Robert T. Howell

The word *team* can mean different things to many people. To some the word *team* means playing a game together such as baseball, football, or basketball. These types of teams, because the outcome depends on their collective action, truly do function together as a team; team members either win together or lose together. For many the word *team* means simply working together on a project or special assignment. In education many schools use team teaching to indicate that two or more teachers work together teaching a class or particular subject.

This article offers a definition of what a self-directed team is, how it functions, how it functions in industry, and what team members need to know to work well in teams. The problems of finding highly skilled self-directed team members and how technology subjects can help prepare such people in the future are also addressed.

Self-Directed Teams

In the business world self-directed teams are increasing in importance and have a direct impact on the success and survival of many companies (Huszczo, 1996). According to Huszczo (1996), many Fortune 500 companies report having some sort of employee involvement program that involves self-directed teams. Forming teams has become a natural way of involving employees in their own improvement and ultimate success. Self-directed teams perform such duties as problem solving, quality improvement, self-directed work, serving on task forces, and new product launches. Huszczo noted that companies recognize that every employee in an organization has some form of expertise that can contribute to the success of the company. Huszczo also reported that teams have the following purposes and benefits:

- Provide an important source of stimulation.
- Create higher-quality solutions than most individuals working alone can create.
- Offer structure that encourages a sense of involvement in a large organization.
- Serve as a vehicle for organizational development efforts.
- Offer a means of satisfying relationship/belongingness needs.
- Provide a form for constructive conflict resolution.
- Provide an opportunity for more individuals to develop and utilize leadership skills to fulfill personal needs.
- Improve productivity through using flexible approaches to problem solving.
- Construct a structure that helps employees appreciate everyone's crucial interdependence for the organization to succeed.

Success of Self-Directed Teams

Many books document the success that companies report since installing self-directed teams in their organizations. Wellins (1994) identified companies showing an increase in profits ranging from 50 to 100% after changing to a team environment. Wellins pinpointed the areas that have reported particular success with teams:

- Cost Savings: Organizations empower their teams to work on continuous improvements. These savings can be enormous—as reported by RCAR Electronics, whose self-directed teams recorded a savings of $10 million annually. Wilson Sporting Goods achieved annual savings of $5 million, while the Harris Corporation reported average savings of $4.5 million.
- Labor Productivity: Teams enable organizations to do much more with less. Reduced costs in production show up in the profits reported by corporations: K Shoes reported a 19% increase in productivity, Sterling Winrtrip had a 40% increase in production, and Kodak Customer Assistance Center showed a 100% increase in profits.
- Quality and Service Improvement: Every company must not only focus on doing business at a lower cost but also on doing things better. Sense quality is often measured by the rate of customer complaints and returns; companies reported lower customer returns and rework because of a teams-directed approach. The list of companies that have used this successfully include the following: Texas Instruments, whose return rates dropped from 3% to .3%; Westinghouse, which reported rework down by 50%; and Tennessee Eastman, which ranked first in customer satisfaction among its competitors.
- Speed: Doing things faster is yet another competitive edge in today's corporations. Teams deliver reduced down time and turn-around time. Companies such as RCAR reported cycle time as having been reduced by 40%. K Shoes reported that it reduced the time it takes to make a pair of shoes from 12 days to 1 day.
- Human Resource Benefits: Teamwork affects other things within a corporation: it increases loyalty, it induces less absenteeism, there are fewer worker compensation claims, and there is lower turnover.

What Employers Want and Teams Need

The paradigm of what employees need to know and what tasks they should be performing has shifted. As Murdock (1999) stated, jobs requiring the most education and training are growing at twice the rate of those requiring less education and training.

This paradigm has been changing so much that lower level jobs require higher levels of education. Murdock further stated that today's employers are demanding higher levels of communication, planning, and problem-solving skills. Their lists of demands also include self-esteem, motivation, learning how to learn, reading, writing, computation, listening, and oral communications. Many employers expect higher level skills such as creative thinking, problem solving, goal setting, career development, interpersonal skills, negotiation, teamwork, organizational effectiveness, and leadership.

Trunk (1995) believed that employees in the year 2000 would need strong technical skills along with greater managerial capabilities. Trunk believed that fewer workers with both technical and social skills needed to be a team member would be scarce, in part, because public schools are not turning out enough qualified candidates quickly enough to meet the demands. Trunk also noted that workers in the 21st century must be able to analyze what is going on at their work site and communicate what they see in order to make decisions to increase productivity and eliminate marginal issues.

Education and Self-Directed Teams

A study conducted by Verespej (1998) found that 62% of what employees needed to know was acquired through informal learning in the workplace. These conclusions were reached after two years of research inside the manufacturing plants of seven high-performance plants in the United States. Verespej reported that only 12% to 18% of the workers surveyed said that formal training taught them skills needed to succeed in a self-directed team environment. The skills these workers felt they needed on a self-directed team included problem solving, interpersonal-communication, and handling conflict. Verespej concluded that "the vast majority of learning by workers is not in the classroom or in formal training, but most learning occurs in the pursuit of everyday work activities" (p. 44).

Finding self-directed team members who are highly skilled and can a meet corporation's needs may prove to be a problem. Although technical colleges are preparing motivated young adults to fill entry-level jobs, many employers face a dearth of highly skilled employees (Trunk, 1995). As Trunk (1995) stated:

> Companies must look to their own employees now, screen them and develop the kinds of workers needed from their own ranks. This is much easier than trying to find new workers who have not proved themselves day-in and day-out. (p. 11)

Today's Students/Tomorrow's Self-Directed Team Members

As many of the Fortune 500 companies move towards self-directed teams, new types of employees will be needed in this new century. Technology studies must stay abreast of this paradigm shift and change how students are educated. Employers are looking for future employees who have problem-solving, interpersonal communication, and conflict-handling skills. The question is: How best do we meet these needs in technology studies? The answer is obvious: We can meet these needs through projects designed to involve groups of students who work and solve problems together.

As stated earlier in this article, self-directed teams and employers are looking for future employees who have problem-solving, interpersonal-communication, and conflict-handling skills. The question is: How best do we meet these needs in technical studies? The answer is obvious; We can meet these needs through projects designed to involve groups of students—students who learn to work together and solve problems together.

Because he concluded that problem solving is limited in technology studies, Todd (1999) believed that students would be better served in programs built around "design" in which problem solving starting at the elementary school level is taught. Design not only encourages problem-solving thinking, but it also fosters group interaction, investigation, creating, planning, testing, evaluation, and improving.

Technology studies can best train people to problem solve through the proper design of projects—projects that will inspire students to be problem solvers, communicate with each other, and handle conflicts that may arise their group. Technology studies are the perfect place to teach students how to work as team members. The importance of selecting the right project, one that will teach the values of teamwork, is important. As Schultz (1999) noted, the importance of technology studies comes from project method. In Schultz's article "Why Do We Teach What We Teach?" he answered this question by saying, "We teach tool and material use and in doing so, we teach people the project method" (p. 84).

The question now arises: How best do we teach the proper project in technology studies? Can students learn how to problem solve and work in groups by sitting in cubicles? Schultz (1999) asked this same question: Do we teach the project method by having students problem solving and building projects the traditional way or do we teach them in library-type cubicles, at computer terminals using software modules developed by vendors? The answer to this question seems obvious. We need to expose technology studies to the more traditional system of project design and development in order for them to develop problem-solving skills and learn work.

Historically, a lot of researchers wrote about the disadvantages of teaching problem-solving skills in a module type presentation. A study by Rogers (1998) showed that technology studies students in a contemporary class setting exhibited significantly better achievement rates over students in modular technology studies classes. Pullias (1997) also noted students in modular labs do not learn how to develop problem-solving skills. They are adroit at following directions, but they do not develop a true understanding of

the various concepts being taught. Dugger (1999) pointed out that technology studies provides students with active learning experiences that add meaning to cognitive knowledge. What a better place for students to learn about teamwork while learning about the real world.

Technology studies educators must begin to change their curricula to include problem-solving design activities that encourage teamwork. As Wellner (1999) stated, "Most of them (high school students) are still teenagers, but their inclinations already portend a different kind of work force" (p. 42). Wellner reported that the secrets of success are getting along with others, working well on teams, and getting along with members of different racial and ethnic groups. Many of these values can be traced back to the classrooms in public schools whose teachers emphasize teamwork and grade students on their ability to get along with other people. Most teens stated that they would be more interested in being a member than leading it or owning a company (Wellner, 1999).

Technology studies educators must prepare to make the changes to maximize teens' movement into the job market. When they do, employers will have the people they want—ones able to function well in teams and contribute meaningfully to the success of their companies.

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Enriching the Undergraduate Experience Through a Technology Learning Community

Steven A. Freeman, Dennis W. Field, and Michael J. Dyrenfurth

This article describes the implementation of a learning community as a model for enriching the undergraduate experience in the Industrial Technology curriculum at Iowa State University (ISU). The authors sought to incorporate effective practices learned from a variety of sources and to increase both achievement and retention. From this three-year project, the authors then provide recommendations for other industrial technology faculty interested in establishing learning communities within their programs.

Teaching and learning are at the heart of the undergraduate experience. Educators and researchers have expounded on the benefits of alternatives to straight lecture-based university education (e.g., Finkel, 2000; Freeman & Field, 1999; Hull, 1995; Johnson, Johnson, & Smith, 1998; McKeachie, 1999; Perlman, 1997;

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