IT alignment, and networking.

Richard N. Katz earned his MBA from UCLA (1989) and was ABD (History) at the University of California, Berkeley. Katz is vice president of EDUCAUSE and founding director of ECAR. Prior to joining EDUCAUSE in 1996, Katz spent 14 years in a variety of executive and management positions at the University of California. His work at UC earned him numerous awards, including university-wide recognition for leadership and innovation in 1995, the second such prize awarded. Katz has authored or edited six books and more than 50 monographs, research studies, and articles. He is a coauthor of ECAR studies on ERP, IT leadership, and IT alignment.

Julie A. Ouska earned her MS in organization leadership from Mercy College (2005) and a BA in fine arts and a BS in business MIS from the University of Northern Colorado. Most recently she was vice president for administrative services and CIO for Mercy College in Dobbs Ferry, New York. Her portfolio included information technology, telecommunications, facilities, safety, and general and auxiliary services. Previously, Ouska was an account executive for SunGardSCT managing higher education and government outsourcing contracts. In April 2005, Ouska became a regional manager for SunGard Collegis. She also teaches in Mercy College’s online masters program for organizational leadership.

Judith A. Pirani earned her MBA from Hofstra University (1984) and her BA from Simmons College. She is an ECAR research fellow and president of Sheep Pond Associates. Her expertise is in the area of educational technology. Pirani has coauthored three ECAR studies: Wireless Networking in Higher Education, Supporting E-Learning in Higher Education, and Information Technology Networking in Higher Education: Campus Commodity and Competitive Differentiator. Previously
she was vice president at Lyra Research and Giga Information Group, where she managed worldwide research practices in digital imaging technologies.

Mark R. Nelson earned his BS from Saint Michael’s College (1991), his MBA (1998) and PhD (2000) from the University at Albany, State University of New York (SUNY). He is the digital content strategist for the National Association of College Stores (NACS). In this capacity, Nelson assists in developing and implementing initiatives and business models to support or enhance the role of college stores in the distribution of digital content. Prior to joining NACS in March 2005, Nelson was an assistant professor in MIS and IT management at Rensselaer Polytechnic Institute. Nelson was an ECAR fellow in 2003 and 2004. Nelson devotes his research to topics relating to strategic alignment of IT, cross-functional integration, large-scale systems implementation, and CIO leadership. He has authored several ECAR research bulletins and coauthored ECAR studies on IT alignment and IT leadership.

**Methodology**

The study builds upon quantitative and qualitative data from 335 institutions of higher education.

**Quantitative Data**

A quantitative Web-based survey was designed by ECAR with special assistance from John Voloudakis. EDUCAUSE staff sent an e-mail invitation with the Web address of the survey and access code information to 1,473 institutions belonging to EDUCAUSE. Senior college and university administrator—the majority were CIOs at 335 institutions—responded to the survey. Their responses provide a detailed understanding of how higher education is engaged with business process improvement and innovation. The survey’s questions are found on the ECAR Web site <http://www.educause.edu/SurveyInstruments/1004>. Appendix A identifies the institutions that responded to the survey. Note that the survey information collected is confidential. No data from the quantitative survey are presented that would make it possible to identify a particular institution or respondent and the data files we use for analysis have been purged of any data that would have similar consequences.

We use means and standard deviations in this study. Means are arithmetic averages and measures of central tendency. Standard deviations are measures of dispersion or variability. What this means is that the larger the standard deviation, the more disagreement exists among the respondents. We also did some comparison of means and regression analyses to determine levels of correlation among the variables. We refer to these analyses but do not present the figures for reasons of simplicity. Note also that percentages in some of the tables do not add up to 100 percent because of rounding.

We urge caution in interpreting these data because of the small number of institutions that reported being leaders or exemplars of business process improvement.

**Qualitative Data**

We collected qualitative data by means of interviews with IT leaders who were significantly engaged with business process performance at their institutions. Judith A. Pirani and Julie A. Ouska conducted a series of interviews with 32 senior administrators and IT leaders at 29 institutions that exhibited different characteristics based upon their survey responses. The institutions chosen

◆ rated themselves as a leader or exemplar of business process performance improvement in general, or specifically for grant, student recruitment, and/or degree audit business processes;
were undergoing significant change by addressing and modifying a large number of business processes simultaneously; 
- indicated that several of their business processes were performing unsatisfactorily; and/or 
- used employee suggestions to improve business processes.

The individuals and institutions are identified in Appendix B.

Our purpose was to uncover in greater depth what distinguished institutions that considered themselves exemplars from those that had business processes deemed at risk. One factor that distinguishes exemplar institutions is the importance of employee suggestions and we wanted additional evidence to support findings from our quantitative data. We wanted a sharper explanation of what was causing change. And lastly, we wanted a better understanding of how institutions managed to improve strategic business processes, which we hypothesize are most difficult to change.

Carnegie Class as a Distinguishing Factor


The Carnegie taxonomy describes the institutional diversity in U.S. higher education. Most higher education projects rely on the classification to ensure a representative selection of participating individuals and institutions. The study collapsed the categories as follows to obtain larger numbers for statistical and descriptive purposes:

- Doctoral/research universities (extensive, or Dr. Ext.) and doctoral/research universities (intensive, or Dr. Int.). Dr. Ext. research universities typically offer a wide range of baccalaureate programs and graduate education through the doctorate. They award 50 or more doctoral degrees per year in at least 15 disciplines. Dr. Int. typically offer a wide range of baccalaureate programs and graduate education through the doctorate. They award at least 10 doctoral degrees per year in three or more disciplines, or at least 20 doctoral degrees per year overall.
- Master’s colleges and universities (MA) typically offer a wide range of baccalaureate programs and graduate education through the master’s degree. The study grouped both master’s colleges and universities I and master II together.
- Baccalaureate colleges (BA) are primarily undergraduate colleges with major emphasis on baccalaureate programs. The study grouped the three baccalaureate college groups (Baccalaureate Colleges—Liberal Arts, Baccalaureate Colleges—General, and Baccalaureate/Associate’s Colleges) into a single BA group.
- Associate’s colleges (AA) offer associate’s degree and certificate programs but, with few exceptions, award no baccalaureate degrees.

We elaborate on differences between public and private institutions. Forty percent of the institutions in our study are private; 60 percent are public. We found little difference, however, along this dimension.

Institutions Surveyed and Their Characteristics

Figure 3-2 compares the distribution of the institutions that responded by their new Carnegie class, EDUCAUSE membership, and the universe of higher education institutions in the United States. The responding schools much more closely mirror the EDUCAUSE membership than they do the national population of institutions by Carnegie class.

Note also that the study relied on volunteers to complete the survey rather than on a
random sample, and this limits the statistical conclusions that are possible.

A statistical analysis of the data’s representation of Carnegie class and EDUCAUSE membership proved inconclusive. The findings do not support the conclusion that the institutions surveyed represent the population as a whole. Nor do they support the opposite conclusion that the respondents fail to represent the EDUCAUSE membership. Neither conclusion is statistically significant.

The survey is weighted toward smaller schools. Almost two-thirds (63.5 percent) are from institutions with student enrollments of 8,000 or fewer (see Figure 3-3).

The vast majority (70.4 percent) of our respondents were CIOs and 90.0 percent worked within their institution’s IT organization (see Figure 3-4).
The respondents, as a whole, have extensive experience (see Table 3-2). The group had on average 12.3 years of experience (mean of 12.34). The median years of experience is 9.0 and the mode was over 25 years. We found no difference in these percentages among private and public institutions. To a very small degree, AA institutions had fewer individuals with 10 years or more experience, but the small sample size leads us to caution against generalizing from our data.

Regardless of years at the institution, all of our respondents report being involved with business process performance improvement (see Figure 3-5). On a five-point scale ranging from (1) strongly disagree to (5) strongly agree, the mean level of involvement was 3.93. Fully 79 percent agreed or strongly agreed that they were involved with business process improvement. This is not surprising, as historically business process performance improvement has been a core feature and expectation of IT organizations.

Table 3-2. Respondents’ Years of IT Experience at Current Institution

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percent</th>
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<tbody>
<tr>
<td>0–5</td>
<td>88</td>
<td>26.3%</td>
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<tr>
<td>6–10</td>
<td>100</td>
<td>29.9%</td>
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<tr>
<td>11–15</td>
<td>33</td>
<td>9.9%</td>
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<tr>
<td>16–20</td>
<td>35</td>
<td>10.5%</td>
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<tr>
<td>Over 21</td>
<td>78</td>
<td>23.4%</td>
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<tr>
<td>Total</td>
<td>334</td>
<td>100.0%</td>
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Our respondents bring a great deal of experience to our study and provide a broad view of IT business process performance improvement from a variety of IT positions and institutions within higher education. We are gratified by the number of respondents, which makes the findings more than simply the observations of a small subset of the industry. In the chapters that follow, we present their collective view of IT business process performance improvement in higher education.

Figure 3-5. Respondents’ Involvement with Business Process Performance