The Economic Imperative Behind School Reform: A Review of the Literature

Cathleen Stasz

DRU-1064-NCRVE/JCB

January 1995

Prepared for the National Center for Research in Vocational Education and the University of California, Berkeley

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This paper selectively reviews the literature relevant to the economic imperative behind many school reforms in the United States. It was prepared as part of a study on skill and attitude requirements in the workplace, sponsored by the National Center for Research in Vocational Education, University of California, Berkeley. The full study report is in preparation and will be published in 1995.

The author thanks RAND colleagues Kim Ramsey, David Finegold, and Tom Glennan for their comments on an earlier draft.

The author gives permission to cite this paper.
INTRODUCTION

There is growing consensus that American education needs fundamental reform in order to adequately prepare youth for the current and future workforce.\(^1\) This belief is based on the view that changes in the workplace will require new and different skills of workers, and that America's competitive edge in the world economy will increasingly depend on the skills of its workers. In recent years, dozens of new proposals have been advanced to restructure secondary education to improve the connection between school and employment and ensure student readiness for high-skill employment opportunities (e.g., Council of Chief State School Officers (CCSSO), 1991; U.S. Department of Labor, Secretary’s Commission on Achieving Necessary Skills (SCANS), 1991). The Clinton Administration prominently places improvements in workers’ skills as key to its overall economic reform plan. The School-to-Work Opportunities Act (STWOA) aims to reform K-12 education to improve students’ preparation for work.

While reforming education is not new by any means, the urgent emphasis on preparing students for productive work in the economy appears to go way beyond the usual responses, such as programs aimed at dropout prevention or at-risk youth (Murnane and Levy, 1992). New “systemic” reform strategies emphasize changes in quality of teachers, curriculum, pedagogy, and new governance and delivery mechanisms aimed at improving outcomes for the roughly three-quarters of secondary students who do not go on to post-secondary education (or who matriculate, but fail to graduate) (cf. Smith, O’Day, and Cohen, 1990). Many reformers look to education and training models employed in other countries which appear to do a better job than the U.S. in assuring basic levels of competence, easing the transition from school to work and upgrading the skills of current workers (Rogers and Streeck, 1991).

\(^1\)The U.S. is not alone in this concern. In recent years, other industrial nations, including Great Britain (Finegold, 1992), France, Germany, and Japan, have also embarked on school reform plans for reasons similar to those discussed here.
The focus on creating a productive workforce also brings new voices into the debate, as many reforms see business and industry involvement as key inputs to bringing about needed changes in schools, in addition to the current roles they play in worker training. Increasingly, many observers recognize that new skill investments are more likely to be made if public and private participants in the broader education and training system collaborate on a strategy that benefits the economy as a whole (Bailey, 1994).

Many educators, faced with increasingly diverse student populations and declining educational dollars, welcome the new interest in public education and, for the most part, appear open to outside involvement. As educators, employers, and others initiate locally-designed reforms, or respond to state or federally directed guidance or mandates, it becomes increasingly important to understand the precise nature of new skill demands in ways that inform decision makers engaged in school reform: What skills are needed? How can they best be taught and trained? How should schooling be organized to support teaching and learning of new skills (Stasz et al., 1993)? In addition, reformers need a clear understanding of how changes in skills and attitudes gained through new educational programs can contribute to desired outcomes: how do skills link with the various levels of performance that eventually lead to enhanced economic competitiveness (e.g., performance outcomes at the work group, firm, industry, or sector)? If the goal of reform is to better prepare students to be more effective and successful contributors to the economy, we need outcome measures to assess these reform efforts.

This paper synthesizes various research literatures that examine the basic assumptions behind various education reforms for improving youth preparation for work or suggest how reformers should design programs to increase students’ work-related skills. The review is not exhaustive, but rather examines important concerns of education and training providers who must design these programs.

We begin with a brief overview of the changing nature of work and the new skill requirements that these changes imply. These changes have
received much attention in the popular press and will be familiar to many readers.

Next, we examine the evidence for new skill needs in the workplace. Less attention has been paid to describing skills and knowledge in work, and our review reveals a host of problems associated with objectively identifying new skill needs. For example, there is no widely accepted conceptualization of new skills or methods for measuring them (Berryman and Bailey, 1992).

Finally, the review reveals that it is extremely difficult to link worker skills to performance outcomes even at the firm level, let alone higher levels such as the industry as a whole. Thus, specific relationships between new skill needs and their relationship to productive work are hard to pin down.

**IT'S THE ECONOMY, STUPID**

New school reforms aimed at improving students' preparation for work follow a basic, by now familiar, argument: Broad changes in the world economy and the nature of competition require changes in production strategies that, in turn, require shifts in skill and education requirements. Key changes in the economy that affect production strategies include 1) increased international competition; 2) a proliferation of products and services toward more varied and customized products; and 3) accelerated product and process innovation. Various technological developments, especially in information technology, have been a catalyst for these changes and also contribute to the rapid pace of change.²

**The Emergence of New Workplaces**

Faced with growing uncertainty in an environment of intensified competition, businesses have looked for new ways of organizing their

²These examples are illustrative for outlining the argument. For further discussion of economic changes and organizational responses to them, see Berryman and Bailey, 1992; Marshall and Tucker, 1992; Commission on Skills of the American Workforce (CSAW), 1990; Johnson and Packer, 1987; Carnevale, 1991; Finegold, 1992; and Raizen, 1989.
production processes. Most accounts of the organizational changes meant to respond to the changing economic environment contrast two production strategies, the "traditional" Fordist (or Taylorist) model versus the "flexible" or "high performance" model. Briefly, the traditional model for U.S. business is based on a production system designed to drive down the unit cost of standardized products produced in large numbers. This system emphasizes narrowly defined jobs that can be filled by low-skilled, interchangeable workers. Other features of this approach include large inventories that minimize disruption caused by production errors or poor quality parts and sophisticated quality control inspection systems and special personnel to catch defects after production is completed. Most importantly, the traditional model uses technology or management structures intended to control or limit worker discretion. In short, the traditional system produces a "low-skill equilibrium" that suppresses the supply and demand for skills and depends on high levels of detailed planning, close supervision, and managerial effort (Finegold, 1992; Berryman and Bailey, 1992).

The problem with the traditional model, so the argument goes, is that it only works when change is infrequent and the cost of developing specialized equipment and processes to manage routinized tasks can be recouped over the long term. But the new competitive environment—characterized by flexibility, fast response time, and innovation—presents fewer opportunities for routinization. The flexible model is meant to respond to the new environment and replace the traditional one. Its characteristics include the following: integration of traditionally separate functional roles (e.g., design, engineering, manufacturing);

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3The terminology used in the literature is inconsistent. For the purposes of this paper, we use the terms "traditional" and "flexible" to discuss these two broad strategies. These are not meant to be exclusive types, but descriptions that anchor a continuum of possible strategies that firms might adopt.

4Marshall and Tucker (1992) point out that schools responded to this demand by offering "mass-produced" education and, because most firms still operate under the traditional model, "there appears to be a rough balance between the skills American employers demand and the skills American educational institutions are supplying" (p. 64).
flatter organizational hierarchies with decentralization of responsibility, and greater employee involvement. Innovation and speed are accomplished through teams of workers who monitor quality and take charge of reconfiguring the production process, thereby performing some of the supervisory, planning, repair, maintenance, and support functions previously done by managers or specialists. This model, then, requires less supervision, but workers with higher and more varied skills.\textsuperscript{6}

**New Skills for New Workplaces**

In the discussion of skill needs for the "new" workplace, it is common for scholars and policy makers to assert that students are ill-prepared for the future workplace and that they need new kinds of skills. A recent book by Marshall and Tucker (1992, p. 80), for example, sums up "the emerging consensus on the skills needed to power a modern economy" as follows:

- a high capacity for abstract, conceptual thinking;
- the ability to apply that capacity for abstract thought to complex, real-world problems--including problems that involve the use of scientific and technical knowledge--that are nonstandard, full of ambiguities, and have more than one right answer, as jobs change in response to a constantly changing market and the opportunities provided by advancing technology;
- the capacity to function effectively in an environment in which communication skills are vital--in work groups, through the use of computer-based systems that require real mastery of

\textsuperscript{5}There is a large, popular literature on flexible production systems and new processes embedded in such systems, such as total quality management, just-in-time supply, quality circles, and the like (Levine and Luck, 1994). In addition, comparative analyses examine broader institutional and cultural contexts to determine the economic and social forces that support the flexible model, including education and training systems (cf. Finegold, 1992; Finegold and Soskice, 1988; Soskice, 1991).

\textsuperscript{6}Before he became Secretary of Labor, Robert Reich argued that investment in higher skills is key to the U.S. competitive advantage because, in the global market, major factors of production (capital, technology, and raw materials) can move more freely and quickly across national boundaries, while labor is least mobile (cf. Reich, 1991). This perspective carries through the current administration's imperative to reform our education and training system.
written English, and by reading technical manuals that necessarily presume a high degree of both reading ability and technical competence;

- the ability to work easily and well with others, and the skill required to resolve conflicts that arise with colleagues and assume responsibility for the work that needs to be done without requiring much supervision.

Others offer even broader conceptions of new skills. Several influential reports issued by the former Secretary of Labor’s Commission on Achieving Necessary Skills (SCANS), for example, define three foundation skills (basic skills, thinking skills, and personal qualities) and five competencies that effective workers can productively use (resources, interpersonal skills, information, systems, and technology) (SCANS, 1991).

Developing New Skills in School and Work

These and other conceptions of new skills have several implications for education. For one thing, they are "generic" skills in the sense that they can be applied in a variety of domains or vocations and in combination with domain-specific knowledge and skills that define competence in a particular area (Stasz et al., 1990; 1993). Teaching generic skills presents a new challenge to most schools because academic curriculum is organized by subject area and vocational instruction is often job-specific. This organization focuses instruction within a domain and emphasizes the development of knowledge and skills particular to that domain.

Second, the conception of new skills includes work-related attitudes that influence willingness and effort expended to perform a task (while skills define a person’s competence or ability to do a task) (Stasz et al., 1990). While skills and attitudes often overlap and it is difficult to determine what proportion of skills or attitudes contribute to skilled performance, both can influence success or failure. While some analysts believe that the skills “gap” may be more prevalent for attitudes than for academic skills (e.g., Cappelli, 1992), schools do not directly teach work-related attitudes. Attitudes are
inevitably tied to values, which schools often avoid teaching for a whole host of reasons.

Conceptions of new skills suggest changes not only in what is taught, but in how and where students learn. New models of learning advanced by research in cognitive science suggest that teaching new skills and work-related attitudes may require radically different approaches to classroom instruction (cf. Stasz et al., 1993; Berryman and Bailey, 1992; Collins, Brown, and Newman, 1989). Some argue that school-based learning should be integrated with work-based experience because some skills can best be learned on the job (cf. Bailey, 1993; Kazis, 1993).

On the employer side, the need for generic, transferable skills may be a disincentive for firms to invest in training because such skills can be easily poached—bought away from other firms—or are subject to the “free rider” problem—firms hesitate to train because of their fear that other firms will reap the benefits without contributing to the costs (i.e., other firms will poach) (Rogers and Streeck, 1991).

And even if such problems are overcome, it is by no means clear that current modes of firm-based training are appropriate. For one thing, firms currently invest little training in production-level workers (in part for the reasons mentioned above) or invest sporadically in “customized” training geared toward specific skills (e.g., when new technology is implemented), rather than in broad training (Rogers and Streeck, 1991). The bulk of firm-based training goes to managerial, sales, and professional workers (Lillard and Tan, 1986; Vaughn and Berryman, 1989).

Second, typical workplace training programs have been designed with the traditional model of work organization in mind, and are likely inappropriate for teaching the kinds of worker knowledge, skills, and attitudes desired under the flexible model (Bailey, 1993). A review of

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7A similar conclusion has been reached with respect to publicly funded literacy or remedial skills programs linked to vocational education and job training programs (Grubb, Kalman, Castellano, Brown, and Bradby, 1992; Schultz, 1992).
worker training conducted by Congress' Office of Technology Assessment (OTA, 1990) concluded that classroom instruction is still the most common formal training method in the U.S. And, studies of informal, on-the-job training suggest that the quality of this training is uneven at best and heavily dependent on who happens to be around to train (Scribner and Sachs, 1990).

In sum, both the nature of new skills themselves and the current practices that institutions employ to prepare future workers create challenges for education and training providers that affect their ability to develop and invest in worker skills—a necessary condition for reaching the broader societal and economic goals that justify many current school reform agendas.

EVIDENCE FOR NEW SKILLS DEMANDS

Because the characteristics of new skills and the solutions proposed for reforming school to teach them are far-reaching, it is important to examine the evidence for transforming education and training practices. Several kinds of direct evidence have been advanced to support reforms driven by an economic imperative for improving education.\(^8\) For our purposes it is most instructive to ask what studies suggest about new skill demands and their contribution to productive work.

It is important to remember that skills are only one of many factors that can affect an industry’s or a firm’s competitiveness; other factors include market strategy, trade, or investments in physical capital. Thus, measures taken to increase skills, by themselves, will not necessarily make our nation more "competitive." Whether or not

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\(^8\)Two indirect measures of skill changes—relative wage rates and shifting occupational patterns—are also often used to argue for changes in skill requirements. These analyses have various problems and produce mixed results (Berryman and Bailey, 1992; Bailey, 1991; Rogers and Streeck, 1991). They are not very useful for our purposes because the unit-of-analysis (e.g., occupations, high school or college graduate) represents broad clusters of generic and job-specific skills, whereas we are interested in finer distinctions between skills, as well as changing skill requirements within occupations.
skill investments improve national economic competitiveness, such investments may increase an individual's competitiveness in the labor market (Berryman and Bailey, 1992) or increase their wages. The individual benefits can be just as valid as national concerns for justifying public investment in education and training.

We now turn to several types of evidence that reformers use to demonstrate that workers need new job skills: anecdotes and employer surveys, studies of technological change, and studies of skills and work.

Anecdotes and Employer Surveys

Anecdotal evidence often appears in newspapers and magazines about the difficulties that employers have in finding qualified workers. Many accounts echo the needs for "new" basics as discussed above, while others focus on "old" basic skill deficits such as reading, writing, and command of English. Some seem less concerned with academic or vocational skills than with finding workers with a good work ethic and appropriate social behavior (CSAW, 1990). Anecdotal accounts are often inconsistent and, even if valid, do not reveal how widespread changes in the workplace are and thus how broadly educational changes are needed to accommodate them. Anecdotal accounts of skill needs seldom provide direct evidence of the contribution of these skills to productivity.

A second source of evidence comes from employer surveys or interviews. Natriello (1989) reviewed 14 studies of employer needs that focused on entry-level workers. He found that employers most often cited the importance of employee attitudes, followed by an emphasis on generic skills such as problem-solving and communications over job-specific skills. Finally, employers emphasized the need for workers to understand the business environment. The conclusion that employers seem more satisfied with workers' technical skills, but see a need for increasing generic skills or improving work-related attitudes has been corroborated in a number of surveys (e.g., Hudis et al., 1992).

While survey data can provide a more comprehensive view of the extent of changing skill demands in an industry or sector, they are
deficient in several respects. Natriello found that studies lacked a clear conceptual basis for asking about employee characteristics. Without a comprehensive set of traits or skills tied to any developed framework, conclusions phrased in terms of what employers find most problematic in new workers may have less to do with true needs than with the list of traits they were asked to comment on.

Second, surveys and interviews are often based on opinions of managers far removed from the shop floor. Their accounts often amount to normative descriptions of what skills might or should be required for certain jobs rather than accounts of what work skills are actually engaged in these jobs (Darrah, 1992; Hull, 1993). Case studies and ethnographic analyses (discussed below) frequently find that normative descriptions depart from actual work practices in important ways. If not normative, survey data may reflect what firms "aspire to be" rather than describing current practices (Rogers and Streeck, 1991). Furthermore, employer expressions of skill needs may reflect local forces or economic conditions (Darrah, 1990; 1992; Grubb, Dickinson, Giordano, and Kaplan, 1992), hiring practices or standards (Cohen and Pfeffer, 1986), or other aspects of the institutional context that the survey neither addresses nor reveals.¹⁰

In addition to methodological problems, anecdotes and survey data about skill needs are inconsistent, a fact that some analysts find particularly alarming. The finding that many employers feel skills are adequate but that workers lack appropriate attitudes suggests that these

³Surveys of skill needs from the worker's perspective (e.g., McGraw and Forrant, 1992) often corroborate employer surveys, but their interpretation is limited by similar methodological and conceptual problems.

¹⁰Cohen and Pfeffer (1986) discuss four perspectives that affect hiring practices or standards—technical, control, political, and institutional. A technical perspective, for example, suggests that hiring decisions or employer needs reflect the intellectual and technical complexity of the job. The emphasis on employee attitudes in the studies reviewed by Natriello may be explained by a control perspective: hiring standards/needs are used to select employees who will be reliable and dependable and conform to desired organizational norms and values (Natriello, 1989).
employers do not recognize the need to increase the skill requirements for front-line production workers, even though their foreign competitors do otherwise. If most employers support this low-skill equilibrium, then U.S. productivity and competitive advantage are bound to further decline (CSAW, 1990).

**Skills and New Technology**

The relationship between skills and productivity has been examined most closely with respect to uses of advanced technologies. This literature, which has been reviewed extensively elsewhere (cf. Attewell, 1990; Brynjolfsson and Bimber, 1991) has used case study, survey, and other methods to examine two specific issues relevant to our interests. The first is whether technology adoption serves to upskill or deskill the workforce. While some argue that new technologies require firms to invest in workers with higher skills to operate, maintain, and make most effective use of them (e.g., Berryman and Bailey, 1992, pp. 17-23; Johnson and Packer, 1987), others believe technology investments substitute for human capital investments by “dumbing down” jobs or by increasing production with fewer workers (e.g., Braverman, 1974). Other analysts conclude that skill requirements for entry into future jobs will not be radically upgraded from those of current jobs despite the impact of technology.

Reviews of case studies and aggregate analyses yield contradictory and complicated changes in how technology will impact the skill requirements of work (Rumberger, 1989). The data indicate that new technologies do not have a uniform affect on skill levels: there are variations across countries, regions, firms, and sectors and within individual firms (Finegold, 1992). This variation suggests that accounts of technology impact on skill needs must pay close attention to the working context, as contextual factors—such as managerial decisions about how to implement technology—can determine whether human skill needs will increase or decrease.

A second line of work concerns technology and the “productivity paradox”: Why have expected productivity benefits from investments in
technology not been widely realized? If technology does not boost productivity, why do businesses invest in technology at increasing rates? Brynjolfsson and Bimber (1991) reviewed over 120 articles about the causes and solutions to this paradox and observed only point of agreement: that understanding the effects of information technology (IT) is exceedingly difficult. Brynjolfsson and Bimber (1991) note several problems with this research that are relevant here: better measures of worker productivity are needed even at the firm level, particularly in the service sector; the value of information’s contribution to other measures of corporate success (e.g., flexibility, responsiveness to market changes, increased market share) is rarely assessed; the reasons why firms decide to purchase IT, as well as what happens after they install it, are not well understood; and non-technology factors (e.g., availability of trained employees or management strategies) may outweigh the effects of information technology in measurable contributions to productivity. In sum, the IT productivity literature does not provide a clear picture how new skills may affect productivity, but suggests that firms will invest in it anyway. These investments affect skill needs in various ways, which are best understood by close examination of work in context.

Skills at Work

A final body of evidence comes from case studies of firms. Although these studies are limited in their generalizability to skill needs in a whole sector, they provide the closest look at the nature of new skills in work, and the possible links between skills and firm performance. Case studies employ various methods for examining skill changes and their effects, and differ in the detail with which skills and contextual features are considered and analyzed. Here we first briefly discuss a set of comparative studies conducted in Europe which are less known (or at least less cited) in the U.S. debate, but which show interesting relationships between skills and firm-level productivity. Then we look at research that employs ethnographic
methods to provide a detailed picture of skills in the context of particular jobs and firms.

Researchers at the National Institute of Economic and Social Research (NIESR) have conducted a series of studies that compare matched samples of manufacturing plants (metalworking, woodworking, apparel) and service industries (hotels) in Britain and other countries (Germany, France, and the Netherlands), controlling as much as possible for firm size and product markets. Their objective was to measure average productivity differences in the targeted industries between the countries, and to examine to what extent differences in equipment and training contribute to productivity differences.

Finegold’s (1992) review of NIESR studies concluded that the research consistently showed that “British firms recruit the majority of their workers with relatively low levels of ET (education and training), then provide them with little systematic training for jobs with relatively low skill requirements” (p. 52). As a result, British firms in both sectors were less productive than their European counterparts.

The Prais, Jarvis, and Wagner (1989) study, for example, compared 14 medium-sized British hotels with 24 German hotels, controlling for differences in operation. They found German hotels to be 65 percent more productive than British establishments, measured as guest nights per full-time-equivalent employees. In their estimation, the productivity difference was due to quality and quantity of personnel; over a third of German employees were certified at the craft level, compared to 14 percent of British employees. Other differences were found in the content of work preparation, with German apprenticeships and training courses providing broad training for different jobs, with more rigorous educational content geared toward national standards. These skill differences led to a more efficient organization of work; German housekeepers, for example, supervised less-skilled chambermaids and spent time on organizational tasks (work scheduling, stock control, purchasing) that occupied higher-level managers in British hotels.

While the NIESR studies are limited in their use of rather narrow productivity measures and under-emphasis of other contributing factors
besides technology and formal skills training (e.g., business cycle, social context of work, informal training, unionization), they provide evidence that investments in vocational training, establishment of skill standards and certifications, and other measures can pay off. Because the U.S. system for training workers for the sub-baccalaureate labor market more closely resembles Britain than the European systems, these results seem particularly alarming. Unfortunately, comparative studies of this type have not sampled U.S. sites, so findings cannot be directly applied to the U.S. case.\footnote{A collaborative project between RAND and NIESR researchers to conduct matched-firm comparisons in two industries (pumps and biscuits/cookies) in Britain and the U.S. is currently in progress.}

In the NIESR studies, vocational certifications or qualifications (technician, craft) are used as an indicator of worker skill levels. Because these certifications are linked to specific education and training regimes in each country, it is possible to get a fair picture of the amount and type of formal training associated with different certifications. The ET system in the U.S., however, is both more varied and less standardized, so these labels may not suffice for estimating current or needed worker skills in the U.S. context. Furthermore, the NIESR studies, like many case studies in firms, rely on employers' views about worker skills and do not systematically incorporate understandings of the worker.

A few studies of workplace skills have employed ethnographic methods to more closely examine skills in context (e.g., Darrah, 1990; 1992; Hull, 1992; Martin and Beach, 1992; Scribner and Sachs, 1990; Scribner et al., 1993). This research questions some of the assumptions and implications driving the basic argument for school reform, such as the emphasis on skills as the driving force behind poor job performance and the declining economy (Hull, 1993) and the notion that externalities (technological innovation, competition) impact uniformly on workers and firms (Darrah, 1992).\footnote{In addition, studies of practical cognition (Rogoff and Lave, 1984; Scribner, 1988) indicate that people develop literacy and numeracy skills in the context of work that have little resemblance to academic}
reflect the decisions of people; skills can only be understood from the perspective of people within a particular context.

The ethnographic research essentially examines skill needs from the perspective of the worker doing a particular job, then extends outward to examine the organizational context of work and, lastly, the external forces that impinge on production skills. Rather than relying on a brief "grand tour" of the plant to reveal how work is done or on interviews with managers, researchers do extended fieldwork in the firm to gain a deeper and richer picture of production work in context--to understand the meanings workers attach to their own activities.

This approach yields interesting and sometimes unexpected results. Darrah's (1990) study, for example, examined a computer firm's reorganization into a "team concept," where teams comprised of mechanical assemblers, a test operator, repair technician, and several board technicians would be responsible for a model line of computers from kits of parts to functioning unit. Management envisioned that this arrangement would motivate workers, increase production, improve quality, and identify production workers with future management potential. While output did increase dramatically, accompanied by a 25 percent reduction in labor, the restructuring was abandoned after several months. Management blamed the failure on worker skills--inability to make decisions to run production smoothly or to "see the big picture," or poor communication. Workers viewed the whole activity as suspect. They were skeptical about management's sincerity--since managers previously showed little interest in workers' ideas--and they feared loss of status and job ladders, and lower compensation for senior workers. In their mind, the team concept was never clearly explained, and they were left to try and figure out what management wanted.

Darrah's analysis explains in detail how failure could not be solely attributed to either mismanagement or worker skills. It argues for an approach that examines workers skills as part of a larger system learning of the same competencies. This questions the assumption that academic learning in school will be transferred directly to workplaces (Darrah, 1992).
that includes individuals, jobs, and a wider context of technology and organization. In addition, the ethnographic approach is more prescriptive because it can help reveal effective training options, both formal and informal, for helping employees develop needed skills. However, the ethnographic work we reviewed does not attempt to measure how new skills affect worker or firm performance.

**SKILLS EMPLOYERS WANT OR SKILLS EMPLOYERS NEED?**

In this review we briefly examined the literature related to a basic premise underlying the current wave of new school reforms. While many believe that our economic health is at risk if schools do not improve students' basic and generic skills, we find little direct evidence to support this belief. Portions of the logical or theoretical argument find some empirical support, but the research base is clearly incomplete and controversial. It appears that research and anecdotal reports tells us more about what skills employers want than what skills they need.

From an educator's perspective, the research fails to specify which skills--domain or job-specific, generic skills, basic skills--or work-related attitudes are needed for productive work. Even if we assume that generic skills or work-related attitudes, in addition to specific job-related knowledge and skills, are important enough to incorporate into school curricula, broad descriptions of such skills are not enough to inform practice. Deeper analysis of the acquisition of target skills and their application in the work context are needed to inform curriculum development and instructional design. This observation holds for firm-based training in new skills as well, for both new and incumbent employees. Unfortunately, school reforms aiming to improve youth transition from school to work or preparation for further education and lifelong learning generally fail to address curriculum reform and all that it entails, except at the most general level.

Educators are perhaps less concerned about whether or not new skills can be explicitly linked to various levels of performance or to competitiveness. Universal education for the good of the individual and
a democratic society is a basic value in this country. The debate about new programs seems as concerned about equity and access--both in school and on the job--as with demonstrating how improved outcomes for students will benefit the economy (e.g., Bailey, 1993). This does not mean that educators are unconcerned with outcomes, only that they depend on others to assess which outcomes make a difference for developing a high-skill economy.

With some exceptions, most employers and analysts offer few concrete suggestions for changing schools that practitioners can readily follow. The data indicate that employers invest little in skills of production-level workers, preferring to invest in employees with higher educational background. Others lack the capital, resources, or incentive to change work organization or skill investments. Even if more employers move toward the high-skill equilibrium, this would not necessarily change the way schools prepare students, as schools face serious financial and other limitations that hamper their own progress. At the moment, public policy seems more focused on changing schools than on changing firms because it has more influence over public education. Even the new Administration, which heartily supports investment in human capital as key to economic growth, has backed away from proposals to use tax incentives or levies for workers and firms to undertake specified forms of training. At the same time, however, the STWQA emphasizes work-based education as a key program component.

In short, while the basic argument underlying school reform may have the political weight to aid public policy--few would argue that our education system should not be an instrument of individual or social economic prosperity--we have a long way to go.\textsuperscript{13} The literature

\textsuperscript{13}Viewed historically, the economic imperative for education reform, however weak the direct evidence for it, may be politically more powerful than previous federal education reform themes. Federal legislation focused on desegregation (in the '60s) and access for handicapped students (in the '70s), thus targeting minority populations who needed equity or access protection. By contrast, the economic imperative, geared to the benefit of all students and the economy as a whole, avoids some of the failures associated with entitlement programs, and focuses on ends rather than means.
suggests specific directions for future research and policy when the aim is to understand changes in skills and their impact on work at a level that informs education and training practice.

1) Skill needs must be examined in the context of work, from the perspective of people engaged in the community of work (including workers and managers). Since skills are constituted by use, technology, and the social organization of work, then the "skills gap" can only be seen from this perspective.

2) Skill needs must be specified in ways that illuminate design of curriculum and pedagogy, in both formal and informal education and training settings. The description must be sensitive to work context.

3) The contribution of skills to productive work needs to be established, at least at the level of the firm. This would enable decision makers to better assess tradeoffs concerning, for example, curriculum content and education or training program design.

4) The literature and the public debate appear one-sided, with an emphasis on blaming the problem on individuals who lack skills or educational institutions that fail to adequately train them. Less is said about shortcomings in firm behavior that affect skill utilization and performance, including poor management, fear of empowering workers, pursuit of low-wage options such as offshore production, and the depression of wages, benefits, and working conditions (Teixeira and Mishel, 1993). Policies to support an education and training system must reflect the complexity of schools and firms as institutions, each of which faces a variety of barriers to any change.
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