

*THE ORGANIZATION OF DAY-CARE ENVIRONMENTS:  
REQUIRED VS. OPTIONAL ACTIVITIES<sup>1</sup>*

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Measures of group participation were used in an experimental analysis of the effects of two preschool activity schedules. Children's participation in preschool activities remained as high when children were allowed no options but were required to follow a schedule of activities in sequence, as when they were free to choose between several optional activities. However, this was only true: (1) when a child was not forced to wait until all other children had finished, but could start the next required activity individually as soon as he had finished the preceding one, and (2) when there was an abundance of materials in each required activity. When there were not adequate materials in each activity, children's participation was disrupted unless they were free to choose among several optional activities. Thus, in order to maintain high levels of participation in preschool play activities, it is not necessary to allow children to choose among several alternative activities. High participation may be more efficiently maintained by providing a supply of materials that is adequate to occupy all children in each of a sequence of required activities and staffing by at least two teachers, so that while one teacher is supervising children still finishing one activity another teacher can supervise children who are ready to start the next.

Experimental analyses of behavior have emphasized descriptions of functional relationships between behavior and certain environmental events that are the immediate antecedents or consequences of behaviors. Group-care environments include numerous variables that are not

temporally related to the occurrence of specific behaviors. A scientific technology of group care requires analysis of such program components as resident-caretaker ratios, architecture, arrangement of physical appliances, type of activities, brands of materials used, caretaker assignments, and criteria for selecting caretakers.

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<sup>1</sup>This study was based upon a dissertation submitted by the first author to the Department of Human Development, the University of Kansas, in partial fulfillment of the requirements for the Ph.D. degree. This is one of a series of studies conducted by the Living Environments Group at the University of Kansas under the direction of Todd R. Risley. The authors would like to express appreciation to Doris Benefiel and Francisco Montes for providing reliability checks and for substituting during staff absences. We would also like to thank our observers Maxine Preuitt and Ella Murphy, and our teachers Cordelia Murphy and Eunice Williams. Further thanks are extended to Judi Hult and Sherrie Doke for secretarial services. This research was supported by the grant HD 03144 to the Bureau of Child Research and the Department of Human Development. Reprints may be obtained from Todd R. Risley, Juniper Gardens Children's Project, 3rd and Stewart, Kansas City, Kansas 66101.

Criteria for choosing dependent variables in such analyses are not immediately obvious. In training or rehabilitation programs, a reasonable dependent variable is behavioral improvement or progress within the program curriculum. However, evaluations of the effectiveness of training programs usually also require additional information concerning the degree to which recipients of training are participating in planned activities. Participation measures also are useful in residential centers (geriatric homes, orphanages, etc.) and recreational projects (social clubs, camps, etc.) whose predominant objectives are simply to provide an "interesting", "wholesome", or reinforcing living environment. Premack's

research (1965) indicated that participation in an activity may be a corollary of that activity's reinforcing function. The "effectiveness" of activities in such programs cannot always be assessed in terms of changes in specific behaviors. Measures of group participation may permit objective evaluation of such activities.

Narrative descriptions of participation have been recorded on individual subjects in relatively unstructured "ecological" settings (Gump and Friesen, 1964; Barker and Wright, 1955; Willems, 1964). Bijou, Peterson, and Ault (1968) suggested that other measurement systems should be developed that (unlike vernacular narratives) would provide data that are continuous, interchangeable, and mutually interrelatable across descriptive and experimental studies. Reliable measures of children's participation in specific activities have been applied to investigations of the effects of contingent teacher attention in classroom settings (*e.g.*, Hall, Lund, and Jackson, 1968). LeLaurin and Risley (1972) obtained participation measures during an (experimental) comparison of staff responsibility assignments in a child day-care center. The demonstrated usefulness of group participation measures in prior research prompted the employment of such measures in the present study.

The present study sought to provide an experimental comparison of activity schedules that are already used in many child-care programs. A larger objective was to further the development of a technology of group care using an experimental technology that is presently available. Stated otherwise, one intention of the present study was to make explicit at least some of the implicit features of quality child care.

The independent variables chosen for comparison were selected because they are already common alternatives in many programs for groups of children. Furthermore, their manipulation does not, in most cases, require the introduction of prosthetics or materials not already found in preschool, day-care, and residential centers.

## METHOD

### *Subjects and Setting*

Fourteen boys and girls, aged 4 to 5 yr, served as subjects. Investigations were conducted at Turner House Preschool, a 3-hr morning program serving poverty level families in an all-Negro neighborhood in Kansas City, Kansas.

The physical design of Turner House Preschool permits continuous observation of children. Permanent walls separating play areas are transparent from a height of about 3.5 ft to the ceiling. Low portable partitions are arranged to define the following activity areas: bathroom and lockers, blocks and cars, manipulative, housekeeping, creative, outdoor recreation, discussion, music and rhythms, and story lesson. Water play in the creative area was a rainy day alternative to outdoor recreation. A floor plan of the preschool is presented in Figure 1. Indoor floor space measured approximately 1000 sq. ft. The tree-shaded and grassy outdoor recreation area measured approximately 4000 sq. ft. The arrangement of activity areas shown in Figure 1 was constant across investigations comprising Experiments I and II.

Table 1 lists materials available in all activity areas. Creative, housekeeping, manipulative, blocks and cars and outdoor activities contained materials that were continuously available to children; therefore, they were categorized as "materials" activities. Activities in which manipulative materials were seldom available to the children, *i.e.*, discussion, music and rhythms, and story lesson, were regarded as "no-materials" activities. The predominant behavioral requirements in "no-materials" activities were: (1) attention to the teacher, (2) attention to another child called upon by the teacher, and (3) verbal responses to the teacher's instructions.

Supervisory responsibility was divided among three teachers for specific sub-groups of activities (as opposed to fixed sub-groups of children) following a method that LeLaurin and Risley (1972) have called a "zone defense". According to this method, each teacher was charged with

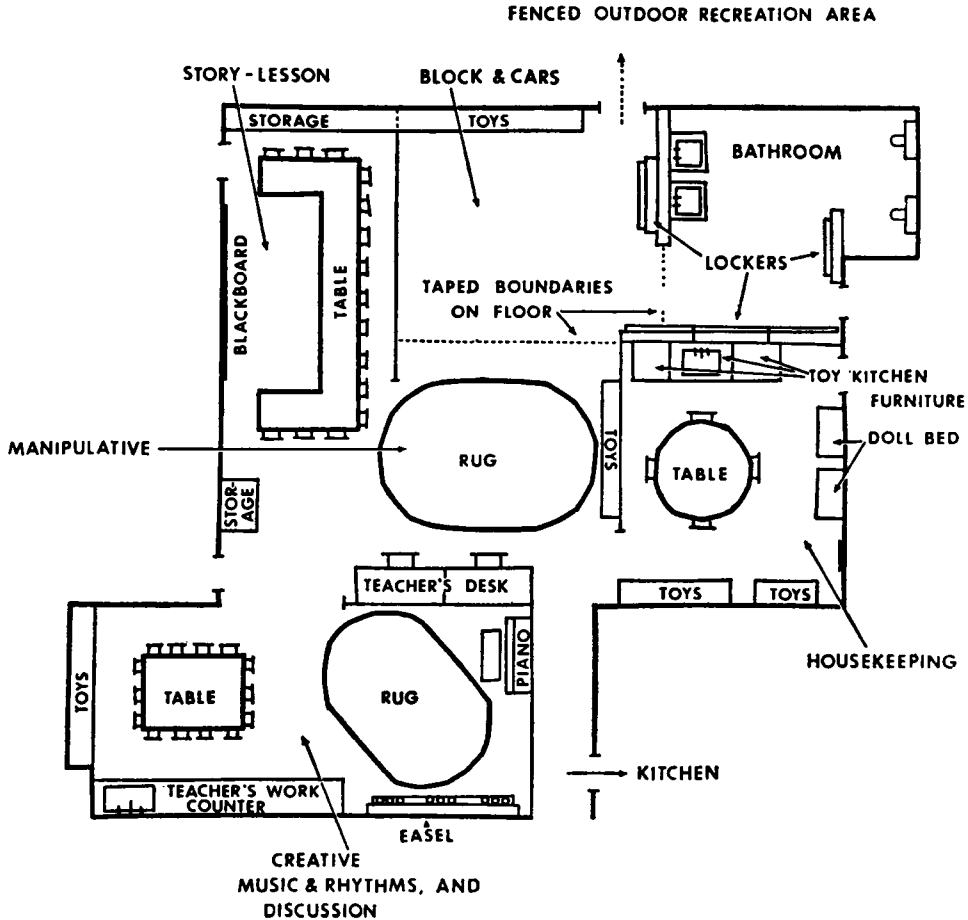


Fig. 1. Arrangement of indoor preschool activity areas. The floorplan diagrammed above was constant throughout Experiments I and II.

planning the activities in his area, preparing, displaying, and distributing materials, setting and enforcing rules, distributing snacks contingent upon appropriate responses (lesson, story, and discussion), admitting and dismissing children to and from areas, and attending to children engaged in planned activities.

*Recording Procedures*

The Planned Activity Check (PLA-CHECK) evaluation of group care (Doke and Risley, *unpublished*) was adopted for use at the Turner House Preschool. Following is a description of this recording system. A list of materials and behaviors explicitly designated as "appropriate" was compiled by the (Turner House) preschool teachers (Table 1). Two observers, after review-

ing this information, assumed daily positions that permitted observations of children in all activity areas from the time of the first child's arrival until the last child's departure. At 3-min intervals, observers recorded the number of children present in a given activity area, then the number of children participating in that area. More specifically, observers were instructed to "count children as participating if they are using any of these materials (listed in Table 1) in a manner which you consider to be appropriate, or if they are doing any of these things (behaviors explicitly designated as appropriate in Table 1)." Immediately after these records were obtained in one area, the same two counts were made in other activity areas that were open at the same time. This sequence of counts was usu-

Table 1

Materials per activity area and behaviors explicitly designated as appropriate. Items remaining in each area after reductions in the number of play materials (Experiment II) are followed by numbers indicating how many of each remained.

<i>Bathroom</i>			<i>Indoor Water Play</i>		
toilets	wash basins	paper towels	measuring cups	plastic bottles	straws
toilet paper		paper cups	ice trays	basters	egg beaters
			plastic cups	corks	dipping spoons
			pancake turners	plastic boats	funnels
<i>Creative</i>			<i>Music &amp; Rhythm</i>		
books	paper (1)	paintbrushes	tambourines	bells	maracas
pencils	paste & paste	dough (1)	sticks	drum	sandpaper blocks
crayons (1)	dishes (1)	rolling pins (1)	triangle		cymbals
magazines (1)	paint (1)	molds (3)			
scissors (1)	aprons	paper scraps			
<i>Housekeeping</i>			<i>Behaviors Explicitly Designated as Appropriate</i>		
dishes	mirror (1)	telephones (1)	Pushing chair up to table after use.		
pots and pans	jewelry	rocking chair	Sitting with raised hand, looking at teacher without talking.		
silverware	play money	refrigerator (1)	Talking to teacher after a recognized hand raise.		
rolling pins	dolls (1)	stove (1)	Looking at teacher (without talking) when teacher is talking or demonstrating.		
egg beaters	doll clothes	sink (1)	Watching another child called upon by the teacher (without talking).		
strainers	doll beds	plunger	Responding when called upon by the teacher.		
pancake turners	sheets & pillow	mops (1)	Carrying out explicit directions from teacher (if directions specify movement or verbal responses).		
artificial fruit	cases	brooms	Putting away materials.		
clothes (2)	blankets	bucket	Moving toward trash can with used paper cup, used napkin, or trash (after an area has closed).		
clothespins	pillows	dishpan	Singing, dancing, or marching upon direction of the teacher, or spontaneously and in unison (Music and Rhythm area only).		
clotheslines	irons (1)	toaster	Eliminating (Bathroom area).		
	ironing boards (1)		Washing and drying (Creative and Bathroom areas).		
<i>Small Manipulative</i>			Filling paper cups and drinking (Bathroom area and activities incorporating snacks).		
beads	puzzles (1)	stacking toys	Taking food from tray (snack activities).		
pegs & pegboard (1)	nesting toys (1)	interlocking toys	Chewing (snack activities).		
	pounding benches		Picking up food (snack activities).		
<i>Blocks and Cars</i>			Watching another child being served (without talking).		
wooden blocks (16)	trucks (hand size)	cars (hand size) (1)			
	airplanes (hand size) (1)				
<i>Outdoor Recreation</i>					
tricycles	boards	sand box			
wagons	climbing frames	buckets			
gasoline cans	packing boxes	shovels			
steering wheels	sliding board	strainers			
helmets	tumbling mats	seesaw			
large trucks	swings	ropes			
ladders	bats	hula hoops			
	balls				
<i>Story Lesson</i>					
food	pencils	paper			
<i>Discussion</i>					
Materials brought from home for display					

ally executed in less than one-third of the 3-min period separating each PLA-CHECK time sample. Supplementary counts of the number of children talking, watching the teacher, or eating, and counts of the number of teachers present and attending to children filled much of the remaining time between PLA-CHECKS.

The two observers recorded in alternate blocks of 13 intervals, the first three PLA-CHECKS overlapping with the last three made by the previous observer. In this manner, reliability checks were obtained on approximately 30% of the PLA-CHECKS made each day. Observers performed most summary calculations

during residual periods between PLA-CHECKS when they were not recording.

### *Measurement Reliability*

A check-by-check reliability coefficient was derived by comparing the two "overlapping" observers' records of the percentage of children participating at each 3-min PLA-CHECK, then dividing the smaller percentage by the larger. Daily mean check-by-check coefficients between the two persons alternating as prime observer ranged from 0.82 to 1.00, with a composite mean of 0.91. Mean check-by-check coefficients between the prime observer and experimentally naive observers recording for full-day periods ranged from 0.77 to 0.90, with a composite mean of 0.86. Reliability coefficients based upon daily summary data were consistently higher.<sup>2</sup> Close observer agreement was obtained across all experimental conditions. No systematic biases were observed in the direction of observer disagreements when they did occur.

Subjects, setting features, and recording procedures were constant for Experiments 1 and 2.

## EXPERIMENT I: COMPARISONS OF ACTIVITY SCHEDULES AND PROVISIONS FOR CHANGING ACTIVITIES

Experiment I investigated the relationship between certain preschool activity schedules and levels of child engagement in planned activities. Planned program events in child day-care and early education centers may be scheduled to occur either simultaneously or sequentially. Simultaneous activity schedules provide two or more optional activities at all times, and their obvious advantage is that they permit participation in any of the available activities for durations determined by the children themselves. Sequential activity schedules provide no activity options and require each child to spend a fixed amount of time in each activity. However, sequential activ-

ity schedules require a smaller staff; in fact, if the population is small, sequenced activities may be supervised by only one caretaker. They also ensure that all children will be exposed to all activities.

Part of Experiment I was directed at determining whether systematic changes from a schedule providing simultaneous activities ("Options schedule") to a schedule of sequential activities ("No-options schedule") would affect child participation in planned activities.

A second objective of Experiment I was to determine whether provisions for individual *vs* group activity transitions would produce differential changes upon child participation, changes that, in some programs might justify adjustments in staff size. In programs featuring sequentially scheduled activities, there is no objective basis for deciding whether it is preferable when activities end to require children to remain together and change activities *en masse* or to permit children to move individually to the next scheduled activity. When children are given individual permission to change activities, an additional staff member is required to supervise the newly opened activity, at least until all children have moved from the preceding one.

A third objective of Experiment I was to examine the effects of alternative teacher activity schedules upon children's participation. Staff management systems requiring teachers to work together were compared to systems in which teachers worked separately.

### *Experimental Procedures*

*Options schedule.* At the beginning of the school year, the children followed an "Options" (simultaneous) activity schedule that featured two or more optional activities simultaneously available at any moment of the day. A schematic of the Options schedule is presented in the upper half of Figure 2.

During the Options schedule, children were free at all times to move from one area to another upon meeting simple exit requirements, which usually included: putting away materials;

<sup>2</sup>More detailed reliability information may be obtained from the authors.

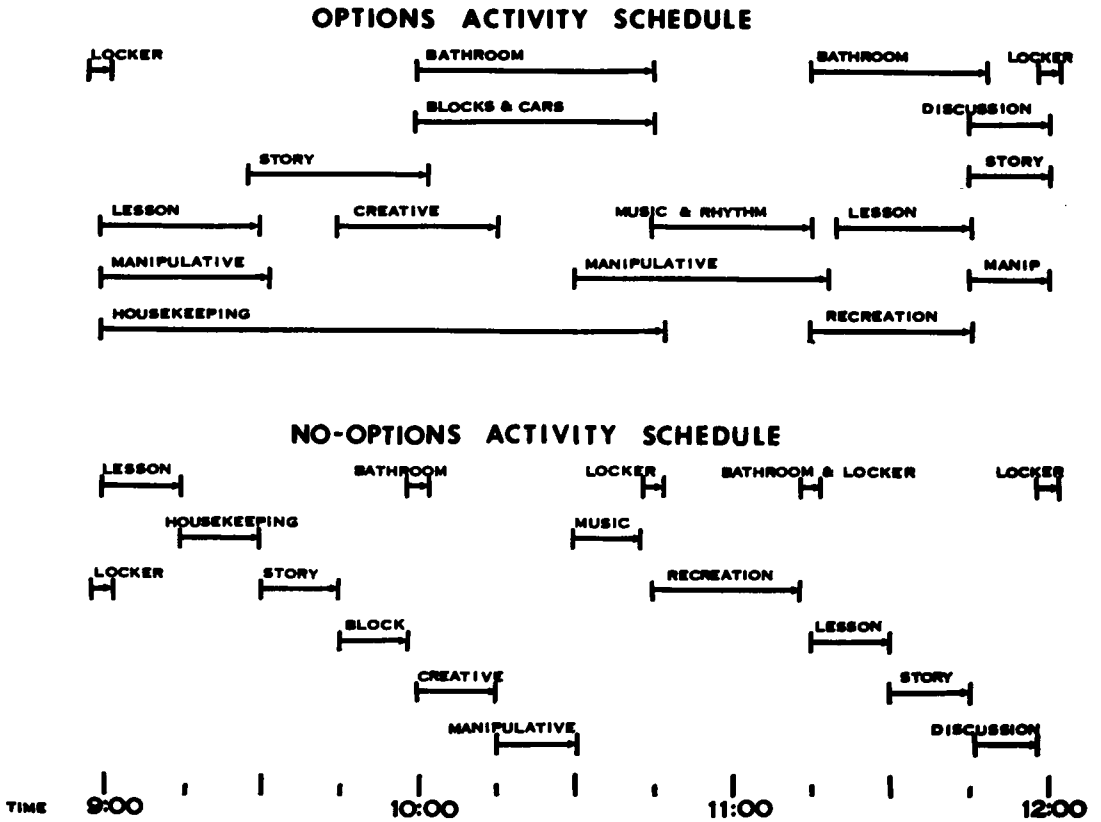


Fig. 2. Schematic of Options (above) and No-Options (below) activity schedules. Note the temporal overlap in activities under the Options schedule and temporal sequencing of activities under the No-Options schedule. Times of day are indicated below.

discarding trash (paper cups, napkins, scraps, etc.); cleaning up messes (paint, paste, etc.); washing hands; sitting quietly and facing the teacher with a raised hand; and after being called upon, asking for permission to go. No time limit was imposed for completion of chains of exit behaviors, either during the activity or after a teacher's announcement that an area was closed. After announcing that an activity area was closed, teachers shifted their attention from children still playing to children who were cleaning up and meeting exit requirements.

*No-Options schedule.* The Options schedule continued until daily percentages of child time occupied by engagement in planned activities appeared to be stable. The "No-Options" (sequential) schedule was then introduced. Under the No-Options condition, only one activity was open at any given time of the day. A new activ-

ity was opened after the teacher supervising the previous activity had announced that his area was "closed." A schematic of the No-Options schedule is presented in the lower half of Figure 2 above.

Under the No-Options condition, teachers were instructed to implement two different styles of activity supervision on alternate days. On "assist" days, the two teachers not specifically assigned to an activity were required to serve as aides to the teacher who was on duty. On alternate "non-assist" days, off-duty teachers were to vacate the preschool room until it was time for the current activity to close. When an activity closed, one of the off-duty teachers entered the room and opened the next activity. The teacher who had been on duty for the preceding activity would then leave the room after all children had entered the newly opened activity area. On alter-

nate days, therefore, the program could be characterized by either all three teachers working with children at all times (assist days) or only one teacher working with children at all times (non-assist days), except during brief activity changes. Hence, overall proportions of available teacher time in the preschool room were directly increased and decreased on alternate days by a factor of three. Daily counts of the number of teachers attending to children at the time of each PLA-CHECK were also included for the purpose of determining possible effects of overall teacher-attention time upon group participation.

An important aspect of the No-Options schedule when it was first introduced was that children who had completed exit requirements were given individual permission to move to the activity area that had just opened. This arrangement is referred to as the No-Options schedule, *Individual* (Ind) dismissal condition. As under the Options schedule, no time limit was imposed for completing exit requirements. Children who finished exit requirements first were allowed to move first to the next activity. Although it was theoretically possible for all children to complete the exit requirements simultaneously, only occasionally were children actually observed awaiting companions and leaving activity areas in groups larger than three. No contingencies were applied to "waiting" for a friend. However, a built-in consequence for children who spent excessive time cleaning up was late arrival to the next activity.

When participation data stabilized under the Individual dismissal condition, new provisions for changing activities were introduced. Instead of being dismissed one-at-a-time, children were required to wait until everyone had finished, then move *en masse* to the next activity area. This Group (Grp) dismissal condition was introduced in order to replicate conditions that are present in many "No-Options" programs that, for whatever reasons (perhaps that only one teacher is present), do not permit children to begin the next activity as soon as they have finished the previous one.<sup>3</sup>

Table 2.

Sequence of Experimental Conditions in Experiment I

	Condition	Number of days
First Comparison of "Options" and "No-Options" Activity Schedules	Opt	10
	No Opt-Ind	12
	No Opt-Grp	3
	No Opt-Ind	6
Comparison of Individual and Group Activity Transitions	No Opt-Grp	5
	No Opt-Ind	2
	No Opt-Grp	2
Second Comparison of "Options" and "No-Options" Activity Schedules	No Opt-Ind	3
	Opt	10
	No Opt-Ind	6

The Individual and Group dismissal conditions during No-Options scheduling were reinstated alternately according to the sequence presented in Table 2. Systematic alternations of the Individual and Group dismissal conditions were scheduled to provide a within-group comparison of the effects of both conditions upon group participation.

Under the Group condition, teachers were instructed to alternate daily between two schedules for supervising activities and activity transitions. The purpose of these schedules was to permit a comparison of a "teacher-aide" system, in which teachers worked together at all times, and a "colleague" system in which teachers always worked separately. On teacher-aide days, the teacher responsible for a particular activity was assisted by the teachers who were assigned to later activities. During transitions between activities, all teachers would walk with the children to the next activity area, which would then be opened by a teacher who had served as assistant only a few minutes before. On colleague days, during which each teacher worked individually, activity tran-

<sup>3</sup>Although the design of an Options schedule incorporating Group dismissal conditions is feasible, such a schedule is not widely used in group care programs. Hence, the effects of an Options schedule with Group dismissal conditions were not examined in this experiment.

sitions looked somewhat different: after all children had completed an activity, the on-duty teacher would escort the group to the next scheduled activity, where the children would be received by the teacher who had been assigned to that activity.

The colleague system under the Group dismissal condition and the non-assist system under the Individual condition were analogous to the extent that in both systems, teachers worked with the group separately and at different times. The teacher-aide and assist systems were analogous to the extent that in both systems teachers worked together with children at all times. Due to a staff absence on the first teacher-aide day, two teachers, instead of three, were working together all day. Two teachers worked together

with children throughout the final No Options (second) phase.

Following the repeated comparisons of the Individual and Group dismissal conditions, experimental procedures were directed toward another comparison of the differences between the Options and No-Options schedules. Approximately six weeks had passed since the children's first exposure to the Options schedule. On Day 43, the Options schedule was reinstated for a 10-day period. Afterward, the No-Options schedule was reintroduced for six days (see Table 2).

RESULTS

Changes in group participation across experimental phases are presented in Figure 3 (refer to left ordinate). Daily proportions of child-time in

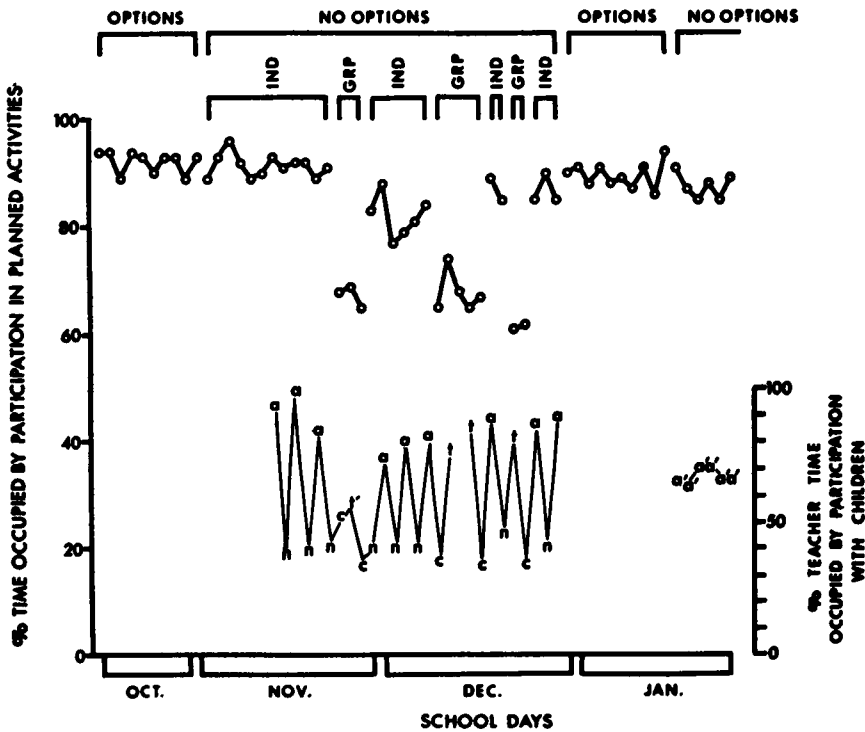


Fig. 3. Open circles connected by heavy lines indicate the per cent of children's time which was occupied by participation in planned activities (scale at left). "Options" refers to an activity schedule in which children could choose between several alternative activities at all times of the day. Under "No-Options" conditions required activities were scheduled in sequence. At the end of each required activity children were dismissed either individually (Ind) or as a group (Grp). "Assist" (a) days and "teacher-aide" (t) days when all three teachers worked together, (or a' and t' when two teachers worked together) may be compared to "non-assist" (n) days and "colleague" (c) days when teachers worked independently with children in alternating shifts. These scheduled changes in numbers of teachers attending to children produced no effects upon group participation.



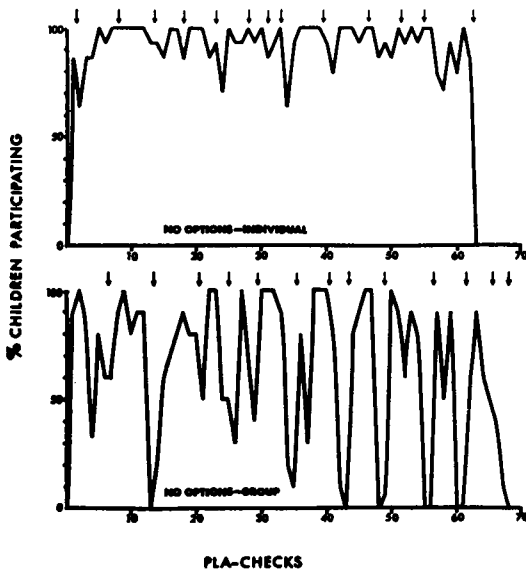


Fig. 4. Percentages of children participating in planned activities across PLA-CHECK spaced 3 min apart. The upper graph presents data from a representative day under the No-Options activity schedule when children were dismissed individually at the end of each required activity. The lower graph presents data from a representative day under the No-Options schedule when children were dismissed as a group from each required activity only after all the children had finished the activity. Midpoints of activity transitions have been marked by arrows above each graph.

planned activities (summed counts of children participating divided by summed counts of children present) during the initial Options schedule stabilized between 0.89 and 0.94 (mean = 0.92).

No changes were noted in participation data during the first introduction of the No-Options schedule with the Individual dismissal condition. Daily proportions of child time occupied by participation remained between 0.89 and 0.96 (mean = 0.91).

A substantial decrement in participation time was noted when the Group-dismissal condition was introduced, when children remained together during activity transitions. For the initial three-day introduction of the Group dismissal condition, proportions of time occupied by participation in planned activities were 0.68, 0.69, and 0.65, respectively. During the first reinstatement of the Individual condition, in which chil-

dren were again permitted to change activities one-at-a-time, the mean proportion of time spent participating increased to 0.82. During subsequent reinstatements of Individual and Group conditions (Figure 3), mean proportions of time spent participating were, respectively, 0.68 (Grp), 0.87 (Ind), 0.62 (Grp), and 0.87 (Ind). Median proportions of child participation time in planned activities were 0.89 under Individual dismissal conditions and 0.65 under Group dismissal conditions.

Representative days (*i.e.*, when the proportion of child time in planned activities equalled the above medians) were selected from the Individual and Group dismissal conditions. Graphed percentages of children participating across PLA-CHECKS, "participation profiles", from both representative days are presented in Figure 4. Arrows above each graph indicate midpoints of transitions between planned activities. Note the extreme variability that characterized participation profiles during the Group condition (lower graph of Figure 4). Under this condition, decrements in group participation frequently occurred during transitions. By contrast, no clear change in participation was noted during transitions on days when children were able to change activities individually as soon as they had finished putting away materials (No-Options-Individual, upper graph of Figure 4). Durations of activity transitions did not change systematically across experimental conditions.

Presented on a scale shown at right in Figure 3 are percentages of teacher time participating with children. These data were calculated from counts of the number of teachers present and the number of teachers attending to ("looking at, talking to, or touching") children at the time of each PLA-CHECK. Reliability on these counts between the two persons who alternated as prime observer ranged from 0.86 to 1.00, with a mean of 0.97. Large differences in proportions of teacher time attending to children were produced by daily alternations between "assist" (a) and "non-assist" (n) procedures under the Individual dismissal condition and by daily alterna-

tions between "teacher-aide" (t) and "colleague" (c) systems under the Group dismissal condition (Figure 3). Despite these differences, no systematic changes were observed in group participation within conditions. In addition, no differences in group participation were observed on days when only two teachers worked together (t' and a', see Figure 3), compared to days when all three teachers worked together (t and a, Figure 3).

The manipulation of conditions for changing activities (Individual *vs* Group) were observed to produce different effects during "materials" activities (creative, manipulative, housekeeping, *etc.*) in which objects were continuously available to the children, and during "no-materials" activities (lesson, story, discussion, *etc.*) in which objects were seldom made available. Introductions of the Group condition decreased participation during both types of activities. In the case of no-materials activities, however, changes in participation were less reversible. The results in materials activities (upper graph) and those in no-materials activities (lower graph) are presented in Figure 5. Figure 5 also presents a comparison of the effects of the Group condition during first and second halves of activities. (The total duration of activities was measured from the time the first child entered the area to the time of the last child's departure.) Values connected by dotted lines in Figure 5 are mean percentages of child participation time during combined first halves of activities. Values connected by solid lines are mean percentages of child participation time during combined second halves of activities.

With respect to materials activities, effects of the Group dismissal condition were restricted to child participation during second halves of activities. With each reinstatement of the Group condition, increasing decrements were noted during second halves of materials activities. Results obtained during reinstatements of the Individual dismissal condition showed these second-half effects to be reversible. Mean percentages of participation time during first halves of materials

activities were essentially equal and remained stable under both the Individual and the Group conditions (upper graph, Figure 5).

Two primary differences were noted with respect to changes during no-materials activities: (1) decrements occurred in first-half participation as well as second-half participation and (2) changes in participation were not as clearly reversible as those observed during materials activities (lower graph, Figure 5).

Although no clear differences in participation were noted during the second comparison of Options and No-Options schedules, participation percentages obtained in no-materials activities under both conditions (second experimental comparison) were somewhat lower than during the earlier comparison of the Options and No-Options schedules (Figure 5). Differences in group participation during the first and second halves of no-materials activities continued beyond the last instatement of the Group condition. Furthermore, participation during the no-materials activities was not substantially increased by the reintroduction of the Options schedule.

## DISCUSSION

High and equal levels of group participation were maintained under both a simultaneous activity schedule that featured optional activities, and a sequential activity schedule providing no activity options. However, group participation during the No-Options schedule was found to be a function of certain provisions for changing activities. A requirement that children remain together during activity transitions (Group dismissal), a requirement likely to be found only in "no-options" programs, was observed to produce significant decrements in daily proportions of time the children engaged in planned activities.

These reductions in child participation occurred primarily during activity transition periods. Under the Group condition, children who finished activities promptly after a teacher had

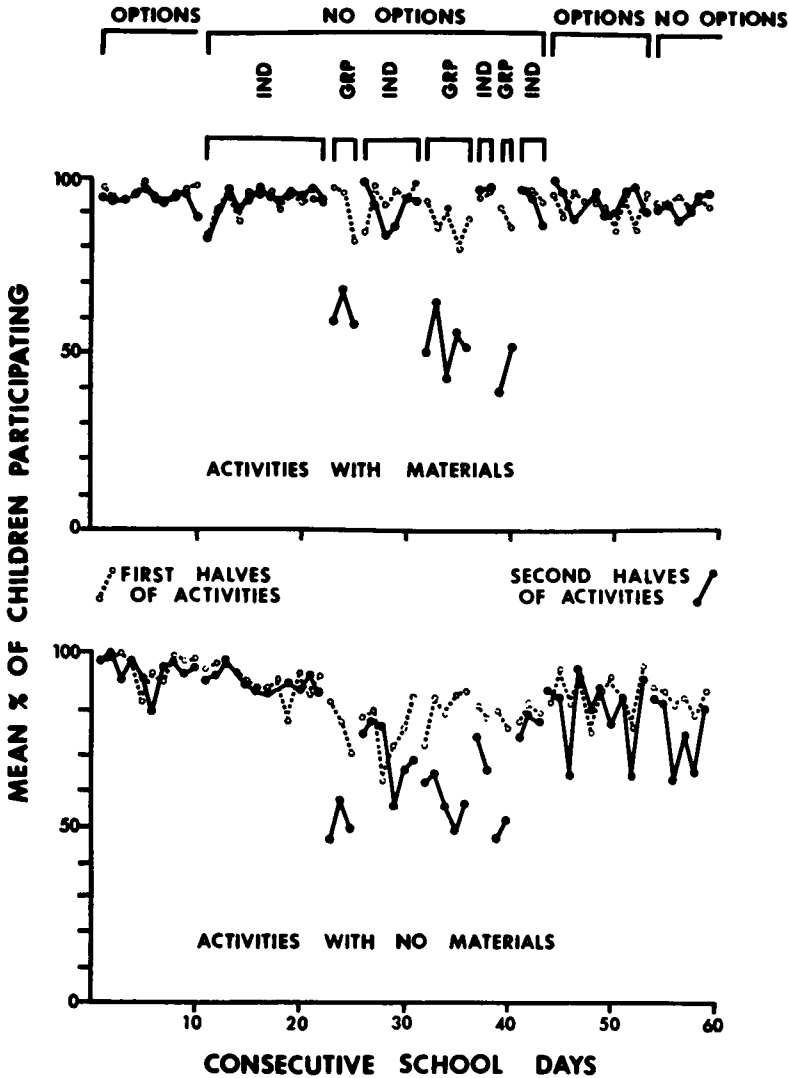


Fig. 5. Mean per cent of children participating in planned activities during first (dashed lines) and second (solid lines) halves of activities such as creative, housekeeping, and manipulative, in which manipulable materials were continuously available to children (upper graph) and activities such as lesson, story, and discussion, in which materials were seldom made available (lower graph).

announced that an area was closed were required to wait for other children to complete their work, put away materials, and clean up. When all children had finished, the entire group moved in unison to the next scheduled activity. By comparison, when children were permitted to change activities one at a time (Individual dismissal), "waiting" was eliminated, and no reductions in group participation were observed during activity transitions.

The group transition requirement also pro-

duced slight decrements in group participation at times other than transitory periods, primarily in activities such as story, lesson, and discussion, which did not routinely provide materials for child use. The observed changes in group participation in these activities were not completely reversed by the reinstatement of provisions for individual activity change (Figure 5). A possible explanation of these findings is that during the Group condition, children might have learned behaviors that competed with participation in

no-materials activities; casual observation indicated that children spent more time talking to each other after the first introduction of the Group condition. It is reasonable to assume that waiting requirements under the Group condition might have occasioned an increase in the frequency of verbal interactions. These increased rates of verbal behavior might possibly have competed with participation in those activities that had relatively few manipulable materials.

Implementation of either activity schedule that maintains high levels of group participation, *i.e.*, the Options schedule and the No-Options schedule with provisions for individual dismissal, requires staff of at least two persons. The No-Options schedule with provisions for individual transition is in some ways preferable to the Options schedule. One advantage of the No-Options schedule is that it ensures exposure of all children to all activities. A second advantage of the No-Options schedule is that it makes possible a more economical use of available staff. By assigning two teachers who alternate between sequenced activities, nearly one-half of each teacher's time may be devoted to other duties such as meal preparation, program evaluation, or lesson planning. By comparison, the simultaneous or Options schedule requires that both teachers be with the children continuously. However, activity supervision by two (or three) teachers was not found to produce relatively higher levels of group participation than did activity supervision by only one teacher (Figure 3).

Thus, the findings of Experiment I are consistent with casual recommendations (Hymes, 1968) that child-care programs include a minimal staff of two persons. In addition, the present results recommend that activities be scheduled in sequence, with provisions for children to move individually during activity transitions. Apparently, however, a simultaneous activity schedule, though less efficient, may be substituted for the sequential schedule with no effect on group participation.

## EXPERIMENT II: AN ANALYSIS OF THE EFFECTS OF MATERIALS INVENTORY UPON CHILD PARTICIPATION UNDER DIFFERENT ACTIVITY SCHEDULES

Throughout Experiment I, large numbers of materials were available to children. Under these conditions, no differences in group participation were produced by reinstatements of the Options and the No Options-Individual schedules. Experiment II was designed to examine the generality of this finding to programs in which materials are not plentiful. The Options and No Options-Individual schedules were compared after a systematic reduction in the materials inventory.

### *Experimental Procedures*

Group participation during the last six days of Experiment I (the No Options-Individual schedule) was treated as baseline for Experiment II.

The first, second, and third phases of Experiment II consisted of a systematic reduction in the number of play materials in the housekeeping, manipulative, blocks and cars, and creative areas. Materials from each activity area were removed, a few at a time between school days, until a decrement in group participation was noted. In each area, the original inventory size was determined by counting materials in "check-out" units; items that were distributed to children piece-by-piece (blocks, cars, dishes, *etc.*) were counted individually, whereas items distributed in sets (crayons, beads, pegs, *etc.*) were counted as a unit. Materials remaining in the four areas, after reduction of the inventory in each, have been designated in Table 1 with numbers that indicate how many of each item remained.

During the first part of Experiment I (Days 7 to 9), the number of materials in the housekeeping area was reduced from 150 to 11. Teachers continued to praise children for using and sharing the materials that remained. Between Days 14 and 18, the inventory of materi-

als in the blocks and cars and the manipulative areas was gradually reduced from 212 to 21 items. On Day 26, after child participation time had stabilized in both blocks and cars and the manipulative activity areas, the first few materials were removed from the creative area. The materials inventory in the creative area was gradually reduced from 159 to 11 items. Throughout this period, the No Options-Individual schedule remained in effect. As before, activities were scheduled in sequence, and children were required to remain in each activity area until the teacher announced that it was closed.

On Day 38, when participation in the creative activity area had stabilized, the Options schedule (see Figure 2) was reintroduced. The Options schedule remained in effect for the next six days. On Day 44, the No-Options schedule was reinstated. Five days later, on Day 49, all materials that had been removed during the first part of Experiment II were returned to the display shelves.

RESULTS

Changes in group participation during Experiment II are presented in Figures 6 and 7. In the housekeeping activity, median participation levels averaged 0.97 during baseline. After the reduction in materials, the median participation proportion was 0.68. Concurrently, a slight decrement in participation was also observed during the blocks and cars activity, which was the next scheduled materials activity in the day (Days 9 to 13, Figure 6).

After materials were removed from the manipulative and blocks and cars areas, decrements in child participation were also observed. Over the last five days of this phase (Days 21 to 25, Figure 6) participation data stabilized at means of 0.49 in the manipulative area and 0.42 in the blocks and cars area. Concurrently, child participation recorded during the housekeeping activity continued to decrease, stabilizing around a mean of 0.48 over the last five days.

The decrements in participation during manipulative and blocks and cars activities were

accompanied by a slight change in participation during the creative activity, which was scheduled temporally between the blocks and cars and manipulative activity periods. The median participation level for the creative activity during this experimental phase (Days 21 to 25, Figure 6) was 0.78, compared to a median of 0.86 during the baseline phase.

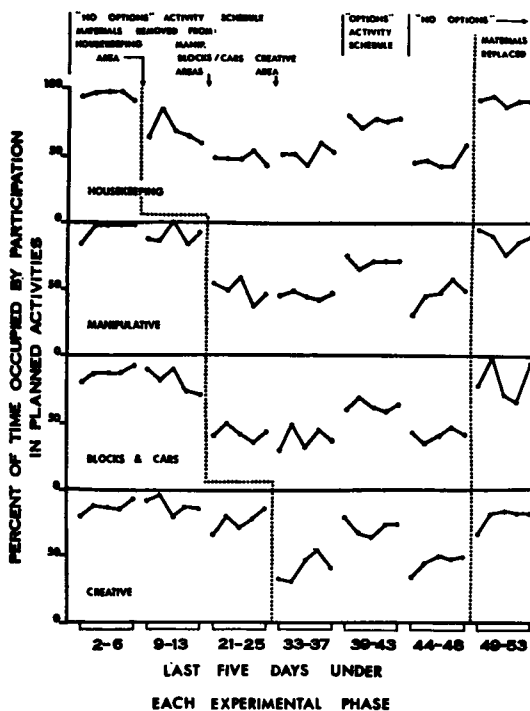


Fig. 6. Per cent of children's time occupied by participation in each of four planned activities. After an initial baseline period under the No-Options activity schedule, numerous play materials were removed first from the housekeeping activity, next from the manipulative and blocks and cars activities, and finally from the creative activity. The Options activity schedule was then introduced with no concurrent change in numbers of available materials. After a reinstatement of the No-Options schedule, materials that had been removed were again made available in all four activities. Results have been summarized by presenting data from the last five days of each experimental phase.

A further decrement in participation during the creative activity was obtained when materials were removed from that area. Over the last five days (Days 33 to 37, Figure 6) of this experi-

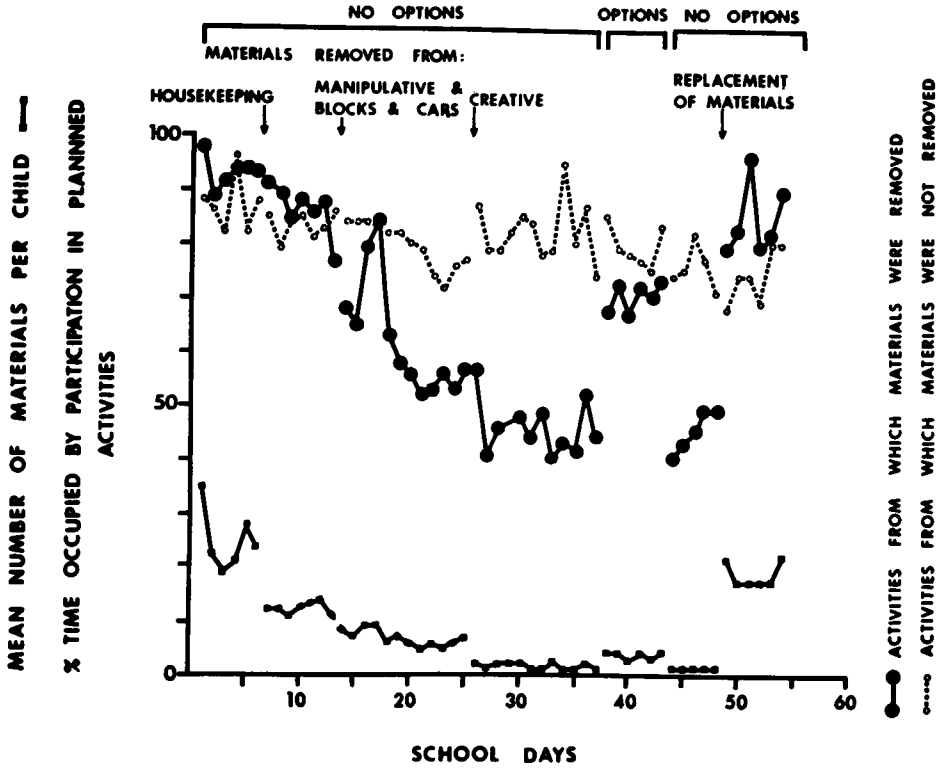


Fig. 7. Per cent of time occupied by participation in the housekeeping, manipulative, blocks and cars, and creative activities (solid circles) compared with participation in those activities from which materials were never removed (dashed lines). Composite mean numbers of materials per child across the four target activities have been presented (solid squares) on the same scale.

mental phase, participation proportions stabilized at a mean of 0.42. Participation data from the other three target activities remained stable (Figure 6).

Changes in the mean number of materials per child (across activities) have been included in Figure 7 (closed squares). The materials-per-child index was based not upon enrollment records, but upon averaged counts of children present in each of the four target activity areas. Although the materials-per-child index varied slightly as a function of daily variations in the number of children present, it was fairly stable within experimental conditions, following initial reductions in the number of materials in each area. With reductions in materials inventories in the four target activities, (housekeeping, manipulative, blocks and cars, and creative) the mean materials-per-child index decreased from 24 to one. Over the same period, the composite par-

ticipation proportion for the four modified activities decreased from a mean of 0.93 to a mean of 0.45 (Figure 7).

When the Options schedule was reintroduced, and children could again choose among concurrent activities, group participation increased abruptly during all four activities. These increases in participation were maintained at an average of 0.72 over the last five days (Days 39 to 43, Figures 6 and 7) of the Options phase.

Upon reinstating the No-Options activity schedule (Day 44) with the requirement that all children stay in the same activity until it closed, participation decreased again (Days 44 to 48, Figures 6 and 7) to levels previously obtained under this condition.

On Day 49, when all materials were replaced, participation proportions again increased in all four activities to an average of 0.86 (Days 50 to 54, Figures 6 and 7).

## DISCUSSION

Child participation in sequentially scheduled activities was disrupted by removing large numbers of materials from activity areas. However, under the Options schedule in which alternative activities were available to the children, the limited materials inventory was sufficient to occupy the smaller, dispersed groups of children choosing each activity.

Comparison of relative changes in group participation to changes in the number of materials per child suggested that the effects of reintroducing the Options schedule may not have been entirely a function of changes in the materials-per-child index. Note that before materials were removed from the creative area, participation had stabilized around a median of 0.55 (Days 21 to 25), and that over the same period, the materials-per-child index was stable around a median of six (Figure 7). Upon removal of materials from the creative area, a reduction in the materials-per-child index to a median of one was accompanied by a reduction in participation proportions to a median of 0.44 (Days 30 to 38). Later, during the reinstated Options schedule, participation proportions increased to a median value of 0.72, concurrent with an increase in the materials-per-child index to a median of only four. One feature of the Options schedule may partially explain these disproportionate changes: under the Options schedule, children typically entered and left activities sporadically, and as a consequence, delays in acquiring and returning materials may have been reduced. Some of the disproportionate changes in participation may actually reflect differences in the teacher's efficiency when confronted with a mass of children arriving at approximately the same time, as opposed to only a few children coming and going at different times.

As mentioned previously, group child-care programs that schedule required activities in sequence can ensure exposure of all children to all activities and can be operated by one or only a few staff members. On the basis of these imme-

diat advantages and the observation in Experiment I that group participation is not necessarily disrupted by scheduling required activities in sequence; such a schedule was recommended, providing that children are permitted individually to move to the next activity as soon as they have finished the previous one. Findings of Experiment II require qualification of that advice. Child time may be wasted when activities are scheduled in sequence if the number of play materials in an activity is insufficient to occupy all the children present in the activity.

Hence, for a program with a limited inventory of play materials but an adequate staff, it is recommended that activities be scheduled so that children are free to choose between several optional activities at all times of the day. However, programs with an inadequate budget, staff, and inventory can seldom bear the cost of hiring and training the additional staff required by a schedule featuring numerous activity options. Such programs might be better advised to adopt the less expensive solution of purchasing more materials or re-grouping present materials.

Until now, decisions regarding such variables in early education and child day-care programs have been dictated by economy, staff convenience, or at best, by informal attention to what it takes to keep children busy. The PLA-CHECK provided a quantitative, reliable, and efficient means of comparing preschool activity schedules on the basis of their effects upon group participation in planned activities. However, despite the availability of adequate measures and experimental methodologies, very few other components of current child-care programs have been subjected to objective examination. Many "care" routines are continued in the absence of any reliable form of feedback regarding their effects upon children. The predominant emphasis on personalized teaching techniques in applied behavior analysis should be supplemented by empirical evaluations of organization, equipment, design, and other similarly "impersonal" variables to complete our educational and child-care technologies.

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Received 29 April 1971.

(Revised 26 June 1972.)