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AUTHOR Gohdes, William
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INSTITUTION Georgia Univ., Athens. Dept. of Occupational Studies.
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ABSTRACT

Although tech prep is still in its infancy in Georgia, increasing numbers of students are entering technical institutes after having completed the secondary-level component of tech prep programs. Georgia's technical institutes must begin the process of developing bridge programs to help adult students with no tech prep experience develop academic and technical skills commensurate with those of tech prep-enrolled students. The Center for Occupational Research and Development (CORD) has recommended that bridge programs be interdisciplinary and systems oriented, designed around foundation courses that are broad in scope, be limited to 25 students per session, and be offered in 18-week sessions that are divided along occupational "clusters." In Georgia, the envisioned occupational clusters are as follows: environmental and agricultural sciences, business marketing and information management, human services, health and medical, and technical/engineering. Although bridge programs are normally taught in postsecondary institutions, high schools are sometimes ideal locations. CORD's Tech Prep Bridge model recommends specific courses/competencies for each cluster and presents specific guidelines for developing, implementing, evaluating, and revising bridge programs. CORD estimates the cost of bridge programs at approximately $2,500 if 25 students are enrolled per session. (Appended are transparency masters detailing sample bridge programs for each of the occupational clusters.) (MN)

GEORGIA DEPARTMENT OF TECHNICAL AND ADULT EDUCATION

Research Brief

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Tech Prep Bridge Programs

Introduction

Implementation of Tech Prep programs in Georgia has now reached the point where high school students who are participating in this new program are beginning to matriculate into the post-secondary institutions (technical institutes and community colleges) throughout the State. They bring with them educational experiences that are new to our educational systems. Instruction in applied math, communications, and science courses has provided foundational experiences that the "general track" student has traditionally lacked. Training in computer operation and utilization of a variety of software programs provides a depth of technological experience that was unknown a decade ago. Tech Prep students may have experience with integrated curricula and may have been taught in a contextual learning environment in their applied math and science courses. They may be the beneficiaries of cooperative teaching methodologies whereby vocational and technical staff have collaborated through team teaching and joint curriculum planning to present an interdisciplinary approach to classroom instruction.

These students, with their advanced skills and exposure to alternative methods of instructional presentation, currently constitute a small percentage of post-secondary enrollment in Georgia and throughout the country but they number 1.5 million students nationwide, and within a short period of time will begin to make their presence felt in technical institutes, community colleges, four year colleges and universities, and ultimately, the work place.

Tech Prep is a positive development in education, but with the passage of time may become problematic for technical institute instructors and staff because the majority of post-secondary schools have done little to change their curricula or teaching methods to accommodate the changes that are rapidly developing at the secondary level (Dutton, 1995). Participation in "articulated" coursework prepares these students for enrollment in advanced studies which presupposes that course modification to support advanced studies has occurred at the post-secondary level. A major challenge for technical institute instructors and administrators will be to revise curriculum, particularly courses in the Fundamental Occupational category, to accommodate the necessary upgrading of coursework that will be required to meet the needs of the incoming Tech Prep schooled students.

Once these changes are in place, a second issue arises: how do we begin to plan for the needs of those students who are **not** Tech Prep experienced and who do not possess the advanced skills that Tech Prep completers have acquired through their applied academics and articulated programs? Business and industry may or may not continue to downsize and consolidate operations but it is a safe assumption that technical institutes will continue to see a steady flow of employed and unemployed people returning to school to upgrade skills to enable them to compete in a rapidly changing job market. Most of these individuals will be years removed from high school enrollment and many

will lack the necessary skills to compete successfully with younger, better prepared, Tech Prep participants. Many of these displaced workers will need remedial instruction to update basic skills to current levels. The purpose of this paper is to describe a model of how such a "Bridge" program may be designed.

Bridge Program Defined

The Center for Occupational Research and Development (CORD, 1993) provides a useful description of a Bridge program:

1. It is interdisciplinary - the instruction crosses the boundaries of several program areas in math, science, and technical training including electronics, mechanics, fluid power, thermal devices, and computer hardware and software applications.

2. The foundation courses are broad in scope CORD describes the Bridge structure as: "built on strong technical fundamentals that are essential to the acquisition of new knowledge and skills as technology and workplace requirements change (ibid, pg 11)."

3. It is systems oriented - CORD defines systems oriented as: "integrating knowledge of subunits of a process or device to deal effectively with the whole unit."

Hull (1993) describes a Bridge program as one which includes:

Applied Academics Courses in subjects of biology, chemistry, math, and communications, and

Principles of Technology which combines math and physics and provides students with the fundamentals of mechanical systems. Computer related instruction and Quality Control (TQM) concepts and practices are often included as part of the Bridge program of instruction.

CORD (1995) states that good Bridge programs have two primary goals that facilitate the transition to post-secondary curricula entry. A bridge program should:

1. Give students a blend of math, science, computer, and occupationally relevant knowledge and skills that facilitate successful completion of two-year post-secondary curriculum.

2. Convey occupationally relevant knowledge and skills that serve as a foundation for lifelong learning processes mandated by high skill/high wage jobs.

It is important to note here that there is a major time differential between Applied Academics and Principles of Technology (PT)as taught in the high school setting compared with the length of a Bridge program taught at the post-secondary level. Applied math, biology, or chemistry classes in high school are customarily two semesters long. PT is divided into two one year courses, usually taught in the tenth and eleventh grades. CORD curriculum developers recommend approximately 500 contact hours of technology oriented instruction that lasts 18 weeks. Reference to the CORD curriculum models show a typical day of instruction that may include five one hour class periods (some subjects are taught in two and three hour time blocks), a one hour self-study period, with a one hour break for meals, rest, and personal time. It is a very condensed and intense program of instruction.

Student Participation

Hull and others suggest that students be enrolled in classes as a contiguous group (Hull,

1993; Decker & Millard, 1994; Edling & Sosbe, 1991) so that a team spirit develops and a mutual support group is created that invites members to provide encouragement to one another during times of personal stress and difficulty. Students taking the same classes together with the same instructors and using the same study materials can better help one another (mentorship) with academic problems that invariably arise when new and unfamiliar materials are presented.

CORD suggests a class size of twenty-five students per session, with a session being equal to an eighteen week semester. The sessions are divided along occupational categories or "clusters". In Georgia, the proposed occupational clusters as currently envisioned by the State Department of Education are:

1. Environmental and Agricultural Sciences which includes programs in aquaculture, biotechnology, environmental horticulture, environmental engineering, and forest technology.

2. Business Marketing and Information Management which includes programs in accounting, computers, fashion merchandising, information and office technology, management and supervision, marketing, restaurant management, and secretarial science.

3. Human Services which is a broad category that includes programs ranging from barbering and cosmetology to child development to law enforcement and paralegal studies.

4. Health and Medical which includes the dental, medical laboratory/assisting, ophthalmic, paramedic, pharmacy, radiologic, respiratory, surgical, veterinary, and occupational therapy, and other allied health programs.

5. Technical/Engineering which encompasses the broadest range of skill offerings. Included in this category is the **trade** group of programs such as carpentry, masonry, plumbing, and electrical; **transportation** programs such as truck and auto repair and the aerospace specialties; **manufacturing** program areas such as machine tool and industrial maintenance, electronics, instrumentation technology, civil engineering, and business equipment; and **communications,** including graphics, photography, and printing.

On occasion, some students will not need all the coursework found in the Bridge program curriculum. For example, approximately ten percent of the student population at Georgia technical institutes consists of individuals who have completed a four year degree. These students would not need the applied communications material but might need PT or other science or computer course work if they lacked these particular skills. Some individuals coming from industry may have excellent electronics background but need the communications and TQM training in order to achieve parity.

Hull (1993) suggests providing advanced placement testing as a tool to determine skill levels of students with uncertain competency levels for a given course or program area. Post-secondary counseling staff would be responsible for testing and advising students on the most appropriate course selections in a Bridge course, a remedial course, a fundamental occupational course or a combination of any of these.

Bridge Program Providers

Bridge programs are normally taught at a post-secondary institution but this is not always the case. A high school location may be ideal because of the availability of lab equipment used in

applied courses or Principles of Technology. Providing high school instructor staff may be problematic. An alternative is to assign technical institute full-time or adjunct faculty to teaching duties at the high school, providing scheduling difficulties with classroom and lab space can be resolved. Banks, Barrow, and Jackson County schools along with Commerce City and Jefferson City schools conduct a regional evening school at the Jackson County Comprehensive High School in Jefferson, Georgia. An evening program at a high school could serve as a "home" for a bridge program. The advantage of this arrangement is that the high school contains space and equipment required to support the applied courses. A disadvantage is that some adults may feel inhibited returning to high school after so many years away. Their high school experiences may be poor and a return triggers memories of failure (Edling and Sosbe, 1991). Enrollment at a post-secondary location, however, is usually associated with "going to college" and may be viewed as a move forward, not a step backward.

A Bridge Program Model

CORD's Tech Prep Bridge, *Preparing Adult Students to Enter Two-Year Degree Programs,* provides an excellent resource for designing a structure for Bridge programs. Chapter six of Dan Hull's recent book, *Opening Minds, Opening Doors* (1993) also provides guidelines for developing Bridge models. The CORD materials are recommended because of the depth of research and development the organization has completed for both applied courses and Bridge programming. However, high school teachers who use CORD materials often find that modifications to some of their materials may be necessary to meet local special needs or conditions. The Bridge program may also require that coursework be tailored to fit the time constraints of a quarter or semester calendar. Curriculum developers and instructors should be flexible and adjust the course materials to fit the instructional needs of the students which, most likely, will vary from group to group and session to session.

Generally speaking, the competencies which are found in DTAE standardized programs within an occupational cluster will determine which courses are included in the Bridge program. For example, the Environmental and Agricultural Sciences require strong basic skills in math, chemistry and biology. Computer literacy is a requirement for **all** entry level workers. Therefore, an Environmental and Agricultural Sciences Bridge program would include:

1. Applied Biology/Chemistry
2. Applied Mathematics
3. Principles of Technology
4. Basic course on microcomputers
5. Agricultural specific courses
6. Employability Skills
7. Safety Skills

A session designed for students enrolled in Business Marketing and Information Management would include:

1. Applied Mathematics
2. Applied Communications
3. Basic course on microcomputers
4. Business specific courses
5. Employability Skills
6. Quality Management Skills

A session designed for students enrolled in Human Services would include:

1. Applied Mathematics
2. Applied Communications
3. Basic course on microcomputers

4. Psychology, Human Relations, Social Sciences

A session designed for students enrolled in Health and Medical would include:

1. Applied Mathematics
2. Applied Biology / Chemistry
3. Principles of Technology
4. Basic course on microcomputers
5. Specific health related course such as physiology and anatomy; psychology

The Technical/Engineering cluster becomes more difficult. This occupational group covers a broad area and several different sessions would be necessary. Examples are:

Construction Cluster

1. Applied Mathematics
2. Principles of Technology
3. Applied Communications
4. Introduction to Health and Safety
5. Employability Skills
6. Specific construction related courses such as tool use and safety, building codes, drafting and plan/drawing reading

Transportation Cluster

1. Applied Mathematics
2. Principles of Technology
3. Applied Communications
4. Mechanical Devices and Fluid Power Systems
5. Electricity and Electronics
6. Employability Skills

Communication Cluster

1. Applied Mathematics
2. Principles of Technology
3. Introduction to Graphics
4. Applied Communications
5. Electricity and Electronics
6. Employability Skills

Manufacturing Cluster

1. Applied Mathematics
2. Principles of Technology
3. Applied Communication
4. Industrial Chemical Safety
5. Quality Control
6. Electricity and Electronics
7. Employability Skills

CORD, AIR, Amatrol, John Wiley and Sons, Goodheart-Wilcox, Delmar, Jostens Learning Corporation and CHEC Systems are just a few of the many curriculum design and publishing companies that provide "turnkey" courseware that can be used as a foundation for Bridge program development. Experience with the standardized curricula used by Georgia technical institutes indicates that excellent curriculum innovation can occur when local schools prepare institutionally developed instruction. Past experience also indicates that regional social, economic, political and business differences impact curriculum development. Therefore, regionally developed Bridge programs can be expected to vary. For example, a course in Industrial Chemical Safety taught in a school that provides employees to the Savannah River project may place heavy emphasis on "Radiation Hazards" while schools located near Atlanta industrial plants will emphasize "Toxic Chemicals". Agricultural areas of the state will emphasize agricultural chemical use and safety. Common sense dictates, however, that curriculum developers need not reinvent the wheel but rather modify existing materials to meet local conditions.

Development

The first step in development is to define responsibility for planning and implementing the program. There are several options:

1. The technical institute can assume sole responsibility for development.

2. The Tech Prep consortium planning committee can be the planners and developers.

3. Shared responsibility between a technical institute and a single secondary school can occur.

4. It was mentioned above that Jackson County High School hosts a regional evening school. At the current time, Tech Prep is not a part of this alternative school's curriculum, but it could be. At the last national meeting of the CORD Bridge committee, several members discussed the possibility of attaching Bridge activities to evening programs.

An evening program would require two semesters with four hour sessions instead of the eight hour periods that comprise a day program.

Developers could include instructors who will teach the courses, TI department chairs of targeted occupational areas, school counselors from the TIs and high schools, curriculum specialists from either secondary or post-secondary schools, and administrators who will be responsible for managing the program.

Development will start with a review of available course materials as outlined above. When materials are selected, they must next be modified to fit the quarter or semester time frame, or in the case of an evening program, two semesters are required. Classroom/lab space and equipment and supplies inventories must be analyzed and selected. A budget must be developed and funding sources identified. Tuition guidelines must be established. A marketing plan should be considered if projected student enrollments are considerably less than the twenty five student per session as recommended by CORD. (Graduates of alternative school programs are likely targets of the marketing plan). A site must be selected, students tested, counseled, and enrolled and teachers hired.

Implementation

Instructional staff will require an orientation that reviews the selected curriculum materials and explains the integration of their courses into the total program and into the TI programs of instruction. Bridge students should also receive a brief orientation which introduces them to their instructors and the materials they will be expected to master.

A sequencing scheme should be developed. An initial program should be conducted as a pilot test. Changes and modifications will be made and then a decision on the number of sessions and the type of scheduling should be considered. Options include scheduling single, back to back sessions, overlapping sessions, or conducting two or more concurrent sessions. Reference is made to CORD's *Tech Prep Bridge* publication which analyzes the strengths and weaknesses of each approach.

Evaluating the Bridge Program

Bridge programs must be evaluated to determine if they are accomplishing their goals. The TI instructor staff will quickly determine if Bridge completers are successfully integrating into fundamental occupational courses. Bridge program staff will need a feedback protocol so that course content adjustments can be quickly made. Similarly, liaison must occur with secondary Tech Prep instructors to ensure that changes at that level are reflected in Bridge program revisions. As mentioned previously, "turnkey" materials will be revised to meet local conditions; these changes should be mirrored at all levels of instruction.

An evaluation team should have members from high school, technical school and Bridge program staff, including Tech Prep coordinators and student representatives. Each Bridge session should conclude with a formal evaluation process. Student progress should be measured as completers move through TI diploma and degree programs by comparing formal (grades) and informal (faculty assessment) indicators of student success at the technical institutes. This is necessary to ensure that the basic skills taught are sufficiently rigorous to prepare students to meet the demands of an advanced skills curriculum.

Revision

Revision to Bridge coursework will be an ongoing process. They key to successful curriculum revision is dialogue between Bridge instructors and TI instructors with responsibility for teaching the Fundamental Occupational courses in the TI certificate, diploma, and associate degree courses. Bragg and others (1994) indicate that communication only between key players in Tech Prep organizations is insufficient. Planners, when designing Bridge programs, must place priority on creating a mechanism that ensures ongoing dialogue between instructors at the TI and all Bridge levels.

Funding Considerations

CORD estimates the per pupil cost for a Bridge program at approximately $2500 if 25 students are enrolled in each session. This figure assumes the providing agency is "starting from scratch" and has nothing in place in terms of staff, facilities, curriculum materials, and supplies. This figure will fluctuate according to variations in teachers salaries.

Students entering the Bridge program will require financial help. Currently, the HOPE scholarship money is restricted to persons enrolled in diploma and degree programs so this money, under current law, is not available. Other States such as Texas, North Dakota and Wisconsin have used a variety of sources to fund their programs by using existing state and federal programs (e.g., JTPA and Perkins II) and tailoring them to meet the needs of individual students. These "set asides" and categorical grants are now in jeopardy because of congressional restructuring of Labor and Education funding streams. Loan programs, in the short term, may be the primary source of money for tuition, books, and materials for students enrolled in the Bridge program. Block grant moneys, if they materialize, may be another source of funding should DTAE be a recipient of these funds.

Alan Sosbe, the CORD staff member responsible for Bridge program issues, reports that some consortia have used Perkins money to help fund Bridge programs. However, Congressional re-authorization of Perkins legislation is also in doubt and only those moneys available through the next fiscal year authorization (the reinstated 108 million) will be available.

Another potential source of income is Lottery money. We assume that current priorities for funding will eventually be met and new priorities then developed. Bridge programs may be given priority for these funds.

Summary

Tech Prep currently remains in its infancy in Georgia. Other states such as Delaware and the Carolinas have been involved with the program for longer periods of time and have seen a maturation of their programs. Single program articulation gives way to cluster development; advanced skill courses replace older material that becomes obsolete when students acquire new and better skills at the high school. Entry level skills will rise as more students matriculate through secondary Tech Prep programs and begin associate degree coursework. Eventually, pressure is brought to bear on post-secondary schools to revise their curriculum to include advanced skills training.

Bridge programs are developed to assist adult students who do not have academic and technical

skills commensurate with those of Tech Prep enrolled students. The coursework is broad-based, multi-disciplinary in nature, and taught contextually with applied courses forming the foundation of instruction. Counseling and career information are integral parts of the program.

Planning, development and implementation of Bridge programs can be assumed singly by a technical institute or in cooperation with other academic organizations. Cooperation with a local high school(s) may be advantageous because of staffing, physical plant, and curriculum resources located there. Funding for Bridge programs currently is a question mark and until such time as new federal programs are initiated, state and local money must support Bridge development.

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Contributor:

Mr. William Gohdes, Program Specialist, Occupational Research Group, University of Georgia

APPENDIX A
Sample Programs

We have included five examples of sample programs, one for each of the five occupational clusters as identified by the Georgia Department of Education and used in the development of skill competencies for the State of Georgia. These samples are based on materials developed by CORD in their publication *Tech Prep Bridge - Preparing Adult Students to Enter Two-Year Programs.* An important part of the CORD Bridge philosophy is the use of block scheduling for applied academics classes. The samples reflect this philosophy. The examples show that the applied courses are presented in three hour instructional blocks, a practice which reduces time loss (room changes) and enhances lab experience (greater time on task with less time lost to setting up and dismantling apparatus).

The skill specific instruction presented in the examples is very general. The content of a *real* Bridge program would reflect coursework developed through an articulated program between the technical institute and its consortium members at the secondary level. For example, one Bridge curriculum model developed by CORD for an Electronics program includes the applied academics courses in math and Principles of Technology, personal computers, blue print reading, introduction to quality control, industrial safety and then skill specific courses in AC/DC circuits, circuit analysis, active devices, digital electronics and introduction to fluid power (CORD 1993, p. 11). The Bridge coursework must mirror the material developed by the curriculum planners for each occupational program. For most Georgia TIs, the Bridge program will be built around the single program articulation agreements that are currently in place. For example, DeKalb Technical Institute and DeKalb County Schools developed articulation agreements for accounting, air conditioning & refrigeration, cosmetology, data processing, electronics, graphic arts, keyboarding, metals technology and the WordPerfect word processing software program. A semester Bridge program would be developed for one of these programs identified as having a high priority of need based on industry personnel shortages and a supply of available applicants for that particular program. The following semester would include material for the next highest priority program and so on down the list of articulated programs.

The most important point to consider when designing a particular curriculum model is the level of competency the high school Tech Prep completer has achieved. The goal of the Bridge program is creating parity for the non-traditional student so that all are on an equal footing when they join together in the regular classroom setting for their first day of classes at the technical institute.

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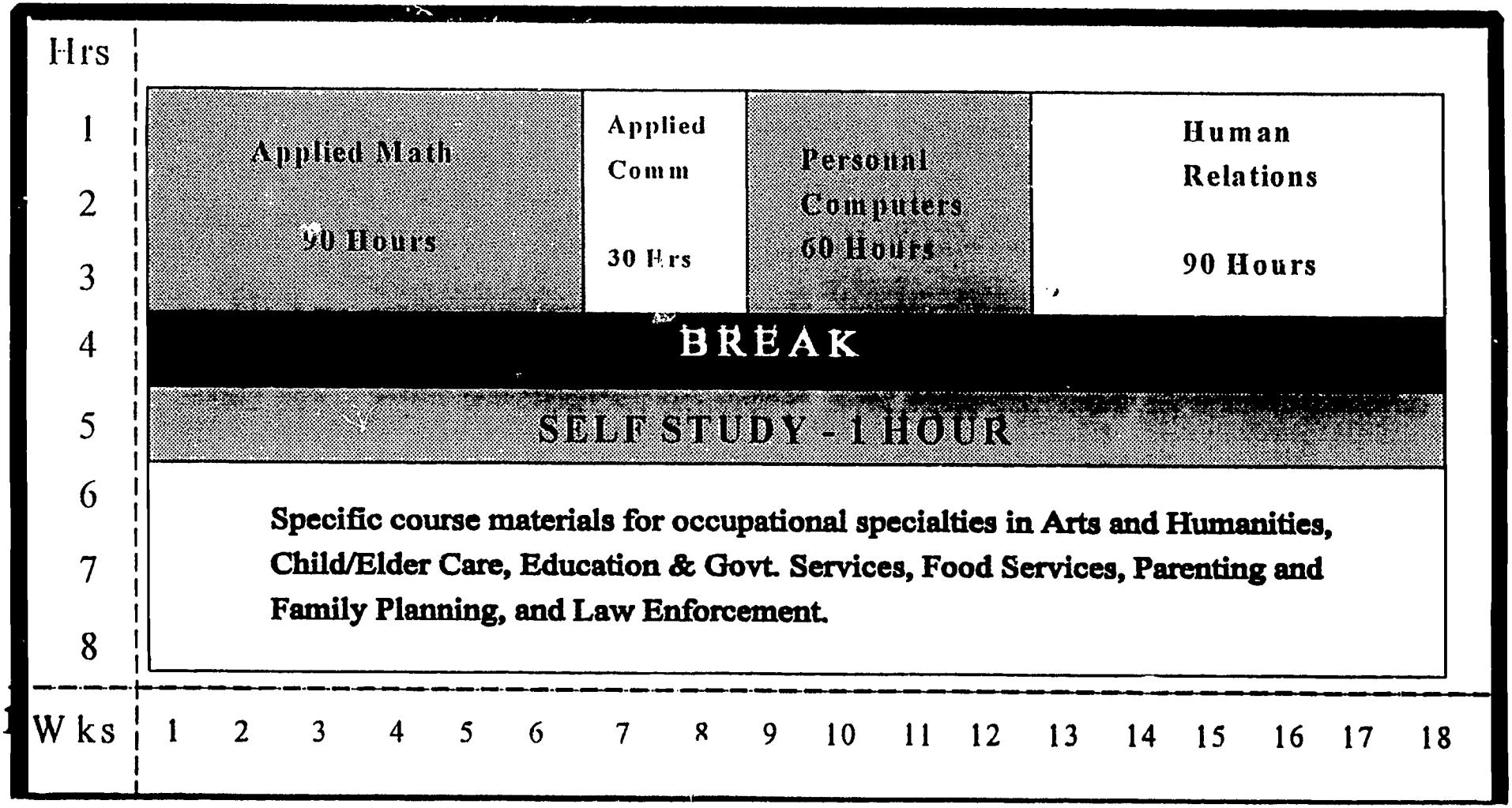

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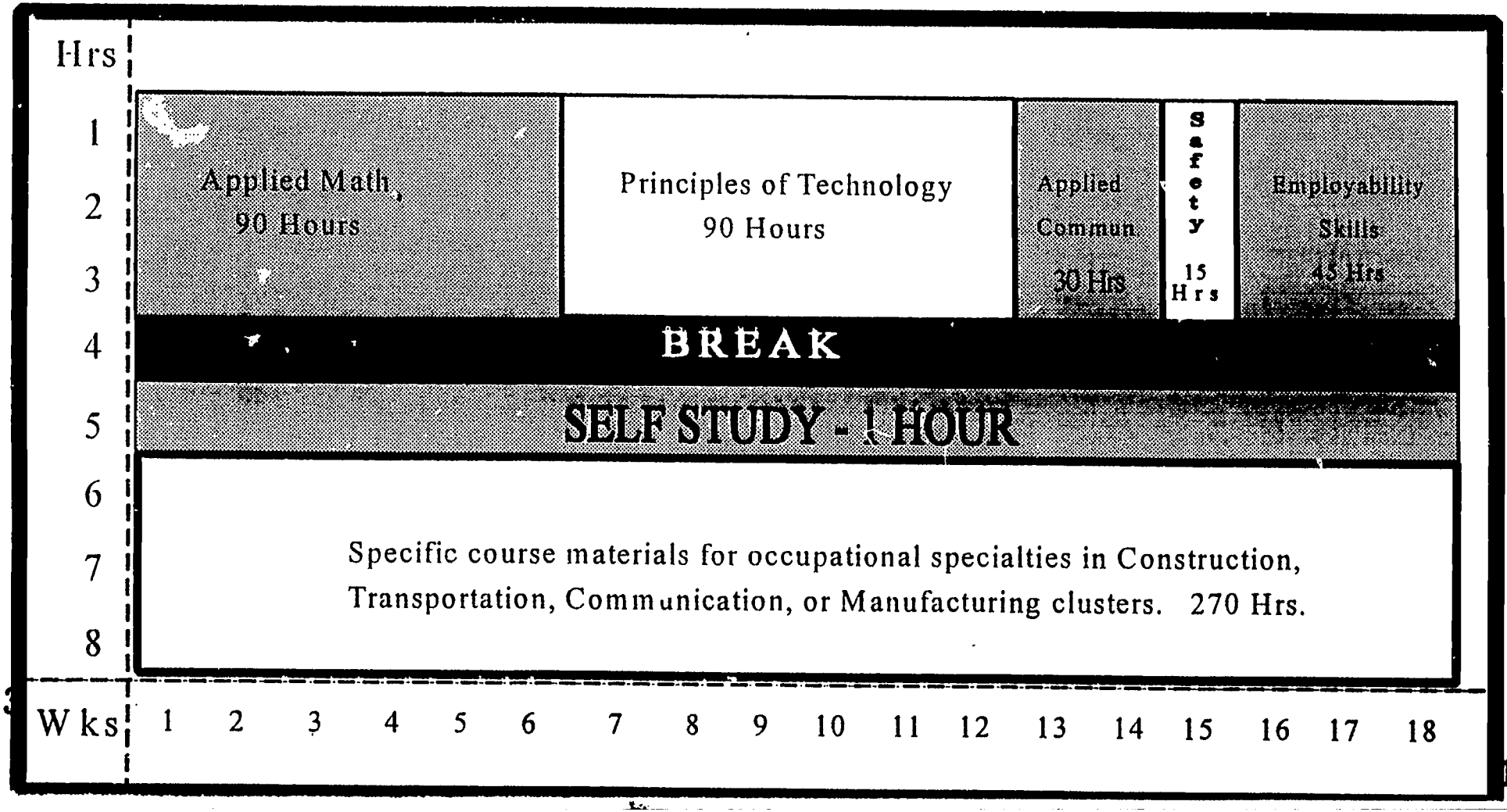

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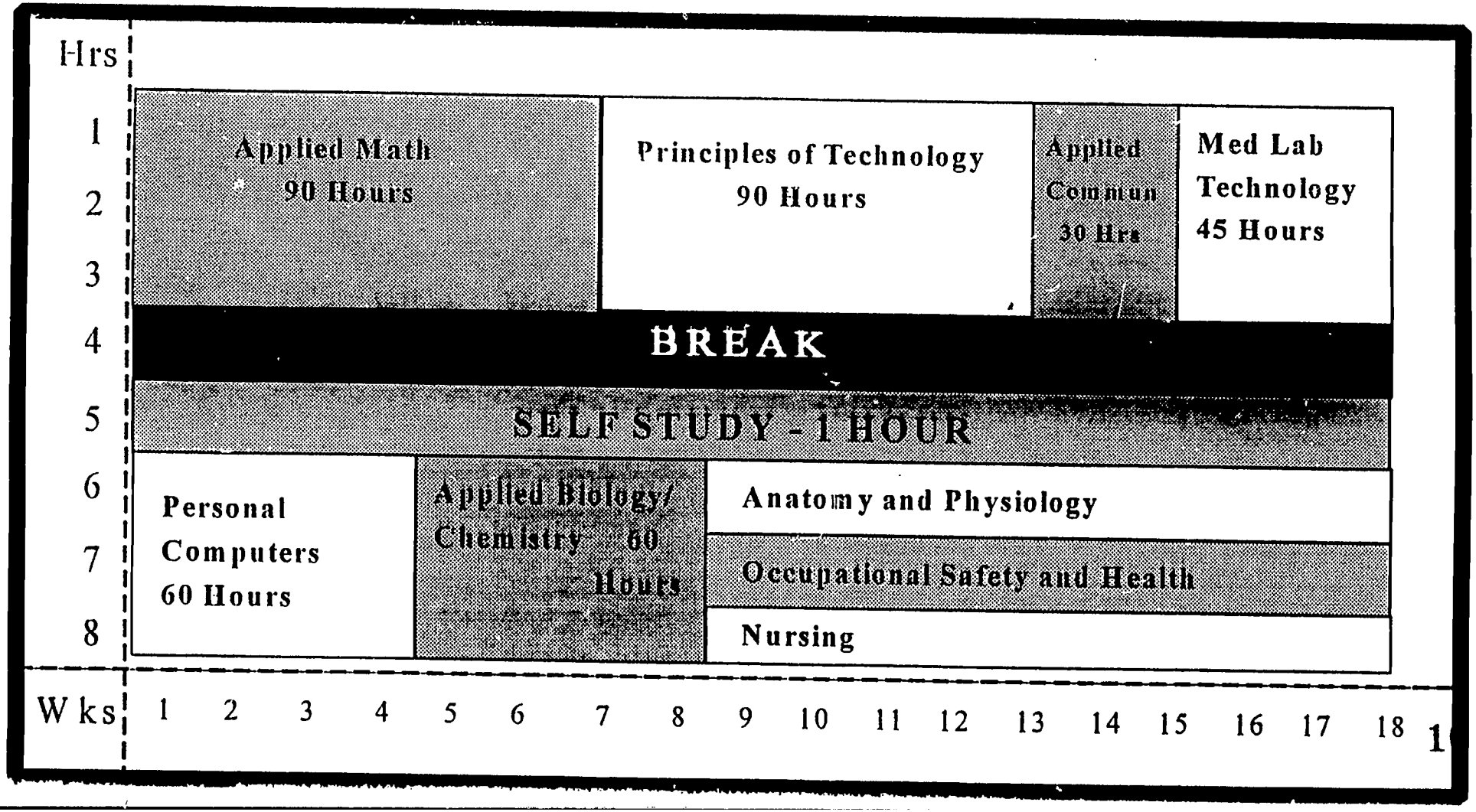

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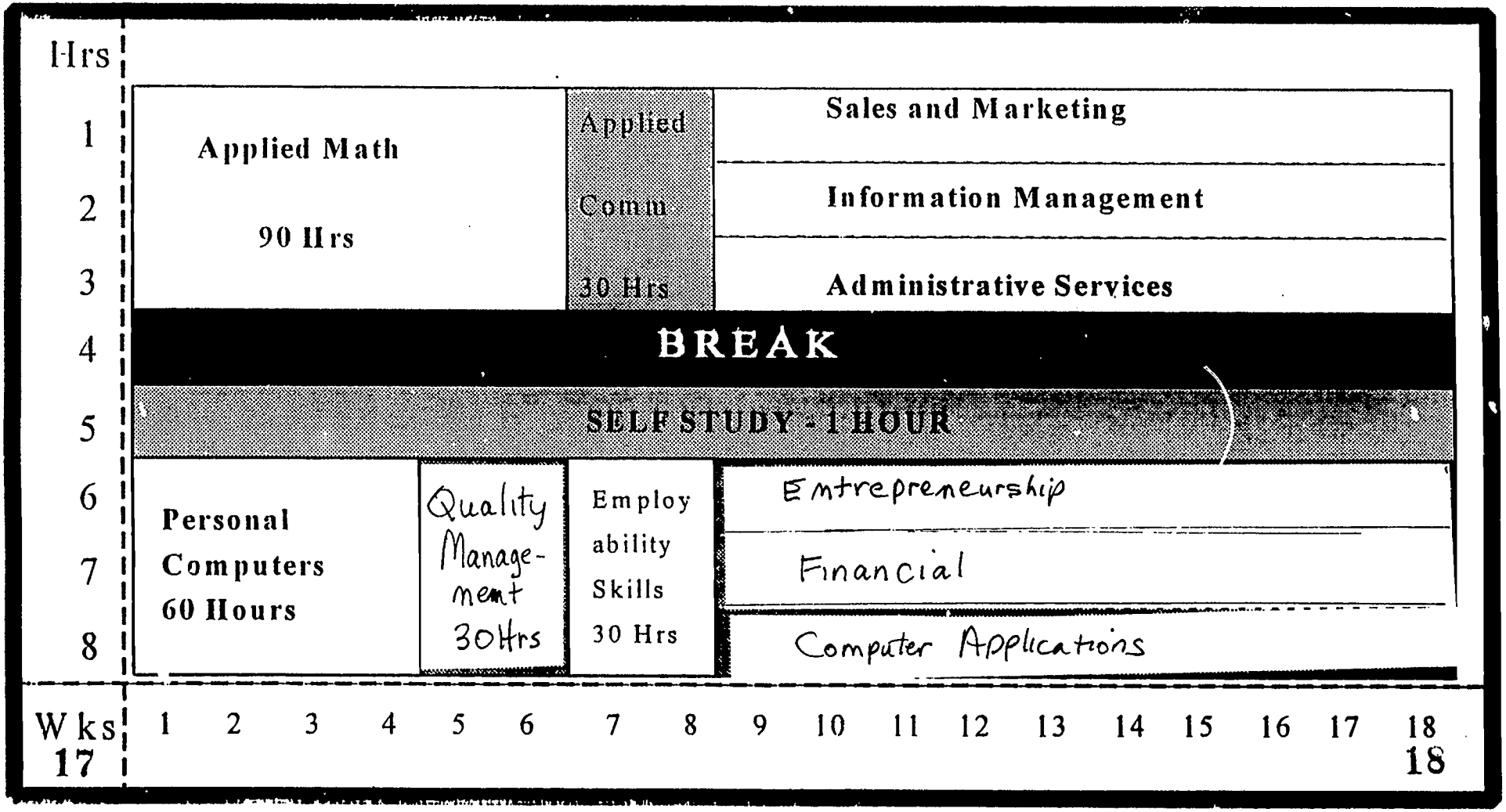

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