New England Journal of Public Policy

Volume 34
Issue 1 *The Future of Work*

Article 4

7-10-2022

Proactive Union and Teacher Strategies for Shaping Technology in Education

Thomas A. Kochan
MIT Sloan School of Management and Institute for Work and Employment Research

Proactive Union and Teacher Strategies for Shaping Technology in Education

Thomas A. Kochan
MIT Sloan School of Management and Institute for Work and Employment Research

Abstract

Artificial intelligence and related technologies will have profound effects on the future of work in all industries and occupations, including education. But technology has no predetermined effects. How it will change work, working conditions, and the performance of organizations depends on who participates in the key decisions that (1) define the problems technology is asked to solve, (2) set the design parameters that shape specific applications, (3) link new technologies and work processes, (4) ensure that the workforce is well-prepared to use advanced technologies, (5) determine who controls the data generated by these tools, and (6) address the needs of workers whose jobs may be at risk. Yet in the United States workers and their unions are too often limited to negotiating over the impact of technology on wages, hours, and working conditions long after many of these critical design choices and related decisions are made. Unions in general and teacher unions in particular need a proactive strategy to gain a voice in each stage of the process of technology development and use. This article outlines the elements of a proactive union technology strategy for teachers and their unions.

Thomas A. Kochan is Professor, Emeritus, MIT Sloan School of Management and Institute for Work and Employment Research.

Across the world we see technologies coming into our workplaces that will change how work is done. But too often the people who are most affected and know best how technology could be used to improve their work and make it safer, more equitable, and more productive have no voice in these decisions. As a result, too many workers are left to bear the costs of technological change without sharing fairly in its benefits and, perhaps even worse, the technology is underutilized and fails to meet its objectives.

The concerns about the introduction of new technologies that apply to workers across the occupational spectrum have been brought home to educators, especially during the COVID-19 pandemic as teachers, students, and families have adapted to the challenges of on-line remote learning.

Yet changes in technology are a reality, and if new technologies are designed well with input from teachers, not just for teachers, they can help transform and expand learning opportunities in profound and positive ways. But this positive scenario will result only if teacher unions develop and implement a proactive strategy for working with advancing technologies. I have been studying and teaching what a proactive worker-centered technology strategy might entail for workers and unions across industries. In this article, I apply these ideas to propose a proactive strategy for teachers and their unions.

I draw on part of my research on shaping the future of work[1] and the project we are now doing with the AFL-CIO Technology Institute to design and deliver an online course on worker and union roles in technology strategies. The key message in this work is that local unions need to shift from the legacy US labor relations model of allowing employers to make the critical decisions regarding what technologies to purchase and how to use them. This model leaves unions only the right to negotiate over the impact of technological changes on wages, hours, and working conditions. What is needed is a proactive strategy that, for teacher unions, engages school administrators, superintendents, school board members, families, and union members in negotiated and collaborative processes for using advancing technologies to improve the education process and outcomes for all these stakeholders.

Let me start with a question I'm often asked: Why now? That is, why should we care about all of this? Consider the list in Figure 1 of the top digital technologies that one vendor believes are coming into education right now. Teachers have a lot to say about how best to put these tools to work, knowledge few of the vendors selling these wares have or are willing to consider seriously. The lesson here is that these technologies are too important to be left to the technologists.

1. eLearning
2. Video-assisted learning
3. Block chain technology
4. Big data will get bigger
5. Artificial intelligence (AI)
6. Learning analytics
7. Gamification
8. Immersive learning with VR and AR
9. STEAM (science, technology. engineering, arts and math)
10. Social media in learning

Figure 1. Top ten digital technologies in education, 2021–2022 (source: Sean Bui, "Top Educational Technology Trends in 2020–2021," November 19, 2020, https://elearningindustry.com/top-educational-technology-trends-2020-2021)

One thing we have learned from long years of labor history is that opposing technological change does not work. We learned this in the eighteenth century when the Luddites took hammers to the newly invented mechanical looms. Eventually these looms became widespread in the textile industry and opened up the industry by creating more jobs than those destroyed because the more efficient production process reduced the price and increased the demand for clothes purchased outside the home. That historical lesson and many others in industries as diverse as mining, longshoring, meatpacking, and health care tell us that a proactive strategy of preparing for, engaging, and using technology and negotiating to ensure that those affected by technological changes are compensated with positive adjustment strategies and benefits is far superior to resisting technological changes.

Randi Weingarten said this best in a recent interview for our online course:

> At the AFT [American Federation of Teachers] we have historically said we can't be afraid of technology but we have to know how to use it, and to know how to use it we have to have a voice in it. . . . If you are not on the ground floor and part of the design and discussing what goal technology is addressing it is always a matter of catch-up and dealing with what the technology is doing to you rather than how to work with these tools.

Elements of a Proactive, Teacher- and Student-Centered Technology Strategy

Figure 2 illustrates the key elements in a proactive technology strategy that guides our work on this subject. In the sections that follow I apply these to the teaching profession, focusing on AI as the core technology and the various applications it supports.

Figure 2. A proactive union strategy for engaging in technology decisions

Point 1: Define the Problems Technology Is Asked to Solve

The first leverage point for workers and their representatives in shaping technologies is to help define the problems that technologies are being asked to solve, or even better, the opportunities they might open up for innovations in education. Here is where workers in general, and teachers

in particular, need an active voice to ensure that the goal is not just to lower labor costs and replace teachers with automated learning or testing tools but, instead, to focus on how to augment and complement teachers' skills and knowledge to deal with the most intractable problems teachers experience and to expand the range of tools teachers have available to reach the diverse array of learners in and beyond their classrooms.

A classic example of the consequences of not having input from workers or other stakeholders in defining the technology problem or opportunity is the hype coming from high-tech entrepreneurs who are racing to develop driverless trucks and cars. Why is removing drivers the goal? Answer: Because Uber and some big trucking companies want to get rid of the need to pay drivers! But given the public investments in research that gave rise to the AI technologies now being developed by these companies, shouldn't the problem be defined as how to best use advances in AI and related technologies to build safer, more efficient, and more accessible transportation systems? If that were the definition of the problem, these entrepreneurs would be working with urban planners, drivers, and pedestrians to use technology to achieve this goal. Left on their own, however, technology entrepreneurs are competing to be the first to build "autonomous" or "driverless" cars. And in the process, they are failing to get there. Instead, they are reluctantly learning that people have driving skills that technology cannot replicate safely.[2]

Because of the decentralization of US education, every local teacher union should have a committee of teachers, perhaps joined by representatives of the school board and parents, that actively engages the vendors of technology early on before new off-the-shelf technologies are purchased. A joint committee would shift the process of allocating scarce public funds from a technology push of products from vendors to a technology pull of problems and opportunities defined by educators and families.

Point 2: Integrate Technology and Work System Design

Once the broad features of the problem or opportunity is determined, work turns to the design of specific tools or products. Too often workers have no voice in this early design stage. Yet that is the critical point where the effects of technology on work and jobs are determined. Workers need to bring into these decisions their knowledge of how work is done today and might be done better with technologies tomorrow. As one leading expert notes, this role for workers is particularly true with respect to AI-based technologies.

> Because machines, unlike humans, have no objectives of their own, we give them objectives to achieve. In other words, we build optimizing machines, we feed objectives into them, and off they go. . . . Machines are beneficial to the extent that their actions can be expected to achieve our objectives.[3]

As the Japanese saying goes, "It is workers who give wisdom to machines."

We learned this truth years ago when General Motors (GM) tried to automate its auto assembly plants only to spend $50 billion dollars on robots without engaging the workforce to learn how they do the difficult parts of their assembly jobs. The effort failed miserably; at the end of the decade GM was still one of the highest cost and least productive auto companies. In contrast, Toyota, which listened to its workforce and introduced robotics step by step to first eliminate the most unsafe jobs and then to make others easier, won that contest hands down.[4] And, while most auto manufacturers learned from GM's mistakes and now engage workers and their union representatives more fully as new technologies are developed and tested, for example, when new

products are launched, the infamous Elon Musk, CEO of Tesla, did not. In 2016 he was quoted as saying he was building the most automated auto assembly plant in the world—essentially without human input. Two years later he would have to eat his words when the overly automated plant could not get his model 3.0 vehicles out the door as promised. He had to admit that in his mind "humans were underrated."

In addition to evidence from the introduction of robotics into auto manufacturing in the 1980s, research on information technologies (IT) in the 1990s, and electronic records technologies in health care all demonstrate that technology strategies conceived and implemented separate from changes in organization and work practices prove to be less productive than systems that integrate technology and work practice innovations.[5]

Figure 3 illustrates this point by comparing two alternative processes for introducing technological innovations into organizations.[6] The typical process is sequential. A vendor or other inventor, and in education, perhaps one of the large publishing companies, develops a generic tool for digitizing or automating some set of work processes and sells this generic tool to organizational executives. Then a process of negotiations begins between the vendor/inventors and superintendents and perhaps the building managers over how to tailor the tool to fit with the curriculum, the standard school day, or the computer and Internet technologies available in classrooms and in students' homes. At some point teachers and their representatives are brought into this process and assessments are made to determine whether the teachers and students have the digital skills they need to use these new tools effectively and equitably.

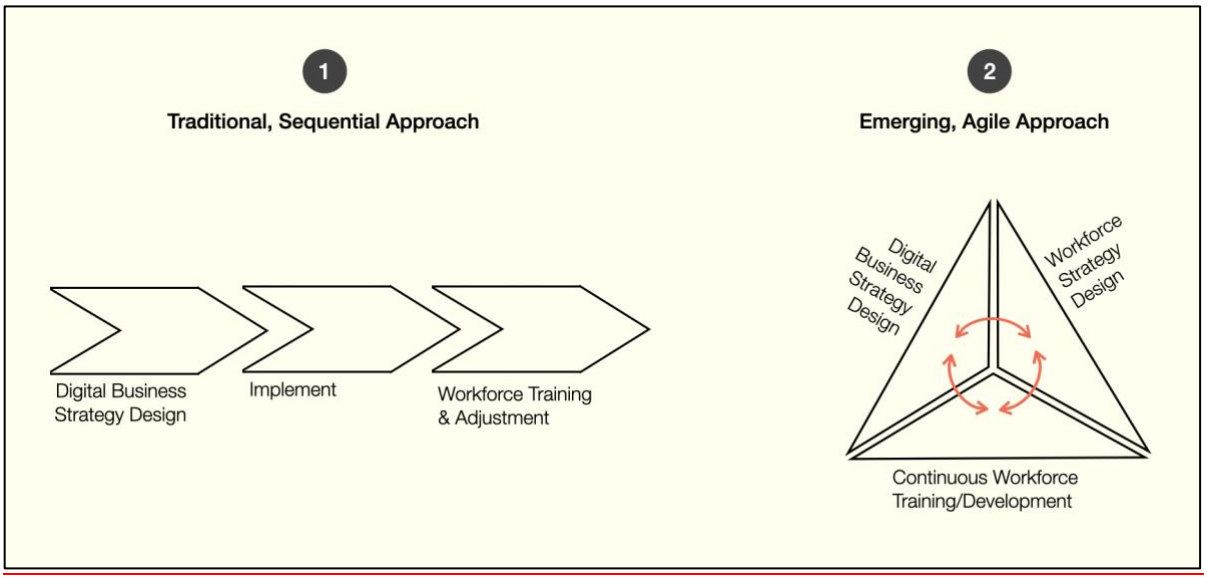

Figure 3. Sequential and integrated models of digital transformation processes

The alternative to the sequential strategy is to integrate technology design and decision-making processes with decisions about how work systems might be changed to put the technology to best use. This idea is as old as the sociotechnical studies in coal mining and other industries conducted by the Tavistock Institute in the 1940s and 1950s.[7] More recently, information technology (IT) specialists refer to this as user-based or agile development processes.[8] Specifically, these processes call for engaging the end users of the new tools at each stage of the

development, implementation, and use of new technology. To get the best returns from technology, AI included, technology and work design should be integrated, not developed in a sequential process where technology design is determined before and apart from considering its effects on work and the workforce.

An integrated strategy requires significant organizational, institutional, and public policy changes. In the United States, workers and their unions have a very weak and at best secondary right to participate in negotiations over the impacts of technological change but no rights to participate directly in the design process. To make an integrated strategy viable this practice needs to change in two respects. First, the scope of collective bargaining needs to be expanded to give workers the right to negotiate over the design of technology and to have advance notice of technological changes that will affect work processes. Second, teachers and their unions need to have some type of body available to consult on the design and implementation of AI and other technologies.

European union representatives often participate in work councils that provide advance notice of plans to purchase or develop new technologies and more opportunities for engaging the workforce in the implementation process. Some union leaders are calling for the creation of specialized "data and technology" councils in which workers, managers, engineers, and others have access to information about technology plans before they are finalized.[9] US teacher unions might in turn advocate for and establish similar councils within their local unions and with administration and school board representatives.

As teacher unions participate in decisions about how advancing digital technologies will be used, they need to keep in mind that many AI-based tools collect large amounts of data that teachers could use to improve how they do their work but that could also be used to monitor them and invade their privacy. And, unlike in Europe where the European Commission has issued a set of guidelines governing the General Data Protection Regulation, there are no legal protections teachers or other workers in the United States can rely on to protect their personal data. This issue is left to local teacher unions to address.

Figure 4 provides a comprehensive checklist of questions that local union leaders might ask when they negotiate how AI-driven digital tools will be used and how teachers and other employees can be protected from inappropriate monitoring and use of personal data. The list was developed by Christina Colclough, a globally recognized expert on these issues, based on her work with leading unions in Europe.

1. Which digital systems is the employer using that affect workers and their working conditions? What are the purposes of these systems?
2. Who designed and owns these systems? Who are the developers and vendors?
3. What transparency measures can be established to ensure disclosure of any algorithms being used in the digital systems?
4. What oversight mechanisms does management have in place? Who is involved?
5. What remedies are in place if a system fails its objectives or harms workers or if management fails to govern the digital system?
6. How do you ensure that the system is in compliance with existing laws?
7. Which managers are accountable and responsible for these systems?
8. What mechanisms can be established to ensure that workers have the right to challenge actions and decisions taken by management that are assisted by algorithms?

9. If personal data and personally identifiable information is processed in these systems, what protections for that data currently exist? What additional protectors are needed?
10. Are datasets that include workers' personal data and personally identifiable information sold or moved outside the company?
11. What mechanisms can be established to ensure that workers have the right to access and correct personal data and personally identifiable information?
12. What assessments have you or a third party made of risks and impacts (positive or negative) on workers' well-being and working conditions?
13. How do you control for and monitor possible worker harms in these systems, for example, health and safety, discrimination and bias, work intensification, and deskilling?
14. What is your plan for periodically reassessing the systems for unintended effects/impacts?
15. What are the mechanisms and procedures for amending the digital systems?
16. How will you log your assessments and adjustments?
17. What mechanisms can you put in place, so you are party to this governance?
18. What skills and competencies do management and workers need to implement, govern, and assess the digital systems responsibly and knowledgeably?

Figure 4. Digital systems governance tool (source: Christina Colclough, christina@thewhynotlab.com)

Point 3: Build Workforce Skills for Changing Technologies

New technologies often require new skills and capabilities. Yet too often consideration of the need for training and upskilling are not addressed until late in the implementation process. Thus, a third point we emphasize in teaching this subject is that workers, in this instance teachers, need to have access to training and upskilling before new technology is at the door and then continue to prepare throughout their careers for further changes in how advancing technologies will affect learning processes. In short, lifelong learning has to be the principle for educators with respect to technology as it already is for other areas of professional development.

Many teacher contracts reward continuous professional development with salary schedules that provide increases for achieving an advanced degree. These legacy features may need to be adapted to the task of preparing and rewarding teachers for learning in modern ways to acquire the technical and social skills needed to adapt to the changing nature of their work. Support for developing skills in managing online learning by taking short online or in-person classes to improve technical literacy in general and to develop the more specific technical skills related to AI-based applications need to be built into the provisions of current and future collective bargaining agreements. These need not all be "credit bearing" courses that lead to an advanced degree. Instead, training and learning systems in the private sector are moving away from formal degree-based credentials to certifications or "badges" that document mastery of specific technical or organizational abilities gained through a series of short on-line (or in person) learning modules. Moreover, unions in industries as diverse as steel, construction, automobiles, health care, and telecommunications have negotiated fixed numbers of dollars or cents per work hour that go into training funds administered jointly with their employers, some of which cover specific skills and information related to changing technologies and work processes and some that do lead to advanced degrees. More provisions like this that support emerging forms of learning and skill development would go a long way to institutionalizing and channeling lifelong learning for educators in the directions tailored to their changing profession.

Point 4: Negotiate and Implement Fair Adjustment Practices

Some technological changes will displace some workers. Thus, teacher unions need to plan for this possibility in education as well as in other industries.

Unions have been on the forefront in negotiating fair adjustment provisions for decades. The common features of these agreements provide for

- no layoffs, or at least specified protections against layoffs and procedures governing them;
- rights to bid on new jobs and, if it requires moving to a different location, rights to transfer and support for the costs of moving one's family;
- training to be equipped with the skills needed as jobs change or new jobs open up; and
- compensation for those who are displaced.

Negotiating provisions like these are as important in education as in these other industries.

Opportunities for Technology Enabled Innovations in Teaching and Learning

Points 1–4 focus on proactive strategies for addressing how teachers and their unions can gain a stronger voice as AI and other technologies are designed and introduced. But there are enormous additional opportunities for using advanced digital technologies to transform aspects of teaching and learning. I will mention just a few to encourage us all to think creatively about possibilities that could be developed.

The most obvious changes in teaching and learning reflect experiences in moving to remote or hybrid learning during the COVID pandemic. While the positive and negative lessons from those experiences are still being analyzed and debated, it is clear that broader use of communications tools such as Zoom and its competitors will be part of the teaching and learning processes of the future. How much, when, for whom, and where remote or hybrid learning lies in the future of education are choices that will be on the agenda for teachers and administrators and families for the next several years, or perhaps longer. Teachers had to adapt to and in some instances learn to use remote learning technologies in a crisis. Now it is possible to reflect on the positive and negative lessons learned from these experiences in considering how to best use remote learning tools to complement classroom interactions.

A closely related development is the enormous growth in online learning resources that students and teachers can draw on to search for information, solve problems, and support learning. Legacy training practices in industry are being transformed to more continuous learning systems that often break down what in the past may have been full-term courses into short modular lessons and that can be accessed more easily and cheaply on a remote rather than in-person medium.[10]

The availability of remote communication tools and modular lessons could open up new possibilities for altering the legacy school-year calendars to reduce the loss in retention of learning that is associated with long summer breaks. Consider the possibilities of engaging students in their homes or neighborhoods with creative modular lessons that reinforce what was learned during the "normal" school year or that offer new lessons on topics covered previously or that will be part of a student's curriculum when the fall term begins. Using technologies to reach low-income students in the summer with creative learning opportunities might help reduce the opportunity gaps low income students and families experience relative to families that can afford private summer camps.

The examples presented are meant to encourage teachers and their unions to be proactive in inventing ways to improve learning and to complement and further develop teachers' knowledge, skills, and use of time. In short, technology is too important to leave to the technologists. A

proactive technology strategy may serve as a channel for teacher unions to shape the future of education and the future of the education profession.

Notes

[1] Thomas A. Kochan and Lee Dyer, *Shaping the Future of Work: A Handbook for Change and a New Social Contract* (New York: Routledge, 2021).
[2] Mica Endsley, "The Limits of Highly Autonomous Vehicles: An Uncertain Future," *Ergonomics* 62 (2019): 496–499.
[3] Stuart Russell, *Human Compatible: Artificial Intelligence and the Problem of Control* (New York: Viking/Random House, 2019), 10–11.
[4] John Paul MacDuffie and John F. Krafcik, "Integrating Technology and Human Resources for High-Performance Manufacturing: Evidence from the International Auto Industry," in *Transforming Organizations*, ed. Thomas Kochan and Michael Useem, 209–226 (Cambridge, MA: MIT Press, 1992).
[5] Ibid.; Skilled Labor," in *The New Relationship*, ed. Margaret Blair and Thomas Kochan, 145–184. (Washington, DC: Brookings Institution, 1999); Mirko Draca, Raffaella Sadun, and John Van Reenen, "ICT and Productivity," in *The Oxford Handbook of Information of Information and Communication Technologies*, ed. Robin Mansell, Chrisanthi Avgerou, Danny Quah, and Roger Silverstone (New York: Oxford University Press, 2007); Mirko Draca, Raffaella Sadun, and John Van Reenen, "ICT and Productivity," in *The Oxford Handbook of Information of Information and Communication Technologies*, ed. Robin Mansell, Chrisanthi Avgerou, Danny Quah, and Roger Silverstone (New York: Oxford University Press, 2007); Adam Seth Litwin, "Technological Change at Work: The Impact of Employee Involvement on the Effectiveness of Health Information Technology," *Industrial & Labor Relations Review* 64, no. 5 (2011): 863–888.
[6] Christidis Antonis, Axel Miller, and Thomas Kochan, "Engaging the Workforce in Digital Transformations," Mercer/Oliver Wyman, 2018, https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2018/april/Engaging-The-Workforce-In-Digital-Transformation.pdf.
[7] Eric Trist and Ken Bamforth, "Some Social and Psychological Consequences of the Long Wall Method of Coal Getting," *Human Relations* 4, no. 1 (2019): 3–36.
[8] Isaac Sacolick, "What Is Agile Methodology: Modern Software Development Explained," *InfoWorld*, March 15, 2018, https://www.infoworld.com/article/3237508/what-is-agile-methodology-modern-software-development-explained.html.
[9] Christina Colclough, "Top Ten Principles for Ethical Artificial Intelligence," UNI Global Union, 2019, http://www.thefutureworldofwork.org/media/35420/uni_ethical_ai.pdf.
[10] Fei Qin and Thomas Kochan, "The Learning System at IBM: A Case Study," MIT Task Force on Work of the Future, Working Paper, 2020, https://workofthefuture.mit.edu/research-post/the-learning-system-at-ibm-a-case-study/.