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ABSTRACT

The ecological concepts of activity structure and activity segments were central to this examination of observational data attained in a three-week period from 18 fifth-grade math classes and 17 fifth-grade social studies classes in school districts in the greater Chicago region. Classroom observations were conducted by pairs of observers: one observer recorded information about the activity structure and behavior setting: the second observer used a strict time-sampling rotation method to study a subset of eight children in each classroom. In the analysis only instructional (as opposed to transitional) segments were examined. The data base consisted of 461 math segments and 474 social studies segments. The frequency distributions of various ecological features of segments were examined: a chi-square test compared frequencies across subject matters. A similar analysis involving mean durations of segments with different properties and mean occupancy time (length X the number of students in the segment) was performed using ANOVA procedures. Results indicated that math and social studies classes differed with regard to distributions of instructional formats. Overall, more variety in format was found in social studies than in math. Additional results were discussed. (Author/RH)

Subject Matter Constraints on the Ecology of Classroom Instruction (1, 2)

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Studies of teaching, classroom processes and instruction have been conducted within a number of different traditions and frameworks. One major dichotomy is between studies of teaching process which have searched for predictors of achievement or other process-product connections at a general cross-curricular level, and studies which have focussed on instruction in a particular subject-matter or age specific domain. The assumptions in these two bodies of research are very different and there is little evidence of overlap in terms of utilization of results. Much of the teaching process research can be characterized by efforts to measure teacher behaviors, often at a relatively molecular level, in the hope of finding variables which are associated with student learning across many instructional contexts. Researchers in this tradition assume that good teaching looks pretty much the

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same regardless of subject matter or goals. Since their focus has been on good teaching and its constituents they have asked, "How is the teacher teaching?" not "What is the teacher teaching?" On the other hand, specialists in certain curricular areas have almost exculsively oriented to the whats in teaching, taking a subject-matter specific approach to both research and teacher training.

Gage (1979) postulates that... "teaching behaviors... will fall into a hierarchical model, ranging from the highly (if not completely) general to the highly specific." (p. 283) Perhaps there are certain generic features of good teaching, but there is insufficient evidence to verify that position. I believe subject matter does significantly constrain the organization and conduct of instruction.

For teachers who teach different subjects, and for curricular specialists, a demonstration of subject matter differences in classroom ecology may seem obvious in the extreme; for others, such a demonstration may be illuminating. It is hoped that regardless of the reader's starting point, the particular conceptual framework used to examine instructional activity and the empirical data themselves will be of interest. While the existence of subject matter difference in instruction may be obvious in a general sense, specific empirical documentation of the nature and types of differences is very limited.

The Subject Matters Studied

The data source for this paper is observational material obtained from fifth-grade math and social studies classes. These two subjects at the fifth-grade level present some interesting contrasts. In our data and in most mathematics texts at this grade level, one finds an almost exclusive emphasis on the learning of algorithms and skills such as those applied to operations with decimals and fractions. The curriculum in fifth-grade mathematics is amenable to sequential instructional methods including individualized programs of various sorts.

Social studies in the fifth grade is not easily described. There are a wide variety of texts and programs available which differ considerably in goals and topics. Often no particular sequential properties are built into the topics "covered" in fifth-grade social studies. While mathematics is skill-oriented, social studies is much less so. In the classrooms we observed we saw many different enactments of social studies. Some children were learning United States or Latin American geography, other children were investigating careers and occupations, some classes were emphasizing the Revolutionary War and colonial American history and some classes used the MACOS curriculum. We also saw children discussing intergroup relations and creating new societies, while others were making craft projects which were related to different countries' traditions. In social studies at this grade level there is much variety of content and goals and concomitant variation in forms of instruction.

The Ecological Approach

The perspective taken in this paper is that a level of analysis of classroom phenomena must be utilized which is consistent with the way in which the participants themselves would characterize or talk about the experience. The ecological concepts used in this research have their roots in the work of Roger Barker, Paul Gump and others who have developed the idea of the behavior setting as a way of conceptualizing the environment of human behavior (Barker, 1968; Barker and Gump, 1964). More particularly, Gump (1967), Kounin (1970), and later Grannis (1978) and Doyle (1977) have applied the idea of behavior setting to analyses of classrooms. Gump, for example, took third-grade classrooms and identified meaningful divisions of the classroom day. In his intra-setting analysis, he examined the segment or activity segment. Gump also developed a variety of coding categories with which he characterized activity segments and related segment properties to student attention. Grannis (1978) extended Gump's work, examining four models in second-grade Follow Through classrooms. I have utilized some of the same concepts (as well as refinements and extensions) in examining our observational data on fifth-grade math and social studies classes.

It is important here to explicate the idea of an activity structure and its activity segments. When one enters a classroom, note can be taken of the "things" that are going on over time. A description of an activity structure includes noting the salient aspects of the physical environment and a cataloguing of the persons who are present (teachers, teachers aides, boys and girls). An activity structure of a classroom describes the main tasks or types of activities in which the children and teacher are participating. Thus a description of a primary class might indicate that the

main activities for a twenty-minute period were a reading group of eight children supervised by the teacher using a certain page in a basal reader and taking turns reading, while located at the front of the room in a circle of chairs; and a group of 18 children at their desks working in a phonics workbook writing answers to written questions about the "th" blend. This skeletal description leaves out many details which our empirical method of describing activity structures includes, but it points to the effort to characterize the various activities which are taking place in an educational environment and to know how they are structured, who is present, their duration, and their instructional purpose and format. Thus in this example we have an activity structure which contains a reading circle in a recitation format and a seatwork format operating simultaneously.

The subparts of the activity structure as we have just characterized them are illustrations of activity segments. They are parts of the classroom activity structure which have a particular instructional format, participants, materials, behavioral expectations and goals, and space-time boundaries. A segment is defined as a unique time block in a lesson and occurs in a fixed physical setting. Segments can occur singly or simultaneously as in our example when part of a class is doing seatwork and another group is engaged in a recitation with the teacher.

Once segments are identified a variety of features may be coded and examined. It is these features of segments which are expected to vary by subject matter. Key features to be examined include the nature and size of the group and type of group structure, the materials in use, who is pacing the work, the types of interactions permitted, the options children have, the expected cognitive level, the specific student behaviors elicited, and the

general instructional format. Durations of segments and student occupancy time are also examined as is the degree to which segments occur simultaneously or one at a time.[3]

Method

Eighteen fifth-grade math classes and seventeen fifth-grade social studies classes in school districts in the greater Chicago region (including the City of Chicago) were observed. The districts were selected to represent high and low expenditure school systems which served children of three levels of socio-economic status. Thus we have observed schools which working-class children attend which are in the upper third of state level expenditures on schools and the lower third, etc. (see Thomas, 1977 for more detail).

The data used in this analysis are classroom observations obtained by pairs of observers who were present in each classroom for three weeks. One observer recorded information about the activity structure and behavior setting of the classroom. Included in these records is information regarding the teacher's location, use of materials and behavior, student location and behavior, descriptions of the materials in use, pacing of the lesson, content of the lesson and information regarding duration of various activities. These records were taken in open, narrative form which allows for coding in a variety of ways, some of which was done immediately after observation. The second observer used a strict time sampling rotation method to study a subset of eight children in each classroom. This observer watched each pupil for five seconds and then noted student behavior and task involvement. Every 30 seconds a new student

[3] In analyses of data not presented here, certain combinations of ecological features are examined for their relation to student attention. (Stodolsky, 1979; Stodolsky, in preparation)

was observed. Observers took turns in these observer roles. Observers attempted to obtain ten consecutive days of observation of full math and social studies lessons in the classrooms. We collected approximately 230 hours of classroom observations in the form described which included activity structure information calibrated with observations of individual students. The analysis presented here makes use of the segmenting and coding of the activity structure information. Only instructional (as opposed to transition) segments are examined. The data base consists of 461 math segments and 474 social studies segments.

Results and Analysis

The frequency distributions of various ecological features of segments were examined using chi-square tests to compare them across subject matters. A similar analysis looking at mean durations (lengths) of segments with different properties and mean occupancy time (length X the number of students in the segment) was performed using ANOVA procedures. Full definitions of each coding category are available. As results are presented, the needed definitions will be provided.

Perhaps the most general variable to characterize an instructional segment is instructional format. The codes for this variable rely heavily on well-established common sense ideas about major patterns of instructional arrangements. Table 1 shows the distribution of segments by instructional format categories, percent of total occupancy time in each category as well as mean durations.

In examining data of this type it is important to understand that knowledge of segment level characteristics may result in information different

from data regarding time distributions and occupancy time distributions. Each level is useful. We have already described the meaning of a segment; one of its attributes is in fact duration and another is membership. Thus segments vary in length and may contain many or few students. In looking at segment property distributions the ecological validity of the segment as a unit is maintained and each is given equal weight. If five social studies small groups are operating simultaneously the characteristics of each of these groups at work would be coded and counted in an examination of segment characteristics. On the other hand in terms of class time observed, the five groups occupy the same time and would be considered just that portion of classroom time. Mean durations of segments reflect the typical lengths. Occupancy time weights the length of a segment by the number of students in it so that one can estimate how many student-minutes are being spent under certain ecological conditions. These two measures, segment distributions and occupancy time distributions are similar when segments contain all or most class members and occur singly, and when segments are of relatively similar durations. The measures produce different patterns when the segments are simultaneous, have varying sizes of membership and/or markedly differ in length.

In looking at our data, the reader must understand that the information is complementary but speaks to different levels of aggregation and different conceptualizations of classroom life. We in fact do not know if, for example, the segment level is the unit most meaningful to the teacher whereas occupancy time is most relevant to pupil experience. But the level of aggregation would seem to relate more in one case to the level at which the teacher operates and in the other to the way in which each child "lives" through the school day. As we look at the data in Table 1, it will be possible to get a better sense of how these measures operate.

Visual inspection of Table 1 clearly indicates that math and social studies classes are conducted using different distributions of instructional formats. (The Chi-square Likelihood Ratio = 418.7, $p < .0001$). In mathematics, seatwork and individualized seatwork where children are working at their own rate account together for about 40 percent of the segments observed. Recitation occupies 30 percent of math instructional segments. Checking work and whole class contests each account for more than 6 percent of the segments in math. The distribution of occupancy time shows a relatively similar pattern to that of proportion of segments because frequently occurring math segment types are whole class and of relatively similar durations. It is worth noting that individualized seatwork segments are relatively long segments compared to others in math.

Social studies instructional formats are differently distributed. Seatwork accounts for only 15 percent of the segments, recitation 17 percent and group work 38 percent. Giving Instructions, a format which often procedes small group work, occurs in 9 percent of the segments. In social studies, comparing proportions of segments with proportions of occupancy time results in notable differences. As we indicated earlier, occupancy time weights segment durations by the number of pupils in the segment, thus the occurance of small groups or part class segments will reduce the occupancy time measure appropriately. Thus in thinking about total student time in social studies, about one-fourth is spent in seatwork, about 30 percent in recitation and about 12 percent in group work. Children also spend more than 5 percent of their time in audio-visual segments and in student reports.

Overall, there is more variety in format in social studies than in math. The most noticeable distinction between the two subjects is that much more time is spent in math on direct practice through the use of seatwork. Individualized seatwork only occurs in mathematics. In social studies, group work,

student reports and audio-visual segments take place while they do not occur in mathematics. The amount of student time spent in recitation is highly similar in the two subjects and we have analyzed elsewhere the qualitative differences which emerge in the recitation segments (Stodolsky, Ferguson and Wimpleberg, in press).

Of course it should be recognized that our analysis of segments sums across instruction in many classrooms. It is in fact the case that the variety found in social studies lessons does not occur in each class setting, rather it is a function of different approaches and curricula used in different schools. Thus for some children small group work will be a relatively common occurence in social studies, for others recitation will be more frequent. In mathematics the classrooms are more similar with an alternation of recitation and seatwork. The major exception to this are those classes which are organized for individualization of instruction through a seatwork format. In those classes, the same instructional arrangement obtains virtually every day. Children work at their desks with the teacher available for checking work and giving assistance.

Let us consider some other properties of instructional segments. Data regarding a number of ecological features of segments are in Table 2. The table contains number and percent of segments of various types, distributions of occupancy time, and mean durations for the categorized segments.

As a starting point it is helpful to know to what extent segments occur singly or operate in parallel. The average number of simultaneous segments is 1.31 (sd = 1.68) in math and 2.49 (sd = 3.04) in social studies. A t-test on these means in significant beyond .0001. Further, the average number of children in segments is significantly smaller in social studies even though enrollment in social studies classes is slightly larger than that in math classes. Despite these differ[illegible] math instruction is not exclusively whole class

(See Table 2). Sixty percent of the math segments are Whole Class in Group Quality (Gump, 1967) while another 30 percent are coded Subgroup-Private in which a group smaller than the whole class works without interaction. Approximately 90 percent of all math segments are only segments or simultaneous with one or two others. In social studies about 56 percent of the segments are whole class, a figure highly similar to math. However the remaining simultaneous segments tend to occur with a number of small groups so that it is not unusual to find 4-8 segments occuring in the same time interval. One consequence of this arrangement is that students may be less closely supervised in social studies and asked to rely more on each other.

The variable Expected Interaction (see Table 2) does in fact show a significantly different segment distribution in the two subjects. (Chi-square Likelihood Ratio = 117.98, $p < .0001$) Social studies lessons contain more instances in which interaction is either permitted (low) or required (medium and high) for the accomplishment of the task. Some interaction is expected in about 18 percent of math segments and in about 49 percent of social studies segments. The occupancy time distribution shows only 6 percent of student time in math to be truly interactive while the comparable figure is 17 percent for social studies.

Clearly small working groups are distinctive in social studies, but our fifth graders still do not experience them as a dominant instructional form. What we have found is that this type of instruction primarily occurs in certain settings, associated with the needs of particular curricula. In math, the only small group interactive settings are games set up for small numbers of students.

If the interaction patterns and instructional formats differ in the two subjects, how is the teacher's role coordinated with these different arrangements? Gump (1967) coded segments for Teacher Leadership Pattern and we have slightly modified his categories and use them here. The category distribution

of segments on this variable is statistically different by subject matter (Chi-square Likelihood Ratio = 94.7, p < 001). It seems particularly relevant here to examine segment distributions with less emphasis on student occupancy time, since this variable deals with teacher behavior. In Table 2 the most striking differences in teacher role are that the teacher is not in about 4 percent of the math segments while this is only the case in 2 percent of the social studies segments. On the other hand the teacher is an Intermittent Watcher- Helper in 32 percent of the math as opposed to 53 percent of the social studies segments, and the teacher leads recitations in 35 percent of the math segments and 23 percent of those in social studies. In addition, the social studies teachers direct action in about 10 percent of their segments and math teachers behave similarly in 7 percent of their segments. Overall, the math teachers seem to do more stand-up teaching but also leave children work on their own more. The social studies teachers do a lot of supervision and give assistance intermittently, seemingly coordinating and orchestrating classroom activities more than math teachers.

The idea of pacing or press has been examined by Gump and later by Grannis (1978). The variable refers to the person(s) who is controlling the rate of work in a segment. Certain associations have been found between pacing, the consistency of other variables with it, and student involvement. (Grannis, 1978; Stodolsky, 1979). Basically pacing can be done by the teacher, the student, by teacher and students together in a joint endeavor, or by students with one another. Consistent with the other information we have examined is the fact that math segments are almost split in half with 47 percent teacher paced, 40 percent student paced and 10 percent paced by students together. In social studies, 41 percent of the segments are paced by students working together, 37 percent by the teacher and 16 percent by students alone. These distributions are statistically

different (Chi-square Likelihood Ratio = 184.08, $p < .0001$).

It is interesting to note that segments which are cooperatively paced tend to be considerably longer than those paced by the teacher and somewhat longer than those paced by students alone. As would be expected, the occupancy time distributions show that children experience highly similar amounts of student time in teacher paced conditions in the two subjects but much more student paced activity in math and more cooperatively paced activity in social studies.

Do children make more choices in one subject than the other? Our code for Options look at this matter. Basically we find a strongly teacher-dominated curriculum in which 82 percent of both the math and social studies segments have tasks which are teacher-specified. In math, about ten percent of the segments are individualized programming in which students work at their own rate and may have choices of materials. In social studies about 12 percent of the segments involve students choosing tasks and an additional four percent contain student choice of materials in the context of a teacher-specified task. By and large, students have very little say about what they are working on.

What about the cognitive level of the tasks in the two areas? Are there differences in the curricular goals addressed in these classes? Each segment was coded for the main cognitive goal of the tasks in the segment using a modification of the levels described in the Taxonomy of Educational Objectives. The distribution of segments according to cognitive level is in Table 2. As can be seen, math segments are almost exclusively oriented toward lower mental processes, in particular to the acquisition of concepts and skills (79%). Social studies segments cover a much broader range of cognitive levels. Receiving information, a lower mental process, accounts for about one-third of the segments, another 20 percent is devoted to learning concepts and skills.

much more emphasis is placed on the higher mental processes: 20 percent of the segments involve application of concepts and skills and another 11 percent involve other higher mertal processes. On the other hand social studies has 13 percent of its segments coded "not applicable" indicating that no cognitive level or content could be ascertained. Thus social studies seems to have both more stimulating and challenging cognitive components and activities which might not be productive of cognitive growth and learning. Math however is heavily skill oriented and directed toward direct mastery of concepts and skills.

The occupancy time distribution mutes the contrast between subjects slightly showing that more student time is spent in the lower mental process tasks of receiving information in social studies than is indicated by the segment distribution. Nevertheless if one wishes to find instruction oriented toward higher mental processes, it will be more likely discovered in a fifth grade social studies classroom than in fifth grade mathematics.

When we look across the major ecological features of math and social studies classes it is apparent that they do differ. The goals in the two areas are quite different and teachers organize instruction accordingly. From the child's perspective, mathematics instruction at this grade level consists primarily of individually assimilating and practicing concepts and skills within the framework of teacher directed lessons such as recitations or seatwork exercises. Math classes are notably lacking in social interaction and cooperation although children may be divided to work on different tasks according to their prior achievement levels. The one context in which cooperative behavior arises in math is in playing cognitive games, an opportunity usually made available to a small group of children at a time. The general intellectual level of the mathematics curriculum as we saw it was oriented toward learning certain algorithms and concepts--- frequently manipulations of decimals and fractions. We saw almost

no evidence of higher mental process activities in math or the use of manipulatives.

Social studies often involves children in recitation or in small group activities of various kinds. More formats are used in social studies making it a more diverse instructional experience from that point of view. The objectives in social studies classes also cover a broader range from the trivial essentially non-cognitive (like cut and paste activities) to complex tasks involving higher mental processes. There is also a heavy dose of sheer information transfer--low level learning of facts. An interesting aspect of these arrangements is that ordinarily the higher mental process goals in social studies are pursued in the context of small group cooperative activity. Thus it is not simply that small groups sometimes occur but that it is children with other children who are asked to accomplish complex objectives.

In thinking about classroom activity structures embedded in time, one arrives at somewhat different pictures depending on whether the focus is from the classroom level (what is happening at any given point in time in terms of organization and segmenting) or from the perspective of the individual child and how he or she spends time. In a social studies lesson which has a number of groups at work, the teacher has created a relatively complex segment structure which she then must coordinate and supervise. The child's world at that time is limited to a small group of children with a task to accomplish jointly with occasional assistance from the teacher. Over days that interactive experience for children may be relatively rare so that the bulk of their time may nevertheless be spent in whole class group structures under teacher direction or in seatwork. Considerations of such issues as variety of instruction must take account of both segment structure, durations and actual pupil occupancy times.

The primary focus of this paper has been to demonstrate the ways in which

math and social studies instruction are conducted when viewed from the perspective of an educational ecologist. We have identified many differences in instruction in the two subjects and yet there is overlap as well. Certain features seem quite similar. For example, children have little in the way of options for activity choice in either subject-- the curriculum is heavily teacher-dictated.

It would be interesting to know if the children themselves perceive any basic differences in the forms of instruction in the two subjects or if they see it all as school and work. We do have data which will allow us to explore the various arrangements described here and their relation to student involvement, as well as joint distributions of segment properties.

While obvious to many, the ecological differences documented in this paper suggest that studies of teaching must be much more sensitive to the issue of context before attempting to generalize. The internal dynamics of educational settings and their relation to student involvement and learning would seem to be a very necessary avenue of research. More fundamental too is inquiry to explore if the arrangements found in our current classrooms are optimal for children's growth and development and teachers' sense of professional accomplishment.

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Table 1

Frequency Distributions, Percent Occupancy Time, and Mean Durations of Math and Social Studies Segments by Instructional Format Type.*

	MATH					SOCIAL STUDIES				
		Seg	Occ Time				Seg	Occ Time		
FORMAT TYPE	N	%	%	$\bar{X}$DUR	SD	N	%	%	$\bar{X}$DUR	SD
Seatwork	129	28.0	29.8	22.0	12.5	58	12.2	20.0	19.2	11.5
Diverse Seatwork	11	2.4	4.0	28.1	11.1	17	3.6	5.0	24.2	8.5
Individualized Seatwork	47	10.2	13.6	33.1	6.9	-	-	-	-	-
Recitation	137	29.7	30.5	16.7	9.7	81	17.1	30.7	19.2	12.5
Discussion	2	0.4	0.5	15.0	7.1	16	3.4	2.6	8.6	7.0
Lecture	8	1.7	1.3	10.6	8.7	2	0.4	0.1	2.0	-
Demonstration	2	0.4	0.3	8.0	-	5	1.1	1.5	15.0	10.3
Checking Work	29	6.3	5.7	12.0	8.7	11	2.3	2.5	10.9	5.6
Test	16	3.5	5.5	21.4	10.8	8	1.7	4.3	29.1	17.2
Group Work	8	1.7	0.4	23.1	16.0	182	38.4	12.4	23.5	11.7
Film/AV	-	-	-	-	-	19	4.0	7.1	18.7	9.9
Contest	35	7.6	6.3	22.5	12.0	7	1.5	2.2	18.4	12.6
Student Reports	-	-	-	-	-	14	2.9	5.6	19.9	11.6
Giving Instructions	25	5.4	1.4	3.8	2.1	43	9.1	4.2	5.9	3.0
Preparation	5	1.1	0.3	3.8	0.8	9	1.9	1.2	8.2	2.0
Tutorial	7	1.5	0.3	22.0	9.7	-	-	-	-	-
Other	-	-	-	-	-	2	0.4	0.6	22.0	18.4
Total Instructional Segments	461	100.0	100.0	19.6	12.3	474	100.0	100.0	19.1	12.3

* Chi-square (Likelihood Ratio) = 418.7, $p < .0001$ for comparison of proportions of segments in format categories by subject matter.

Table 2

Properties of Fifth-Grade Math and Social Studies Segments

VARIABLE	MATH					SOCIAL STUDIES				
		Seg	Occ Time				Seg	Occ Time		
	N	%	%	XDUR	SD	N	%	%	XDUR	SD
GROUP QUALITY*										
Whole Group	275	59.7	71.2	15.5	10.2	264	55.7	83.2	16.3	12.1
Sectioned	9	2.0	0.4	15.1	5.6	117	24.7	8.4	21.5	12.7
Subgroup-Interdependent	36	7.8	3.7	30.9	9.1	73	15.4	4.8	25.8	9.9
Subgroup-Private	140	30.3	24.3	25.4	13.2	20	4.2	3.5	19.8	8.9
EXPECTED INTERACTION										
None	375	81.3	84.5	18.4	11.7	243	51.3	72.8	15.7	12.0
Low	34	7.4	9.3	24.9	15.3	42	8.9	10.6	21.6	11.4
Medium	28	6.1	4.3	26.5	10.2	104	21.9	6.6	21.3	11.5
High	22	4.8	2.0	24.6	13.9	85	17.9	8.0	24.9	11.5
TEACHER LEADERSHIP PATTERN*										
No -In Segment	63	13.7	11.5	25.2	12.8	10	2.1	1.1	14.3	9.5
Watcher-Helper-Intermittent	146	31.7	34.0	24.9	11.5	250	52.7	38.8	22.9	11.5
Watcher-Helper-Continuous	20	4.3	7.7	29.8	13.7	10	2.1	2.6	19.9	8.9
Recitation Leader	159	34.5	35.7	16.2	9.3	111	23.4	37.0	16.9	12.1
Instructor	22	4.8	2.2	6.3	6.3	30	6.3	4.6	8.5	6.5
Action Director	32	6.9	3.6	6.7	5.3	48	10.1	9.7	11.1	10.6
Participator	-	-	-	-	-	4	0.8	0.6	7.3	4.6
Reader	7	1.5	1.4	11.0	12.9	3	0.6	1.0	14.3	5.5
Tester	12	2.6	4.0	18.9	8.7	8	1.7	4.7	31.1	15.1
PACING**										
Teacher	216	46.9	42.5	13.7	9.8	173	36.5	46.3	14.0	11.5
Teacher-Student	12	2.6	3.9	28.0	13.4	15	3.2	2.7	11.5	6.4
Student	185	40.1	48.0	24.4	11.7	74	15.6	28.2	21.4	12.6
Student-Student	45	9.7	4.6	26.8	12.3	192	40.5	15.5	23.5	11.7
Mechanical (A-V)/Other	3	0.6	0.9	23.5	13.4	20	4.2	7.4	18.4	10.2
OPTIONS										
Teacher Task-Time	379	82.2	81.0	17.4	11.3	389	82.1	75.5	17.6	12.2
Teacher Task-Student Time	7	1.5	1.4	22.4	8.1	1	0.2	0.1	9.0	-
Student Task-Time	9	2.0	1.6	37.8	9.9	16	3.4	5.8	33.0	15.1
Student Task-Teacher Time	6	1.3	1.0	26.2	8.3	44	9.3	11.9	24.6	7.3

Table 2 (continued)

Teacher Task Time/S-Materials	5	1.1	0.2	17.6	23.6	21	4.4	6.1	26.1	8.2
Teacher Task Time/S-Order	8	1.7	2.4	24.0	13.8	3	0.6	0.5	16.0	2.6
Individualized Program	45	9.8	12.4	33.7	6.1	-	-	-	-	-
EXPECTED COGNITIVE LEVEL**										
Receive Information	61	13.2	8.9	9.3	8.1	157	33.1	47.9	15.5	11.7
Learn Concepts and Skills	365	79.2	86.8	21.1	11.8	99	20.9	26.0	20.1	11.6
Apply Concepts and Skills	22	4.8	3.5	30.1	11.0	96	20.3	11.5	21.0	10.9
Other Higher Mental Processes	-	-	-	-	-	50	10.5	5.8	16.3	13.6
Variable	9	1.9	0.7	6.9	10.0	7	1.5	3.1	23.0	9.4
Not-Applicable, Not Cognitive	3	0.7	0.1	5.7	3.2	63	13.3	6.7	25.2	12.5

* Coding categories from Gump (1967) sometimes with modifications.

** Coding categories modified from Grannis (1978).