Schools and Other Education and Training Sources

Competitive Advantages for Workforce Development

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Worker Education Matters

- Bassi: Companies that invest in training do better
- Modern work requires continual innovation
- New technologies keep arising and one has to learn to use them
- Just as the industrial revolution devalued human strength, the information revolution devalued rote capability with simple procedures



Are All Workers Ready to Be Smart Workers?

Everyone needs:

- Life-long learning skills
- Motivation
- Ability to grasp hard concepts
- Ability to use basic knowledge processing tools
- Ability to adapt to new situations and new paradigms of work

How is all of this produced?



Additional Needs

- People who will start new businesses
- People who will develop new business opportunities

Economic development is best when not wholly dependent upon outside entrepreneurs, so a country or region must grow its own.





- What needs to be added to education for economic productivity?
- Why is it hard for schools to do this?
- How can schools (and other providers) do this?
- Spreading awareness and a sense of direction

What Needs to Be Added?

- Skills that permit one to quickly join in new smallscale enterprises
 - Quick learning
 - Communication
 - Collaboration
 - Handling the novel
 - Understanding systems of human enterprise
 - Positive cognitive style



What Needs to Be Added?

- This is not simply embedding standard schooling into the context of a particular job – no particular job will last a lifetime
- But: applied learning does need to take place in a mixture of work contexts – a mixture that varies in its familiarity

The New Standards Project

- Effort to stimulate improvements in American education by University of Pittsburgh Learning Research and Development Center and National Center for Education and the Economy (led by Lauren Resnick and Marc Tucker)
- One component was standards for applied learning – the skills needed to be productive in our modern world



Overview of the High School Applied Learning Performance Standards

- Areas of Competence
 - Problem Solving
 - Communication Tools and Techniques
 - Information Tools and Techniques
 - Learning and Self-management Tools and Techniques
 - Tools and Techniques for Working With Others
- The standards are set at a level of performance approximately equivalent to the end of tenth grade (~age 16 yrs).

Problem Solving



 Identify needs that could be met by new products, services, or systems and create solutions for meeting them.

Improve a System

 Develop an understanding of the way systems of people, machines, and processes work; troubleshoot problems in their operation and devise strategies for improving their effectiveness.

Plan and Organize an Event or an Activity

 Take responsibility for all aspects of planning and organizing an event or an activity from concept to completion, making good use of the resources of people, time, money, and materials and facilities.



Communication Tools and Techniques

- Make an oral presentation of project plans or findings to an audience with expertise in the relevant subject matter.
- Prepare a formal written proposal or report to an organization beyond the school.
- Develop a multi-media presentation.

Information Tools and Techniques

- Gather information to assist in completing project work.
- Use on-line sources to exchange information for specific purposes.
- Use word-processing software to produce a multipage document.
- Write, add content to, and analyze a relational data base.
- Create, edit, and analyze a spreadsheet.



Learning and Self-management Tools and Techniques

- Learn from models.
- Review one's progress in completing work activities and adjust priorities.
- Evaluate one's own performance.
- Develop a plan for specific additional learning.

Tools and Techniques for Working With Others



- Participate in the establishment and operation of self-directed work teams.
- Plan and carry out a strategy for including at least one new member in a work program.
- Complete a task in response to a commission from a client.



Forms of Rigor

- Traditional school rigor
 - Increasingly complex concepts tested with relatively simple questions
 - Why: because complex questions confound "understanding" a concept with successfully using it (e.g., arithmetic mistakes can cumulate in a complex example)
- But: in the real world, what is especially valuable is the ability to apply simple concepts to complex situations

Example Task for Kodak Apprentice Technicians

(from American Diploma Project, www.achieve.org)

Application of Weight and Volume

If you needed to add 300 lbs. of a material to a mix tank, how would you determine if you had enough room?

• Determine the equivalent of one inch in pounds or gallons. Do this by draining one inch from the tank weighing the liquid. (1 in = 25 lbs)

• Divide the specified amount in pounds by the lb/in to get total inches required.

300 lb ÷ 25 lb/in = 12 in

• Determine the room available in the mix tank. Subtract actual tank level from maximum tank level.

120 in - 40 in = 80 in

• Compare to total inches required.

12 inches needed, 80 inches available



How Do Students Become Able to Do This?

- Learning by doing
- This means doing complex tasks as part of schooling
- Complex tasks often require teamwork This isn't cheating!
- Novel tasks are inherently "unfair," but so is the life for which students are preparing!



Some Schoolish Work Can Help

- Accountable Talk
- Modeling of situations in science and social studies classes (e.g., AIDS transmission, predator-prey population trends, city management games like Sim City)
- BUT: some of the experiences dealing with complexities should come from real-world tasks

Example of How to Teach Applied Learning Capability: The Quick Printing Entrepreneurship

- A New York high school has a digital copier.
- Students designed new business opportunities for this equipment they put capital to work.
- State provided start-up funds for the business as part of the high school's educational function.
- The students developed a needs survey was there a market?

The Quick Printing Entrepreneurship

- The teacher and the students had to learn how to operate the digital copier and use various illustrator programs.
- Researched desktop publishing and the production of professional publications.
- The students developed a brochure to advertise their services – did research on competing brochures. Each student created a competitive pricing database for the brochure and routed it into an information spreadsheet.

The Quick Printing Entrepreneurship

- Each student wrote a mini-proposal of his/her ideas for the brochure and gave an oral presentation to the class.
- Then, a representative gave a multi-media (text and images) presentation to an advisory board.
- In order to get a handle on workload priorities, the students created a billing form, a job ticket order, a job estimate sheet, and a chart pin-pointing orders in progress.
- Outside advisory group of adults kept project realistic and provided coached apprenticeship environment.

Lessons to Be Learned

- The best way to become an intelligent worker is to learn by doing
- A teacher who already knows every answer cannot model continual learning easily
- It is important to practice the hard stuff, but this requires major changes in how schooling works



Learning by Doing

- Practice doing complete meaningful tasks
- Be supported while making mistakes and encountering impasses
- Be safe when failing
- Be supported for multiple efforts that do not end until tasks are done successfully
- Who does this?
 - Not enough schools
 - Armies, sports teams, medical training, pilot training the things that really matter!

Basic Approach – Think Football

- Opportunities to play
- Real-time minimalist coaching
- Something like game films to review and analyze

Learning by Doing with Reflection

- Realistic work environment in which hard problems can be confronted
- Supportive coaching to assure that with effort every student can do every problem
- Tools to support reflection after solving a problem

Reflection

- Students request
 - "how" information while working on a task and
 - "why" information when reviewing their performance (research by Sandra Katz)
- Thus, reflection and review are keys to generality, reusability, or transfer of what is learned from applied experiences

Learning by Doing Can Be Supported by Simulated Tasks



- Permit thinking in situations where acting is dangerous
- Permit thinking when actions take a long time in real life
- Permit trying alternative ideas



Bottom Line

- Focus on the hard stuff
- Focus on ways to connect experiences to principles
- Focus on tools sufficiently dynamic to allow considerable experimentation by students
- Focus on collaborative activities when feasible
- Focus partly on tasks hard enough to provide practice in real problem solving

Teacher Requirements

- Strong applied learning capabilities
- Confidence to be in less structured situations
 where answers not always known in advance
- Understanding how to be supportive without doing the hard thinking for the student – "sink or swim" but with ways to assure that no one sinks

Higher Demands with Less Pathology in Grading

- Multiple chances to demonstrate success
- Acceptance of the possible "unfairness" of tests for which one cannot prepare completely
- Acceptance of the need to demonstrate skills in collaborative environments
- Acceptance that every student will need "just in time" bits of coaching and even remediation

Sources for Education and Training

- Elementary and secondary school system
- Community colleges
- Proprietary training schools
- Business-based corporate training
- Supplementary nonprofit programs

What sequence of focus on these various alternatives will work best?



Plusses and Minuses



- The repository of current teaching strength and community support, but often not able to change quickly
- Community colleges
 - A good source, but focused too late in children's development to carry the load alone
- Proprietary training schools
 - Able to move quickly but harder to embed in communal support systems
- Business-based corporate training
 - If social awareness is cultivated, this is a good source of realistic advice for student projects
- Supplementary nonprofit programs
 - A few very good ones; need to have clear sense of purpose, strong applied learning skills, and courage

Some of the Key Issues

- Positive cognitive style
- The culture of schooling
- Enculturating high-performance education

Positive Cognitive Style

- Effort vs. aptitude
- Depends upon multiple factors
 - Experiences with learning success and failure
 - Observed relationship between work in school and apparent success in life
 - Societal beliefs

School Is a Culture as Well as a Content Source

- Many factors combine to make schooling mostly about what goes on in schools, rather than what goes on in life
 - School is what schoolteachers know about
 - School is the common experience for diverse student populations, so learning about school is culturally more neutral
 - School performance measures are less subject to external evaluation – it's safer to aim for good performance on school-based tests
 - BUT: school is not much like productive life!

Need to Shape What Society Believes

- Society confuses the sources of knowledge
 - The "trigonometry" example
- Society believes that "education" is much more valuable than "training"
 - "Education" too often means didactic and memorization of verbal content
 it is teacher centered
 - "Training" often is generalized to mean anything outside the domain of standard school artifacts – books, worksheets, simple verbal tests. Too often, anything student centered is seen as low-end training.
- Teach the broader society the importance of doing plus reflection
- Make sure teachers understand why applied learning is important they are the one group that was successful without it!

Thank You!







