

IBM Global Business Services



*IBM Institute for Business Value*

Human Capital  
Management

# Closing the generational divide

Shifting workforce  
demographics and the  
learning function

*In association with*



## **IBM Institute for Business Value**

IBM Global Business Services, through the IBM Institute for Business Value, develops fact-based strategic insights for senior business executives around critical industry-specific and cross-industry issues. This executive brief is based on an in-depth study by the Institute's research team. It is part of an ongoing commitment by IBM Global Business Services to provide analysis and viewpoints that help companies realize business value. You may contact the authors or send an e-mail to [iibv@us.ibm.com](mailto:iibv@us.ibm.com) for more information.



# *Closing the generational divide*

## **Shifting workforce demographics and the learning function**

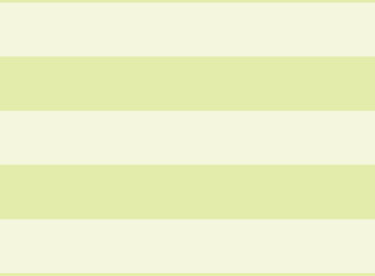
*Changing workforce demographics are having a notable effect on organizations across a variety of industries and geographies. While the learning function has significant opportunities to help companies address issues associated with this shift, it needs to reorient its focus and capabilities. To help mitigate the challenges of retiring workers and their subsequent replacements, the learning function needs to play a role in areas such as determining critical skills and capabilities, transferring knowledge and reducing time-to-competence for newer employees.*

As a result of a shift in employee demographics, many organizations are looking to solve a number of important learning-related challenges. In some companies, increasing numbers of employees are retiring, many leaving with sizable amounts of knowledge that can place the organization at risk.

For others, the challenges include maintaining a productive workforce in the face of potentially shrinking labor pools and the increased mobility of the younger generation of employees. Several industries, as diverse as electric utilities, oil and gas producers, health-care and the public sector, are clearly feeling the effects of employee retirements and the difficulty in sourcing new talent.

The learning function is in a unique position to provide assistance in these matters. Many of these issues, from the preservation of critical institutional knowledge to the rapid on-boarding of new hires, relate to the ability to share and apply formal and informal knowledge. The learning function brings a wealth of experience that can enable employees to absorb and apply insights using a variety of different channels, techniques and media. Few other areas in the organization have the depth of expertise to provide answers to these types of operational problems.

Yet, as we have seen, many learning functions have yet to develop a comprehensive plan for addressing the needs of their organizations with respect to changing workforce demographics.



For some, taking on issues beyond the formal development and delivery of courseware is seen as outside the learning function's traditional charter. Others lack the capability for assisting business units in determining critical skills and developing knowledge transfer strategies. In still other situations, the training function is already stretched with current initiatives and does not have the resources or senior management commitment to take on this issue. Despite each of these potential hurdles, the learning function has the opportunity to directly impact the organization's ability to deliver business results.

## **Study background**

To better understand the impact of changing workforce demographics on the learning function, IBM and the American Society for Training & Development (ASTD) conducted an online survey of 239 learning executives. Participants were recruited primarily through ASTD membership and existing IBM clients. The majority of respondents were headquartered within North America (86 percent), while 11 percent were located in Europe, the Middle East and Africa, 2 percent in Asia and 1 percent in Latin America. Participating companies completed a 21 item online survey during a six-week period between June and July, 2006. (See Appendix for additional survey demographics.)

# Closing the generational divide

## *Shifting workforce demographics and the learning function*

### Changing workforce demographics— The primary concerns

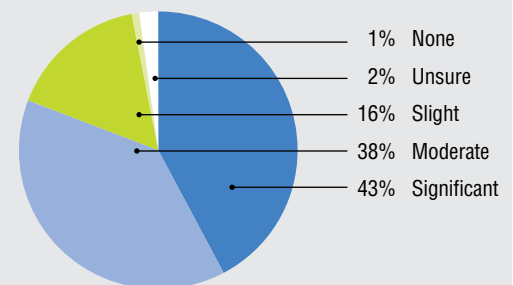
Based on our study, there are five important findings for the learning function:

- *Important issue, little action* – Most companies, and their learning functions, are ill-prepared to adapt to the changing workforce
- *Passing the torch of experience* – Transferring knowledge between generations is becoming a critical capability for today's organization
- *Beyond one size fits all* – Learning executives believe there are clear differences in the learning preferences of workers from different generations
- *Avoiding roadblocks to learning* – Older workers may find more barriers to participating in learning activities
- *Bypassing the learning curve* – Getting new employees rapidly up to speed is taking on a new priority.

#### ***Important issue, little action***

Learning executives clearly believe that the maturing workforce, coupled with smaller pools of incoming employees, will affect their organizations in the next three to five years (see Figure 1). Over 43 percent indicated that these changes will have a “significant” impact on their organizations, while another 38 percent anticipated a “moderate” impact. One respondent said, “We have mature individuals at the top of our organization. If they were to leave, a lot of experience would be lost.”

FIGURE 1.  
What impact will changing workforce demographics have on your organization in the next 3-5 years?



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

While learning executives state that changing workforce demographics represents an important issue, they also believe that their organizations have done little to address its potential consequences. Only 46 percent of learning executives report their organizations are doing either a “good” or “excellent” job in addressing demographics shifts. Further, just over 40 percent agree that their companies are addressing their overall skill and capability needs over the next three to five years.

Perhaps even more concerning is the fact that just over one-quarter of companies has plans in place to address positions that are potentially at risk due to a maturing workforce. Put together, these statistics suggest that many organizations remain unprepared. As one study participant indicated, “(My) organization fails to recognize the enormous body of information residing within senior people...when they leave, it will be too late.”

At the same time, learning executives recognize that the learning function itself is not fully prepared to address this potential crisis (see Figure 2). Only 16 percent indicated that changing workforce demographics are a “priority” area and only 40 percent are directly addressing these shifts in their learning strategies. Just over one-third of the training groups participating in the study reported they are working with specific business units or as part of a larger enterprisewide business initiative in this area.

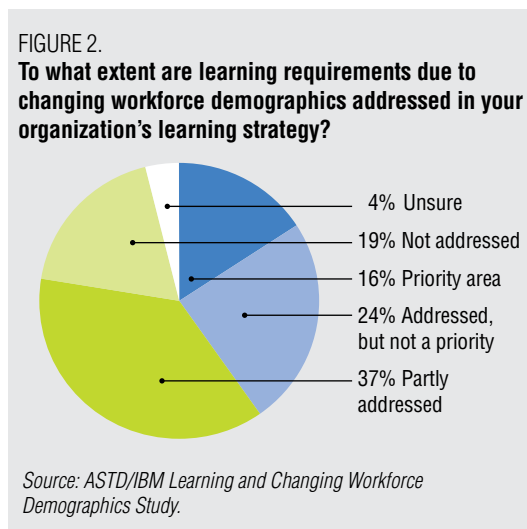
**Passing the torch of experience**

One of the biggest concerns of learning executives is the ability to preserve critical knowledge before it walks out the door. Knowledge transfer issues were the highest rated challenge associated with changing workforce demographics, cited by almost 30 percent of participants. As one respondent noted, “(We) need to develop the preoccupation for knowledge transfer and information sharing at all levels of the organization, and not only when employees are leaving. It should be considered at all times.” Despite this concern,

less than half of the organizations surveyed are specifically addressing knowledge transfer as part of their overall learning strategy, with more than one-quarter indicating they are not addressing the issues at all.

It appears that companies have begun to take some steps to more effectively pass corporate knowledge to the next generation (see Figure 3). According to study participants, 60 percent are using some form of mentoring as a way transferring knowledge, while approximately one-half of organizations are using document/ knowledge repositories as tools for capturing and preserving knowledge.

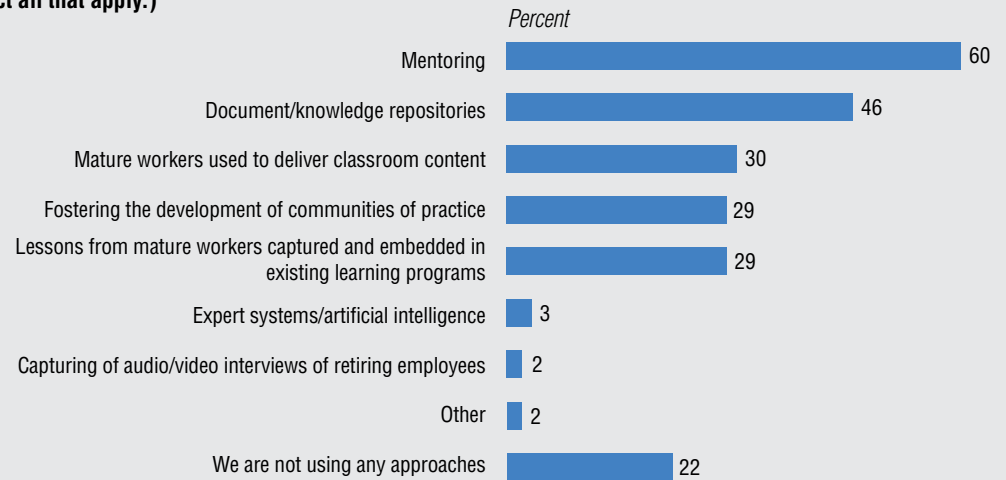
However, relatively few companies are incorporating knowledge transfer into their more traditional learning programs. For example, only 30 percent are using mature workers to deliver classroom content, 29 percent are fostering the development of communities of practice and 29 percent are capturing and embedding the lessons from mature workers into existing learning programs. Almost no companies are leveraging multimedia as a way of preserving critical knowledge – only 2 percent are capturing audio/video interviews of retiring employees.



**A single approach to knowledge transfer and training isn't enough – the learning function needs to understand employee preferences and how different generations of learners learn best.**

FIGURE 3.

**What approaches are being used in your organization to transfer the knowledge of maturing workers? (Select all that apply.)**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

***Beyond one size fits all***

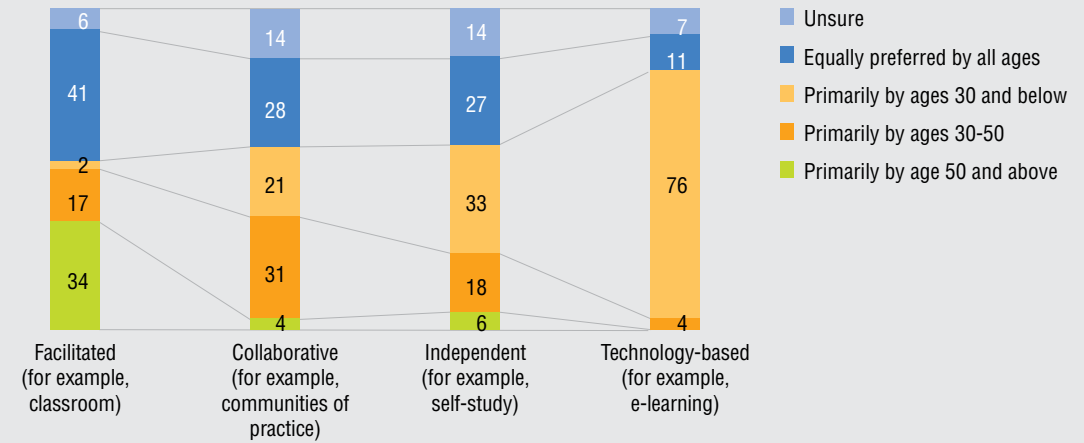
Another area of notable concern for our survey participants is the differences in learning preferences across generations. Given the advances in training technology, coupled with the experiences that different generations have had with training in the workplace, learning executives are concerned with the channels through which learning is delivered and the cost-effectiveness of those delivery vehicles. One study participant articulated the concern of many: “(We) need to ensure that methods and content are applicable and relevant to all age groups and educational levels.”

Our study found that learning executives believe there are clear differences in the learning preferences of seasoned and younger workers (see Figure 4). For example, 34 percent of learning executives stated that workers over 50 prefer classroom training, versus 2 percent who report the same is true of younger workers. Similarly, 76 percent of executives expect workers under 30 to prefer technology-based training, versus none who believe workers over 50 would. These findings, while not necessarily indicative of actual employee preferences, suggest that learning executives recognize some of the sensitivities associated with how different employee populations learn and that learning activities need to address those differences.

FIGURE 4.

**To what extent do you think the following learning methods are preferred by workers of different generations in your organization? (Select one category per learning method.)**

Percent



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

### Avoiding roadblocks to learning

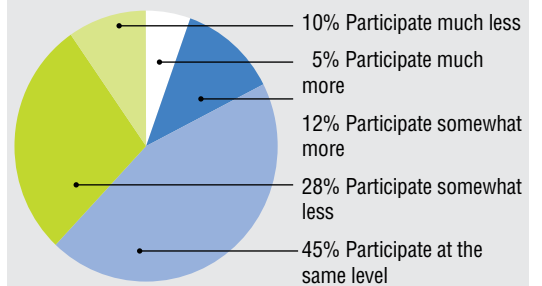
Previous research on mature workers suggests that older workers may be less likely to participate in learning activities of any kind. For example, a U.S. sample of approximately 1500 firms with 50 or more employees found that about 70 percent of all employees received formal training during the previous year, versus 50 percent of employees aged 55 and above. Of those who were trained, mature employees received less than 40 percent of the number of training hours compared to their colleagues aged 25-54.<sup>1</sup>

A host of reasons has been suggested for this difference, including: older workers have more responsibilities and therefore less time to participate in training activities; they are less interested in learning new skills; and companies are unable to recoup their investment in training older workers and so are less likely to provide them with training opportunities.

In our study, we also see that older workers are less likely to participate in learning activities (see Figure 5). While 45 percent of companies indicate that mature workers participate at the same level as younger workers, over 38 percent of the companies report that mature workers participate less than younger workers (versus only 17 percent said that older workers participate more than younger workers).

FIGURE 5.

**Compared to younger workers, to what extent do mature workers participate in learning activities in your organization.**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

**Addressing persistent, negative beliefs about providing training for older workers is a key challenge as workplace demographics change.**

Further, when asked about the barriers that prevent older and younger workers from participating in training, the results highlight some important issues (see Figure 6). Lack of time appears to be a substantial barrier to participating in training activities for both younger workers (40 percent) and older workers (41 percent) – a burden that seems to impact both groups equally.

However, two barriers appear to affect the different age groups disproportionately: whether there is a perceived resistance to learning and whether learning is considered valuable for each group. Of the surveyed executives, 28 percent responded that older workers are viewed as resistant, versus 12 percent who felt that younger workers are perceived as resistant.

Another barrier that mature workers face is the perception that training is not viewed as valuable for them. Thirty-four percent of learning executives agreed that this perception constitutes a barrier for older workers. In contrast, only 19 percent reported that their organizations felt training was not valuable for younger workers. Overall, these results

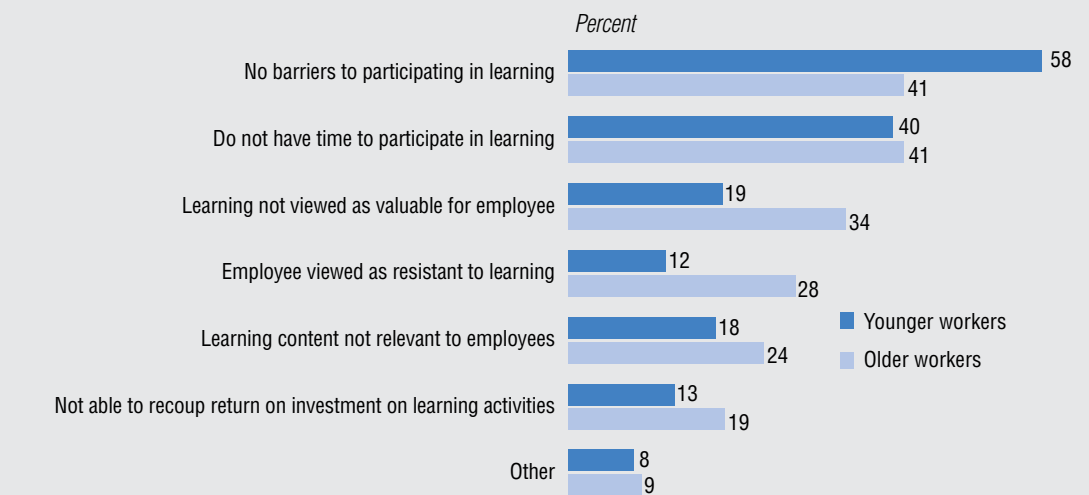
suggest that some of the traditional, negative beliefs regarding older workers may still exist in today's organizations.

***Bypassing the learning curve***

While survey participants are concerned with the challenges associated with mature workers, they are also concerned with the other side of the demographic shift. Over 20 percent cited issues associated with developing the next generation of leaders, the lack of basic skills of new employees and the need to get new employees rapidly up to speed.

One survey respondent describes the need for the learning function to “provide the new younger worker with a broad picture of the whole process that older workers have learned through time and exposure.” Another indicated that, “younger employees do not believe that they will be able to possess the breadth of knowledge and experience...they are intimidated.” This suggests that organizations need to focus not only on knowledge walking out the door, but building a capability that allows them to enable new entrants to quickly gain the necessary skills to replace the exiting generation.

FIGURE 6.  
**What barriers, if any, prevent workers from participating in learning activities? (Select top 3).**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

## Considerations for the learning executive

Based on the results of this study, and our experience working with clients in this area, we have identified five considerations for learning professionals as they work to address the issue of changing workforce demographics:

### Actions for the learning executive

- Work with HR and line-of-business leaders to increase awareness and visibility of changing workforce demographic issues
- Develop a knowledge transfer strategy to address high-value knowledge at risk in the organization
- Consider learner preferences as one input into a larger training delivery strategy
- Identify relevant opportunities for mature workers to take part in learning activities, including non-traditional learning experiences
- Focus on reducing the cycle time and increasing the effectiveness of on-boarding and management development efforts

### ***Work with HR and line-of-business leaders to increase awareness and visibility of changing workforce demographic issues***

David Ellwood, the dean of Harvard University's Kennedy School of Government, once described the challenges associated with changing workforce demographics as:

*This is not something that tomorrow, all of a sudden, will show up in the headlines. This is a slow effect of changing demographics that is absolutely predictable but with profound implications... There will never be a moment where there is a massive crisis to call attention to this. If there is a crisis, it will be too late.<sup>2</sup>*

While some industries, such as oil and gas and electrical utilities, have already begun to see the effects of changing workforce demographics, many companies remain unaware of the potential risks associated with retiring workers, and the potential difficulty in identifying and bringing on board the next generation of employees. In fact, we see many organizations seriously hampered by their inability to both understand and build an effective business case to address these effects.

Among the questions that learning professions should work to answer in conjunction with their HR colleagues and line-of-business leaders are:

1. Who is going to be leaving our organization, in terms of both eligibility outlook and attrition projections?
2. Which of our key roles and positions are going to be affected?
3. What is our business risk from these potential departures (for example, critical knowledge leaving the organization, possible inability to locate and hire skill replacements, and deterioration of important relationships)?
4. What is the relevant timeframe (that is, when will this happen and how long will it take us to remediate this)?
5. How should we respond, not only from a learning viewpoint, but from a larger talent management perspective?

As part of this analysis, the learning function can help highlight the extent to which key skills areas are at risk, determine the amount of time and cost it will take to hire and train potential replacements, and identify potential external partnerships, such as community colleges, where potential labor pools could be targeted and needed skills could be cultivated early.

**Learning functions are increasingly benefitting from two techniques to capture and share knowledge across generations – learning communities and mentoring.**

***Develop a knowledge transfer strategy to address high-value knowledge at risk in the organization***

As companies acknowledge the need to formally transfer knowledge from one group of employees to another, the learning function should play a larger role in developing and executing the strategy to accomplish this. Among these tasks are:

1. Identify the actual positions where knowledge needs to be preserved and transferred (for example, positions that are both strategically important and have a high attrition risk)
2. Determine the critical knowledge for each position and the form in which that knowledge currently exists (for example, written in documents, in the experience of individuals, built into work activities and processes)
3. Identify potential techniques to capture and share the knowledge with various audience groups
4. Develop evaluation techniques to determine the knowledge transfer effectiveness.

While there are a number of techniques that can be used to capture and transfer knowledge between different generations,<sup>3</sup> learning functions have begun to focus more time and attention on two areas: the development of learning communities and mentoring. Learning communities (frequently referred to as *communities of practice*) typically bring together individuals who have a common interest or passion around a particular work-related subject.<sup>4</sup> These groups often span departments and business units, and are focused primarily on knowledge sharing among participants. The use of communities is often viewed as an important learning technique, as these groups foster the develop-

ment of connections, relationships and context that enable knowledge to flow from different parts of the organization. Communities give junior people in the organization an avenue in which to make connections with more experienced personnel, while older workers can share learning and experiences with individuals who have already expressed an interest in their particular domain of expertise.

In many cases, learning communities can be developed in conjunction with formal learning courses offered by the organization. Students, having completed the training course, are guided toward participating in a community of individuals with real-life expertise in a set of related issues. The community continues the ongoing learning experience long after the formal learning event is completed.

Mentoring is another form of knowledge transfer that is often developed as part of a larger learning strategy. This technique has the advantage of developing the one-to-one relationships that make it easier to transfer experiential, or tacit, knowledge. Recent research conducted by Dorothy Leonard at Harvard Business School and Walter Swap at Tufts University suggests that the most effective mentoring relationships focus on “learning while doing,” where the mentor provides to the student guidance that is specifically geared to situations the student is facing.<sup>5</sup>

In addition, mentoring does not have to be limited to the traditional scenario of older workers passing along their accumulated wisdom to more junior employees. In fact, a number of organizations have seen the value of “reverse mentoring,” where younger workers with a specific area of expertise, such as new technology, are asked to help get more senior individuals better acquainted with those new ideas.<sup>6</sup>

***Consider learner preferences as one input into a larger training delivery strategy***

One of the clear messages from our study is the perception that different generational groups have clear preferences in their learning approaches. In our sample, learning executives believe that younger workers prefer technology-based learning overwhelmingly over any other learning method. This is not surprising given that younger workers are very likely to have participated in technology-based learning in their previous education, and fully expect learning programs to have some technological component. Also not surprisingly, maturing workers overwhelmingly preferred classroom-based or instructor-facilitated learning to any other method.

However, we believe that while preferences should be one consideration in determining the format for content delivery, they are only one of several factors that should be included in the decision. Effective training programs also incorporate the desired outcomes of the training (that is, the expected business results), the cost-effectiveness of different delivery channels and the ability to influence user preferences through appropriate support and motivation.

For example, mature workers can find technology-based training to be useful if they are working with a cohort of other learners to whom they can turn for assistance. Similarly, younger workers may find classroom training valuable if active learning experiences and the ability to network with other professionals are built into the learning program.

Blended learning experiences, involving both technology and classroom experiences, can provide both sets of generations with the experiences they prefer, while at the same time applying the strengths of both learning techniques. Rather than setting up different tracks of different types of employees, firms

should focus on setting up situations that allow both constituent groups to share expertise by working and learning together.

***Identify relevant opportunities for mature workers to take part in learning activities, including non-traditional learning experiences***

Our study results suggest that older workers may be perceived as resistant to training and that training opportunities are potentially seen as less valuable for older workers. We believe these misperceptions can wrongly influence companies as they are making training investments.

A number of studies have demonstrated that there is no evidence that older adults are less able to learn new skills, including the use of new technologies. While studies do recognize that older workers generally require additional learning and practice time, and may be slower in completing repetitive technology tasks, they also indicate that accumulated knowledge in older workers may compensate for declines in cognitive efficiency.<sup>7</sup>

A classic example of the value of training older workers is a 1991 study involving Days Inn, which began to recruit older workers to staff their call centers. While training some older workers took slightly longer, older workers stayed with the company an average of three times longer than their younger counterparts, effectively reducing the amortized cost of training. Further, these older workers were more likely to complete a call with a successful reservation.<sup>8</sup>

Another model of educating older workers that has been used successfully is to provide training while, at the same time, harvesting the knowledge of experienced workers. Lufthansa, the German airline recognized that many of its older workers were not participating in learning activities. An annual training evaluation showed that the company had not offered systematic training opportunities to older workers for more than ten years.

**Changing workforce demographics mean the learning function has to act quickly, both to preserve critical knowledge and train a new type of workforce consisting of employees from several generations.**

Lufthansa started an initiative to address the learning needs of managers older than 45 – the “Added Experience Program.”<sup>9</sup> Among the program’s objectives are to transfer informal skills, create a dialogue among participants to facilitate the exchange of valuable experiences, and allow top management to learn about, and tap into, the experiential knowledge of these managers. The program lasts for one year and consists of multiple one-week modules. The participants stay in the same cohort throughout the year to build the trust necessary to share the knowledge they’ve gained over the years.

***Focus on reducing the cycle time and increasing the effectiveness of on-boarding and management development efforts***

In addition to preserving critical knowledge, getting new employees up the learning curve is clearly an important issue. This is especially true given the speed in which organizations will need to replace older workers and the rapid growth in the number of employees in emerging economies, such as India and China.

One way for learning functions to bolster their on-boarding capabilities is through a combination of formal, enabled and embedded learning. *Formal* learning programs, both classroom and e-learning based, help ensure that individuals are learning consistent messages about the organization, its policies and procedures, and its values and beliefs. *Enabled* learning provides job-specific content through guided workplace experiences, where individuals get to develop skills at their own timing and pace. *Embedded* learning incorporates performance aids at the time the individual requires the new information as they do their jobs. Combining these three learning approaches allows individuals to develop proficiency in their specific roles, while providing the appropriate context for their day-to-day work activities.

**Learning function can lead the way as the workforce evolves**

Given the expected changes in workforce demographics over the next several years, the number of organizational challenges associated with the ability to share knowledge and insights is expected to grow. The learning function is in a unique position to be able to contribute tools, methods and intellectual leadership that help address the challenges associated with preserving critical knowledge, as well as enabling a new type of workforce that blends older workers looking to extend their careers and younger workers needing corporate know-how.

Our study indicates that while learning functions recognize the need to tackle these challenges, many have just begun to undertake work in this area. In some situations, the larger organizations in which they work have just become aware of these important issues. For others, the learning function will need to extend beyond its traditional mandate of course development to branch into areas such as community of practice facilitation, mentoring, the on-boarding of new employees and other forms of informal knowledge transfer.

Changing workforce demographics is an opportunity for the learning function to address an important strategic problem within today’s organization. However, if the learning function does not stand up and begin to take action, the problem will either be addressed by individuals in the organizations with less insight, or worse, be neglected altogether.

To learn more about the IBM Institute for Business Value, please contact us at [iibv@us.ibm.com](mailto:iibv@us.ibm.com). For a full catalog of our research, visit:

**[ibm.com/iibv](http://ibm.com/iibv)**

### About the authors

Eric Lesser is an Associate Partner with over 15 years of research and consulting experience in the area of human capital management. He is currently responsible for research and thought leadership on human capital issues at the IBM Institute for Business Value. He is the co-editor of several books and has published articles in a variety of journals including the *Sloan Management Review*, *Academy of Management Executive*, and the *International Human Resources Information Management Journal*. Eric can be contacted at [elesser@us.ibm.com](mailto:elesser@us.ibm.com).

Ray Rivera is the Director of the Workplace, Learning and Performance Scorecard at the American Society for Training & Development (ASTD). He has a Masters degree in Instructional Design and Technology from the University of Iowa and is completing his PhD at Stanford University. His dissertation research focuses on using intangible asset valuation methods to determine the effects of learning on performance. He is a co-author of ASTD's 2005 *State of the Industry Report*. Ray can be contacted at [riversa@astd.org](mailto:riversa@astd.org).

### About IBM Global Business Services

With consultants and professional staff in more than 160 countries globally, IBM Global Business Services provides clients with business process and industry expertise, a deep understanding of technology solutions that address specific industry issues, and the ability to design, build, and run those solutions in a way that delivers bottom-line business growth.

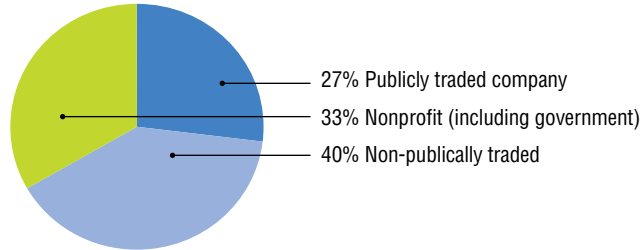
## References

- <sup>1</sup> Munnell, Alicia H. "Policies to Promote Labor Force Participation of Older People." *Center for Retirement Research at Boston College Working Paper #2*. January 2006.
- <sup>2</sup> Barrett, J. "An impending work crisis." *Newsweek*. September 20, 2002.
- <sup>3</sup> For additional information on knowledge transfer approaches related to a maturing workforce, see Casher, Amy and Eric Lesser. "Gray matter matters: Preserving critical knowledge in the 21st Century," IBM Institute for Business Value. July 2003. <http://www-935.ibm.com/services/us/index.wss/ibvstudy/bcs/a1001915?cntxt=a1000074>; DeLong, David, *Lost Knowledge: Confronting the Threat of an Aging Workforce*. Oxford University Press. 2004.
- <sup>4</sup> For additional information on communities of practice as a vehicle for knowledge transfer, see Lesser, Eric and John Storck. "Communities of Practice and Organizational Performance." *IBM Systems Journal*, No. 40, Vol. 4, 2001; Lesser, Eric, Michael Fontaine and Jason Slusher. *Knowledge and Communities*, Butterworth-Heinemann. 2000; Wenger, Etienne, Richard McDermott and William Snyder. *Cultivating Communities of Practice*. Harvard Business School Press. 2002.
- <sup>5</sup> Leonard, Dorothy and Walter Swap. *Deep Smarts*. Harvard Business School Press. 2005.
- <sup>6</sup> GE Annual Report 1999; Schlender, B. et al. "The Odd Couple." *Business 2.0*. May 2000; Breen, B. "Trickle-Up Leadership." *Fast Company Magazine*. November 2001; Low, L. "New Tricks for Old Dogs." *CIO Magazine*. October 15, 2000; Useem, M. *Leading Up: How to Lead Your Boss So You Both Win*. 2001. New York, New York: Three Rivers Press, p. 284.
- <sup>7</sup> Prenda, Kimberly and Sidney M. Stahl. "Peak job performance at any age: The truth about older workers." *Business and Health*. 2001.
- <sup>8</sup> Imel, Susan. "Older Worker Training: An Overview." *Educational Resources Information Center (ERIC) Digest no. 114*.
- <sup>9</sup> Euler, Petra, "Die vergessenen Manager trainieren." *Personalführung* 1998, p. 1.

## Appendix

A1.

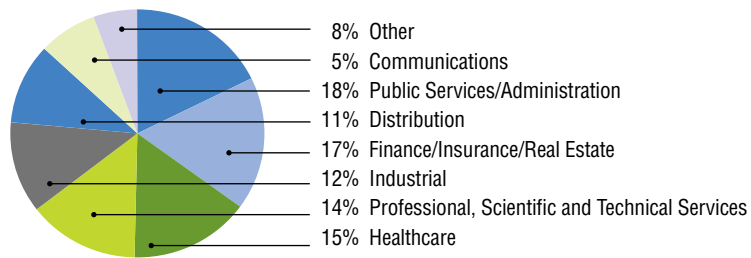
**What type of organization do you work in?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

A2.

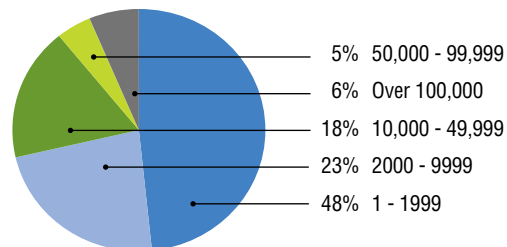
**To what industry sector does your company belong?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

A3.

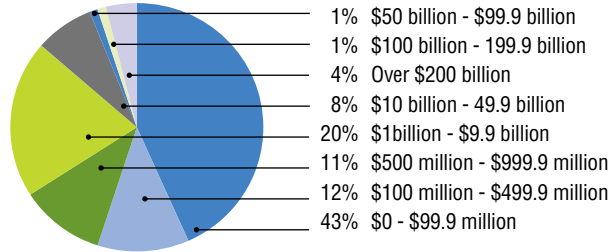
**How many employees are there globally in your company?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

A4.

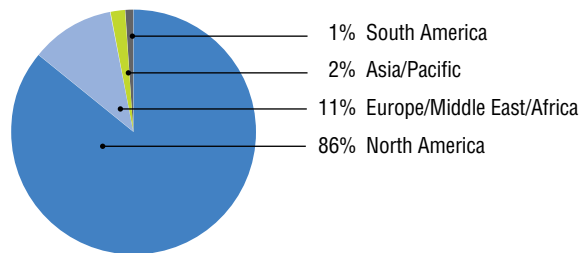
**What is the annual revenue of your company in US dollars?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

A5.

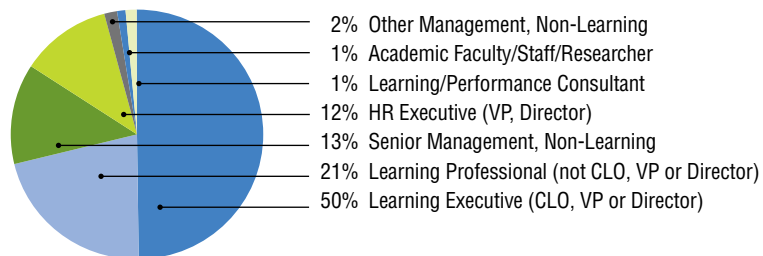
**In which region is your company's global headquarters?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.

A6.

**What is your current position?**



Source: ASTD/IBM Learning and Changing Workforce Demographics Study.







© Copyright IBM Corporation 2006

IBM Global Services  
Route 100  
Somers, NY 10589  
U.S.A.

Produced in the United States of America  
09-06  
All Rights Reserved

IBM, and the IBM logo are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both.

Other company, product and service names may be trademarks or service marks of others.

References in this publication to IBM products and services do not imply that IBM intends to make them available in all countries in which IBM operates.