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Courses = Classes: Catch-22 for Small Schools

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The purpose of this project was to explore an alternative to the grade-level, subject-matter, classroom-group organization for delivery of instructional services in small schools. The method probed the limits of the prevailing classroom organizational model using simulated secondary school master schedules. Equating learning opportunity (courses) with classes offered automatically places small schools at a program disadvantage because they lack the critical mass of students needed for a comprehensive array of electives. The proposed learning center approach is a multi-grade, multi-course organizational alternative that uncouples the course = class equation through individualized and small group instruction. It is suggested thatby using the learning center approach a school with 180 students in grades 7-12 could offer the same (or better) program as a school with 300 to 374 students using the traditional classroom approach.

Introduction

The relationship between secondary school size and access to program opportunity is a continuing educational issue. When is a school "too small" to provide access to a comprehensive program? Education Research Service Inc. [5] reviewed 261 studies and articles dealing with size of schools and school districts. Minimum size recommendations ranged from 90 to 1,500 for junior high schools and from 100 to 1,600 for senior high schools. The range in recommended minimum sizes among the studies was associated with differences in size of schools studied, geographic location, degree of urbanization, programs offered and research methods used. The definition of a "small" school is relative as highlighted by the observation that a 100-student Alaskan village secondary school would be considered large in a state that reported 60 one-teacher high schools in 1977-78 [2].

An incidental finding in a 1979 study [3] designed to simulate program based foundation aid distribution (program equity) indicated that, on the average, schools with enrollments below 374 in grades 7-12 lacked the critical mass of students to offer classes in all areas of the specified foundation program. Limitations of the 374 enrollment size as a criterion of smallness include (1) its derivation in a one state system and (2) its dependence on educational program, pupil-teacher ratio, and teacher licensure variables. However, the finding is relevant in that it focuses attention on the relationship between program disadvantage in small schools and the classroom organization for delivery of instructional services. Typically, schools are judged "too small" when they cannot offer a sufficient number of learning opportunities (courses) in traditional classroom groups. If the schools could offer expected learning opportunities or courses without relying on the traditional classroom delivery system, then they would not be "too small."

Defining the Problem

Defining program disadvantage in small schools as a natural consequence of low enrollment size tends to generate solutions that call for making schools larger. By defining the problem as partially a function of the prevailing organization for delivery of instructional services opens the door for organizational alternatives. The prevailing grade-level, subject-matter, classroom-group organization automatically places small schools at a programmatic disadvantage by equating learning opportunities (courses) with classes offered. Labeling the program disadvantage as a "small school problem" establishes an association with enrollment size that directs attention away from the implications of classroom organization for delivery of instructional services. Understanding the classroom delivery system is essential in developing alternatives to overcome its short-comings in small schools.

Origins of the prevailing classroom delivery system have been linked with scientific management and industrialization in the United States [1]. Changing from an agricultural to an industrial society, increased population concentrated in urban centers, and expectations for a broader range of educational services caused elementary/secondary education to adopt a mass production service delivery model. Application of mass production to schooling resulted in (1) defining work tasks in terms of age, grade, subject-matter and sometimes ability groups of students, (2) increased specialization of teacher roles, (3) search for optimum student-teacher ratios, (4) normative performance standards and (5) separation of teaching from administration of instructional activities.

The mass-production classroom model which became an integral feature of graded-elementary, comprehensive-secondary, consolidated-districts that replaced ungraded rural elementary and town high schools was not appro-

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priate for small secondary schools. The program disadvantage of small schools lacking the critical mass of students necessary for offering a comprehensive array of electives has been intensified by other factors. Teacher training programs, licensure provisions, aid distribution formulas, public employee bargaining laws and state reporting procedures have been geared to schools with enrollments sufficiently large for successful implementation of the classroom organizational model. Sher [10] indicated that when small schools called attention to their unique situation, the almost universally prescribed solution was consolidation i.e. get bigger, make the mass production model work and the problems will be solved. District reorganization may be appropriate for low and declining enrollment schools in close geographic proximity. However, educational program limitations need to be minimized where isolation, transportation barriers, community expectations or other factors negate the feasibility of reorganization.

Educational television offers the latest promise of making the mass-production model work in small schools. If a small school does not have sufficient enrollment or resources to offer a particular elective, a televised class may be transmitted by cable, microwave, or broadcast from a neighboring school, central location or satellite. Addition of an interactive feature supports the teacher-present/student-recite pattern of traditional classroom organization by allowing "...distant school students (to) use the raised hand technique for getting the teacher's attention" [4]. Television is a new mode of delivery, but the basic organization and assumptions of the mass production delivery system appear unchanged. The teacher remains a transmitter of knowledge with a reach extending beyond district boundaries making the classroom "...thirty miles long" [8]. In educational television, technology appears to be miles ahead of pedagogy—the art and science of teaching. If such pedagogical matters as curriculum content and sequence, individual differences, student motivation, and peer reinforcement are not addressed, educational television becomes a technological "quick fix" to make the mass production model work. Educational television may be a viable alternative for some small schools; primary concerns in planning for its use need to be (1) a favorable student learning environment, (2) quality educational programming worth transmitting and (3) reaching sufficient numbers of students to justify capital and operating costs.

The assumption that students learn most effectively in supposedly homogeneous grade-level, subject-matter groups should be challenged by small schools. It is possible that the small school program disadvantage is at least in part an artifact of an inappropriate mass-production delivery system. Educators in small schools need insights into the limitations of the classroom group delivery system.

Classroom Delivery Limitations

The admonition, "Why fix it if it isn't broke?" applies to the use of classroom group organization in small schools. Part of the problem is having alternatives available when the limits of classroom-group usefulness are reached. The limits vary from district to district depending on enrollment size, pupil-teacher ratio, staff licensure and educational program. The following illustration (1) specified a pupil-teacher ratio of 20:1, (2) assumed that teachers with the necessary licensure were contracted to teach five periods per day, (3) specified criteria for a comprehensive program and (4) prepared simulated master schedules for progressively lower enrollments in grades 7-12. Its purpose was to explore the lowest enrollment limit in grades 7-12 at which the classroom group organization could be used to deliver a comprehensive program. The following criteria were specified for a comprehensive program:

(1) Classes must meet state minimum requirements.
(2) Elective class opportunity must be offered for both college-preparatory and non-college bound students.
(3) English language arts classes must be offered at each grade level.
(4) Social studies classes must be offered at each grade level.
(5) Classes in general mathematics must be offered in grades 7 and 8, general mathematics or Algebra I in grade 9, and the following electives in grades 10-12: applied math, geometry, advanced algebra, and pre-calculus.
(6) Classes in general science must be offered in grades 7-9 and the following electives offered in grades 10-12: applied biology, general biology, physics and chemistry.
(7) At least two years of elective foreign language classes.
(8) Home economics and/or industrial arts classes must be offered in grades 7-9 and at least two electives offered in each area in grades 10-12.
(9) Physical education, health, and safety classes must be offered in grades 7-12.
(10) Elective classes in fine arts, instrumental music and vocal music must be offered in grades 10-12. (Exploratory art units in grades 7 and 8 would be part of the home economics/industrial arts/art sequence. Instrumental music in grades 7-9 would be arranged individual and group lessons. Junior high instrumental and vocal music groups would be co-curricular.)
(11) Three elective business education classes must be offered in grades 10-12.
(12) An elective class in computer programming and applications would be offered.

The simulated master schedule in Table 1 meets the specifications listed above and illustrates the following limits:

(1) The "rock bottom" minimum enrollment size at which small secondary schools can use grade-level, subject-matter classroom groups to deliver the specific comprehensive program (with a student-teacher ratio of 20:1 and assuming an appropriate licensure mix) is 300 students in grades 7-12.
(2) If the school served by the simulated master schedule had an enrollment driven staff reduction, it would have no choice but to reduce program opportunity by eliminating class offerings.
(3) Continuing to offer the program after a staff reduction would require an alternative to the traditional classroom delivery system.

The classes in Table 1 constitute a "rich" educational program for a school with 300 students in grades 7-12. In practice, under "real world" small school conditions some of the classes in Table 1 probably would not be offered because (1) enrollment in some electives such as pre-calculus might be too low, (2) the number of teacher preparations would be too high (M. Romeo has five), or (3) the necessary teacher licensure mix might not be

Table 1

Simulated High Master Schedule Using Classroom Group Delivery System
Enrollment Grades 7-12 = 300, Authorized FTE Staff = 15.0

	PERIOD					
Teacher/Room	I (8:30-9:25)	II (9:30-10:25)	III (10:30-11:25)	IV (12:30-1:25)	V (1:30-2:25)	VI (2:30-3:25)
M. November 15	Eng. 12	Eng. 12	Off. Mgmt. 11 Room 35	Typing 10 Room 35	Acct. 12 Room 35	
M. Oscar 16	Engl 11	Eng. 11	Eng. 9		Eng. 9	Speech 10-11-12
M. Papa 17	Am. Hist. 11	Am. Hist. 11	Soc. St. 9		Soc. St. 9	Humanities 10-11-12
M. Quebec 18	Sc. 9	Biol. 10	Appl. Bio. 10	Physics 11	Chem. 12	
M. Romeo 19	Math. 9	Bus. Math 10	Geom. 10	Pre. Cal. 12	Alg. II 11	
M. Sierra 20	Soc. St. 12	Soc. St. 7	Soc. St. 7	Soc. St. 8	Soc. St. 8	
M. Tango 21	Eng. 10	Eng. 7	Eng. 7	Eng. 8	Eng. 8	
M. Uniform 22	P.E. 7-8[a]	Soc. St. 12		P.E. 9	H. & P.E. 10	R.P.E. 10-11-12
M. Victor 23	P.E. 7-8[a]	Elem. P.E.	Elem. P.E.	P.E. 9	H. & P.E. 10	
M. Whiskey 24	Ind. Arts 7-8[a]	Ind. Arts 9	Computer Industry 12	Ind. Arts 12	Ind. Arts 11	
M. X-ray 25	Home Ec. 7-8[a]	Home Ec. 9	Home Ec. 12	Home Ec. 11		Art 10-11-12 Room 15
M. Yankee 26		Sc. 8	Sc. 8	Sc. 7	Sc. 7	Sc. 9
M. Zebra 27		Math. 8	Math. 8	Math. 7	Math. 7	Alg. I
M. Able 28	Eng. 10	Elem. Foreign Language	German II 11	German I 10		Study Room 32
M. Baker 29	Elem. Music	Elem. Music	Sec. Music	Sec. Lesson	Sec. Lesson	Band/Chorus 10-11-12
Study Hall 31	Aide	Aide	Aide	Aide	Aide	Aide

[a]Grades 7-8 alternate P.E. and Home Ec. or Ind. Arts every other day.

available. Other reasons small schools sometimes use to justify (or rationalize) less comprehensive programs include (1) lower community expectations, (2) insufficient student demand, (3) inadequate resources, etc. Pressures for expanded curriculum, particularly in mathematics, science, and foreign language could increase programmatic stress in small schools.

Classes in Table 1 constitute the "regular" instructional program for *all* students. Special education services helping students with learning handicaps benefit from the regular program would be provided on the basis of need by additional licensed staff. Instructional support services such as counseling, library/media and administration are part of the total program, but external to the classroom delivery system.

A Learning Center Alternative

A "learning center" is neither a new concept in education nor does it promise complete alleviation of program disadvantage in small schools. While the proposed learning center alternative was developed independently, many similarities can be found in the Catskill [11], Oregon [7] and other small schools projects. The unique feature of the proposed learning center is its conscious decoupling of the learning opportunity (course) = class equation. When small school enrollments are too low to offer desired courses in traditional classroom groups, the learning center approach is a multi-grade, multi-course organizational alternative. Features of the proposed secondary learning centers include the following:

(1) Staffing would include one or more teachers licensed in the center's subject matter area. Aides may be assigned to (a) maintain records, (b) carry out center routines and (c) provide adult supervision of hazardous activities.
(2) Instructional supplies would include diagnostic tests, worksheets, packets, learning packages, books, diskettes, achievement tests and other materials that lend themselves to individual and small group study of a specified set of courses offered in the center.
(3) Center equipment would depend on the nature of courses offered. A mathematics learning center might be equipped with perimeter small group and individual study carrells, calculators, and micro computers or a main-frame terminal. A commercial occupations learning center might have specialized work stations with typewriters, duplicators, data entry equipment, etc.
(4) Supporting subject-matter materials to enrich teaching/learning and develop inquiry skills would be provided through a small decentralized library within each learning center. References, visual aids, and other supplementary materials appropriate for courses offered would be available for supervised student use.
(5) Student work responsibility would be specified in individualized contracts for pre-planned sequential learning experiences (courses). The teacher's role would shift from knowledge transmission through preparation, presentation, assignment, and recitation/evaluation to diagnosis, planning, assistance, and evaluation of learning activities. Learning center activities would include sufficient teacher-student and student-student interaction to prevent individualized study from becoming the "lonely curriculum" of independent study.

The simulated master schedule in Table 2 illustrates use of the learning center alternative to offer the specified program maintaining a pupil-teacher ratio of 20:1 in a secondary school with an enrollment of 180 students in grades 7-12. Schools of this approximate size typically have sufficient enrollments in each grade to offer required

Table 2

Simulated High School Master Schedule Using Learning Center for Electives[a]

	PERIOD					
Teacher/Room	I (8:30-9:25)	II (9:30-10:25)	III (10:30-11:25)	IV (12:30-1:25)	V (1:30-2:25)	VI (2:30-3:25)
M. Oscar 16	Prep.	Eng. 12	Eng. 11	Eng. 9	Eng. 7	Eng. 8
M. Papa 17	Prep.	Am. Hist. 11	Soc. St. 12	Foreign Lang.[b] L.C. (Rm. 28)	Soc. St. 8	Soc. St. 7
M. Romeo 19	Prep.	Math 7	Math 8	**Mathematics Learning Center[c]**		
M. Quebec 18	Prep.	Sc. 8	Sc. 7	**Phys. Science Learning Center[d]**		
M. X-ray 25	Prep.	Eng. 10 Room 21	Unassigned	Home Ec. 8 (1st Semester) **Personal Development Learning Center[e]**		
M. Whiskey 24	Prep.	Unassigned	Soc. St. 9	**Agriculture and Industrial Occupations Learning Center[f]** Ind. Arts 8 (2nd Semester)		
M. Baker 29	Prep.	Elem. Music	Elem. Art	General Music 7 (1st Semester) Art 7 (2nd Sem.)	**Fine Arts Learning Center[g]**	
M. Uniform	Prep.	Health and Phy. Ed. 9	Health and Phy. Ed. 10	Phy. Ed. 7-8	**Recreation, Health, Safety, & Fitness Learning Center[h]**	
M. November 15	Non-Teaching Assignment			**Commercial Occupations Learning Center[i]**		

[a]Enrollment Grades 7-12 = 180; authorized FTE = 9.0 (actual assigned 8.6 FTE)
[b]Individualized/small group instruction in German I, II, and III.
[c]Individualized/small group instruction available in general math, algebra I, business math, computer math, plane geometry, trigonometry, solid geometry, advanced algebra, pre-calculus.
[d]Individualized/small group instruction available in geology, meteorology, wildlife biology, general biology, applied physics, general physics, applied chemistry, general chemistry.
[e]Individualized/small group instruction available in nutrition, food preservation, meal preparation, child-care, family living, clothing alteration, garment making, interior decorating, home management.
[f]Individualized/small group instruction available in soils, agronomy, horticulture, poultry, dairy husbandry, carpentry, cabinet working, welding, small engines, engine tune-up, basic electricity, basic electronics, house wiring.
[g]Individualized/small group instruction available for instrumental lessons, (band), music appreciation, music history, voice, sketching.
[h]Individualized/small group instruction available for tennis, golf, wrestling, slimnastics, weight lifting, running, cross country skiing, folk dancing, bowling, driver safety, firearms safety, water safety, first aid.
[i]Individualized/small group instruction available for accounting, bookkeeping, typing, shorthand, office machines, data processing.

courses in efficient-sized regular classes. As enrollment drops below 180 students, the student-teacher ratio must be decreased to guarantee that basic complement of licensed staff necessary to operate the specialized learning centers. Providing the program presented in Table 2 in a school of 120 students in grades 7-12 would require a pupil-teacher ratio of 13:1. These circumstances might be used to justify a sparsity aid differential to support program equity in small schools.

Viability of the proposed learning center approach has not been demonstrated. Small schools' decision to try this alternative must be based on face validity of the following advantages it appears to offer:

(1) With appropriately staffed and equipped learning centers, a school with approximately 180 students in grades 7-12 could offer the same (or better) program of courses that could be offered by a traditional class schedule in a school with 300 to 374 students.
(2) A licensed teacher in the learning center can more readily personalize the teaching-learning relationship, individualize instruction, and provide special help than a teacher in a remote television studio classroom or a correspondence study "grader" hundreds of miles away.
(3) Number of teacher class preparations is not a bargaining issue because there are no formal class presentations in learning centers. Considerably more preparation is needed to find, organize, and adapt teaching materials, but not on a day-to-day basis. Teachers would be employed for additional periods to identify and prepare materials to be used in learning centers.
(4) The learning center alternative maximizes opportunity to individual instruction. Flexibility in assigning units and allowing students to work at their own pace facilitate individualized educational planning.
(5) Instructional activities in a learning center lend themselves to effective small group and cooperative learning. Recent research by Johnson [6] indicated that achievement is greater in cooperative than independent or competitive learning situations.

Obviously, the learning center approach also has limitations to its usefulness. The limits are approached when school enrollments and revenue drop to a point where the complement of nine teachers in Table 2 cannot be employed. Required courses could also be offered in learning centers if enrollments were sufficiently low to justify regular classroom groups. In very small isolated schools combination learning centers such as English-social studies, mathematic-science, career occupations, etc. might be established.

Implementation

Districts considering the learning center approach would do well to heed Paul Nachtigal's [9] perception of change in small schools. He would argue that innovations must be home-grown with mobilized incentives, provisions for institutionalizing the change, and external assistance available for planning, implementation, and evaluation. Even if learning centers appear to be a promising alternative, implementation must not be a foregone conclusion early in the planning stage. The planning process should increase board member, administrator, teacher, student and community understanding of limitations inherent in the classroom organization for delivery of instructional services in small schools. Understanding can be enhanced through planning committee participation in a program inventory, specification of a desired program, enrollment projections, and revenue and expenditure budget forecasts.

The learning center approach ought to be compared with correspondence study, teacher sharing, district pairing, educational television, reorganization and other alternatives. If there is agreement that the learning center approach holds promise, then an implementation strategy should be developed. Several small school districts might form a consortium to pool resources and ideas to improve implementation efforts. Attempts at implementation without adequate attention to employee relations and inservice training would be premature.

Attention to learning center implications for terms and conditions of teacher employment is of primary importance. During periods of enrollment decline, job security is a key issue. Enrollment-driven reductions linked to revenue are accepted, but innovations perceived as requiring fewer staff will be resisted. Districts need staffing policies which respond to enrollment fluctuation, but implementation of the learning center should be independent of district pupil-teacher ratio policy. The learning center is an organizational alternative for increasing learning opportunity with the staff complements small schools can afford. Master work agreement language may need modification if it is patterned after those in larger districts where classes taught, number of preparations, preparation time, and class size are meaningful considerations. Additional learning opportunities increase the "worth" of small schools; some of the added worth should be shared with teachers through incentive pay for learning center operation and/or extended contracts for preparation and adaptation of learning center materials.

Inservice training for teachers and principals is essential for success of the learning center approach. Most educators were trained as interchangable parts for the classroom group, mass production delivery model. The learning center approach would replace homogenous grouping with individualized and small group instruction. Important topics for inservice training include student motivation, individual differences, learning styles, curriculum development, instructional goals and objectives, administration of individualized and small group learning programs, and teaching effectiveness. Teachers and principals should participate in planning the inservice training. It should begin before implementation, focus on specific subject matter learning centers to be established, and continue during the early phase of operation to deal with problems that arise.

Both formative and summative evaluation are needed. Formative evaluation monitors the implementation process and focuses attention on assumptions, activities, and solving operational problems. Summative evaluation is important whenever educational programs are to be judged by their results. A "no significant difference" in achievement between the learning center and traditional classroom approaches would be an important finding for small schools. It would challenge the equating of limited educational opportunity with low enrollment size under which small schools have labored so long.

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