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Improving Special Education Teachers' Use of Data-Based Instruction

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IMPROVING SPECIAL EDUCATION TEACHERS' USE OF DATA-BASED INSTRUCTION

by

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The data-based decision model involves frequent measures of student performance (i.e., 2 - 5 times per week), frequent analysis of performance data (weekly or bi-weekly), and the application of decision rules. In the first study, we surveyed 406 special education teachers state-wide. Results of the survey suggest that the data-based decision model is not generally practiced by special educators in the field. Just over one quarter of the respondents report to assessing student performance frequently enough to qualify as using the model. Only 10% of respondents indicate that they generally graph student performance. Additionally, less than 23% of respondents who graph data indicate reviewing their student's chart at least monthly.

The second study increased teachers' use of the data-based decision model through functional assessment and interventions matched to the results of the assessment. A functional assessment identified that teachers lacked skills, knowledge, feedback and materials to utilize the data-based decision model. As a result of the assessment, training and feedback were introduced sequentially to three groups of teachers. Training improved performance for every teacher. Initial increases in performance following feedback were observed for 4 out of 8 subjects. During the follow-up phase of the study, the environmental supports were no longer in place. Teacher performance returned to baseline levels. Implications for staff development and improving staff performance are discussed.

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Steven D. Goodman

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The reauthorization of the Individuals with Disabilities Education Act (IDEA '97) contains several provisions that focus on evaluation of student performance within special education. IDEA '97 requires the development of annual goals and short term objectives with an emphasis on measuring student progress towards the goals. Student progress is then reported to parents on the same time schedule as for regular education students. For accountability purposes, students in special education must participate in general assessments or alternative assessments. Finally, discipline procedures require that functional assessments be conducted in cases involving long term suspensions or expulsion from school.

The information obtained on student performance is used to communicate with others (i.e., parents, professionals), to evaluate progress and to aid in the determination of program changes. However, measuring student performance may be insufficient for improving student performance. Effective teaching consists of adjusting instruction in response to feedback from student performance. Determining how to modify instruction can be a difficult task. Decision rule systems can help the educator to make timely and complicated decisions (Liberty & Haring, 1990). Decision rule systems have been developed in the areas of skill acquisition (Browder, 1997), fluency building (Haring, Liberty, & White, 1981), generalization and maintenance (Liberty, Haring, White, & Billingsley, 1988), and reducing problem behavior (Browder & West, 1991; Evens & Meyer, 1985).

Measures of student performance and modifying instruction based upon these measures describe the data-based decision model of instruction (Browder, 1997; Browder, 1991). Data-based instruction involves a three step procedure. The first step is the frequent measures of student performance (i.e., 2 - 5 times per week). The second involves frequent review of performance data (e.g., weekly or biweekly). This process requires the summary of performance data on a graph. The data are analyzed using judgment aides (e.g., trend line, aim line, mean). It is during the review of performance data that student learning patterns are identified. The third step is the application of decision rules to modify instruction. These rules provide guidelines to modify instruction based on student performance information. Detailed procedures of the data-based decision model have been published elsewhere (Browder, 1991; Farlow & Snell, 1994; Haring, Liberty, White, 1980).

The data-based instructional model has been demonstrated to be an effective teaching method. Data-based instruction has been in use for a number of years and is emphasized in precision teaching (Jordan & Robbins, 1971; Lindsley, 1992). Fuchs, Deno and Mirkin (1984) investigated the use of data-based program modification by randomly assigning teachers to 2 groups. The experimental group was trained in measuring student performance at least twice weekly, graphing performance and implementing a decision rule involving a program change. The contrast group monitored progress as they wished and was provided training in addressing learning and behavior problems without the data-based instruction model. The researchers found that teachers using the frequent monitoring and data-based rules had students who achieved more, compared with those who used traditional informal monitoring methods or workbook samples. Fuchs and Fuchs (1986) applied a meta-analysis of 21 controlled studies on the frequent collection of performance data and modification of instruction based on these data. They found greater academic achievement when

teachers employ data-based decision rules as compared to teachers using subjective judgments. The data-based decision model has increased the performance of students with severe disabilities (Browder, Demchak, Heller, & King, 1989), mild learning handicaps (Jones & Krouse, 1988) and behavior disorders (Stowitschek, Lewis, Shores & Ezzell, 1980).

The efficacy of data-based instruction has been documented and certain components of data-based instruction are mandated in the provisions of IDEA '97. However, it is unclear the extent to which data-based instruction is applied in special education settings. In a study that examined the use of decision rules, Farlow and Snell (1989) surveyed 57 teachers who regularly collected student performance data for students with moderate to profound disabilities. The respondents indicated that they routinely collect training data for almost every session on 75% of the objectives written for each of their students. It was reported that 54% of the respondents examined raw data at least weekly and 39% examine graphed data weekly. A minority of these teachers use rules for instructional decisions. It is probable that the typical teacher is even less likely to use data-based decision rule because the researchers selected only those teachers who regularly collect data for participation in the study.

Several studies have investigated various components of the data-based decision model. Wesson, King and Deno (1984) surveyed teachers of students with learning disabilities and found approximately 44% used direct and frequent measurements to evaluate student performance. However, the investigation did not examine how often direct and frequent measures are obtained or how this information is used for instructional decisions. Cooke, Heward, Test, Spooner, and Courson (1991) conducted a survey of 510 teachers in two large metropolitan school districts. The results suggest that a majority of teachers often collect direct observation data for evaluation of instruction and performance although frequency of data collection was not

indicated. When asked how often student data was charted, 84.8% of participants answered "never" or "seldom". The researchers did not investigate the use of instructional decision rules by the teachers. Nevertheless, the minimal charting of data would suggest the lack of the visual analysis component of data-based instruction requiring visual judgment aids (e.g., trendline, aimline).

Some tentative information exists from surveys to imply that the data-based decision model is not widely used. However, this determination is speculative due to the limitations of past research. Previous sampling procedures were limited to specific respondents who may employ different teaching methods than the typical special educator. Additionally, previous research did not investigate the extent to which each component of data-based instruction is utilized within the field. Further research is needed in order to adequately examine the current practice of data-based instruction.

Recently, there has been increasing emphasis on pre-treatment (functional) assessment. A review of functional assessment within school settings is provided in Appendix A. The interest in functional assessments may be due to current advances in functional assessment technology as well as to discipline requirements of IDEA '97. Functional assessment is a process that describes the relationship between behavior and environment. During functional assessment, information is obtained to predict the occurrence of specific behavior and to identify environmental consequences that maintain the behavior. The data-based decision model is similar to functional assessment in that both involve direct observation of a person's behavior. Interventions are then developed to match the information obtained through observation. The functional assessment process has had many applications in the treatment of aberrant behavior (Mace, 1994). Interventions matched to the function of the problem behavior have been shown to improve efficacy when compared to

interventions that are not matched to the function of the problem behavior (Repp, Felce, & Barton, 1988).

It is possible that functional assessment techniques may be efficacious with problems other than aberrant behavior. Limited staff utilization of data-based instruction can be viewed as a performance problem. A framework for identifying variables that contribute to performance deficiencies has been developed by Gilbert (1978). The identification of barriers to the application of data-based instruction and strategies that remove these barriers should result in effective interventions in improving staff performance.

In the present study, we determine the extent that data-based instruction is utilized by special educators in public school settings. This information is obtained through mailed questionnaires. The results from the survey then provide support and direction for examining special educators use of data-based instruction in a center for students with developmental disabilities. Pretreatment assessments were conducted and interventions based on the subsequent information were implemented to improve staff performance.

CHAPTER II

STUDY 1: SURVEY ASSESSING USE OF DATA-BASED INSTRUCTION

Method

Participants

Participants were selected from the most recent data-base of special educators compiled by the Michigan Department of Education. This data-base consists of demographic information on entire special education teacher population employed by the public school system within the state of Michigan. Questionnaires were mailed to 406 randomly identified teachers from the special educator data-base. The teachers were employed in schools that include center-based facilities as well as local public schools with classrooms providing services along a continuum of inclusiveness. The teachers provided services for students with diagnostic labels of learning disability, mental impairment, emotional impairment, visual impairment, hearing impairment, autism, physical or otherwise health impairment and pre-primary impairment. The students of the teachers in this study ranged in age from 3 years to 26 years.

Response Definitions and Measurement

A questionnaire was created to investigate special educator utilization of data-based instruction. Each questionnaire contained 32 multiple choice questions. Twenty-three questions examined demographic characteristics of respondents, data collection practices, data review practices, and reasons for not collecting and/or using components of data-based instruction (see Appendix B for example questionnaire). The remaining

nine questions contained information regarding alternative assessment for special education students as required in IDEA '97.

Procedures

A random sample of the public school special education teacher population was created using a computer generated list from a data-base obtained from the Office of Special Education for the state of Michigan. At the time of this survey, there were approximately 10,653 special education teachers identified in the data-base complied for Michigan Department of Education. A random sample of 406 (3.8%) participants was identified using a computer containing the data-base. Participants were mailed a cover letter explaining the purpose of the survey, the questionnaire with instructions, a self-addressed stamped envelope for returning the questionnaire, and an identification card to be used in a raffle. The cover letter was printed on State Department of Education stationery with a statement indicating support by the Office of Special Education. When the surveys were returned, a clerical assistant separated an identification card from the completed survey prior to the experimenter coding the responses. The assistant also checked the respondent's name on a master list. This list documented individuals who returned surveys and was used for a second mailing to those who did not respond to the first mailing. A second mailing was sent to only those who had not responded to the original mailing by a certain date. The material sent as the second mailing was identical to the first except for the modified cover letter indicating a second mailing. The second mailing took place approximately two weeks after the first. If the recipient of the survey was no longer a special education teacher, instructions were provided to pass the survey on to a current special education teacher. As the surveys were returned, responses were entered into a spreadsheet by the experimenter.

Formulas were created using the spreadsheet to calculate percent of responses for each question.

In order to increase the response rate, a raffle was included in this survey. The participants wrote their name, address, and telephone number on the identification cards. No identifying information was on the survey form. Three name cards were randomly chosen from the collection of cards. A prize of $25.00 was mailed to the selected individuals in the form of a cashier's check.

Results

Demographics

A total of 225 out of 406 questionnaires were returned (55.2%). The demographics of the respondents are presented in Table 1. The majority of respondents served students in grades 4 - 6 (27.2%) followed by grades 7 - 8 (19.7%), grades 9 - 12 (18.3%), grades 1 - 3, (17.2%), Pre - K (13.1%) and Post secondary (4.5%). The respondents had considerable experience with 44.6% reporting over 16 years or more of teaching, while 38.3% indicated 10 or fewer years of teaching. Over half (56.7%) of respondents earned a Masters degree. Respondents mainly served students with learning disabilities (50.0%) followed by mental retardation (19.9%) and emotional impairments (12.6%). The surveyed teachers primarily worked in the settings of resource rooms (34.9%) or self-contained classrooms (27.3%).

Table 1

Percent of Respondents by Demographic Variable

Grade Level	Pre-K	1-3	4-6	7-8	9-12	Post-second
Percent	13.1	17.2	27.2	19.7	18.3	4.5

Student label	AI	MI	EI	HI	LD	POHI	PPI	SXI	VI
Percent	3.8	19.9	12.6	2.0	50.0	3.8	3.8	2.7	1.2

Setting	Center-based	Self-contained	Resource room	Inclusive room	Co-teaching	Other
Percent	15.3	27.3	34.9	8.4	8.4	5.6

Degree	Bachelors	Masters	Specialist	Doctorate
Percent	38.4	56.7	4.0	1

Endorsement	AI	MI	EI	HI	LD	POHI	PPI	SXI	VI
Percent	2.5	30.6	24.4	2.8	27.8	4.4	5.0	1.9	0.6

Years teaching	1-5	6-10	11-15	16-20	21+
Percent	18.9	19.4	17.1	15.8	28.8

Table 1-Continued

Theoretical orientation	Behavior-al	Cognitive	Develop-mental	General-ist/ eclectic	Psycho-analytic	Other
Percent	22.8	17.0	31.5	25.7	1.2	1.7

College credits in applied behavior analysis	0	1-3	4-6	7+
Percent	6.8	21.8	31.8	39.6

Note: N = 225

Components of Data-Based Instruction

Frequent Measures of Student Performance

The utilization of the data-based instruction model components are presented in Table 2. Over one-quarter of respondents (26.2%) indicate that they assess student performance 2 or more times per week. However, it is important to note that 73.7% of the respondents report to assessing student performance less than 2 times per week. Many of the respondents (26.6%) schedule an assessment of student performance during a marking period. The duration of marking period most often reported was 9 weeks (range = 4 - 24 weeks). Respondents indicated that the primary methods of assessing student performance were direct observation (40.2%), class written

Table 2

Percent of Respondents Using Components of Data-Based Decision Rules

Frequent Measures of Student Performance								
Assessment schedule	Daily	2-3x/ week	1x/ week	Several times/ month	Once / month	Marking period	Annual	Never
Percent	14.5	11.7	10.5	14.9	16.5	26.2	5.2	0.4
							Frequent Review of Performance Data	
Review ungraphed data	Daily		Weekly	Monthly	Annually	Never	Other	
Percent	24.0		37.8	18.7	9.3	2.2	8.0	
Graphing data	Always		Almost always	Usually		Sometimes	Never	
Percent	4.5		4.1	1.4		29.3	60.8	
Review graphed data	Daily		Weekly	Monthly	Annually	Never	Other	
Percent	1.5		10.5	10.5	14.0	56.5	7.0	
Judgment aids	Aim line		Trend Line	Variability guideline	Mean	Other	None	
Percent	5.4		3.6	5.0	35.3	13.1	37.6	

Table 2-Continued

Application of Decision Rules		
Utilization of instructional guidelines for:	Yes	No
When an objective is achieved	83.6%	16.4%
How long to wait before making any changes	52.7%	47.3%
When to decrease difficulty	68.6%	31.4%
When to increase difficulty	70.4%	29.6%
When to change instructional procedures	67.5%	32.5%

assignments (19.6%), test scores (11.1%), oral responses (9.8%), and teacher's subjective impression/judgment (7.9%).

Frequent Review of Performance Data

The majority of responses indicate that reviews of ungraphed student data took place weekly (37.8%) or daily (24.0%). Over 60% of respondents never graph student performance data while 4.5% always graph data. Interestingly, of those who reported using graphs, less than 23% review this information at least monthly. The use of the statistical mean was most often reported (35.3%) as a judgment aide used to analyze student performance data. Trend lines were only utilized by 3.6% of the respondents.

When asked why student progress data is not charted, respondents indicated not necessary (31.9%), too time consuming (30.4%), don't know how (9.4%), and don't have the materials (9.4%). The primary responses for not using specific guidelines in analyzing student progress data include: not necessary (34.7%), don't have the materials (23.6%), too time consuming (12.5%), and don't know how (11.1%). The explanations for not using judgment aids include: don't know how (32.8%), not necessary (25.9%), don't have the materials (20.7%), too time consuming (8.6%).

Application of Decision Rules

Of those who use of instructional guidelines, a majority (83.6%) report using guidelines to indicate when a student has achieved an objective. Guidelines were also reported on: increasing difficulty of instruction (70.4%) decreasing difficulty of instruction (68.6%), deciding when to change instructional procedures (67.5%), and how long to wait before making any changes (52.7%).

Discussion

Assessment of student performance is mandated under the provisions of IDEA '97. Also, frequent and ongoing performance assessment has been demonstrated to improve student learning when applied in data-based instruction. The purpose of Study 1 was to identify the extent that special education teachers are assessing student performance and employing data-based instruction. The results of our survey suggest that the data-based decision model is not generally practiced by special educators in the field.

The basic components of data-based instruction include: (a) frequent measurement of student performance, (b) frequent review of performance data by charting data and applying judgment aids, and (c) applying decision rules to modify

instruction. Almost 74% of the respondents indicate that they are not assessing student performance frequently enough to utilize the data-based instructional model. Over 90% of respondents do not typically graph student performance data. Less than 23% of respondents who graph data will then review their student's chart at least monthly. Visual analysis and the identification of patterns of student performance depends upon graphing the data. Furthermore, the application of decision rules relies upon the correct identification of learning patterns in performance. Only 67.5% report to having guidelines for deciding when to change instructional procedures. It is even more surprising that 16.4% respondents reported the lack of guidelines to indicate when a student has achieved an objective. This information suggests that the data-based instructional model is not widely utilized. The graphing of student performance is the component that predominately omitted.

There are several limitations with this investigation. It should be noted we have gathered no evidence to indicate that the limited use of data-based instruction has adversely impacted student learning. The responses to the surveys are self-reports with no verification as to the accuracy of the responses. Additionally, this survey does not assess the quality of teacher use of data-based instruction. For example, it is unclear that any reported component of data-based instruction is conducted using the procedural integrity to the extent necessary for the model. As with any mailed survey there is the potential problem that the respondent may not understand the intent of the survey question. For example, when asked how often do you assess student performance, 26.2% stated daily to 2-3 times per week. It is possible that this question was interpreted as informal observations rather than systematic documentation of student performance. However, only approximately 8% of respondents indicated use subjective impression/judgments as their primary method of assessment. Finally, it is

possible that those who responded to the survey may differ from teachers who did not respond. This would cause a bias in the interpretation of the results.

Since data-based instruction has been demonstrated to improve student performance and components of data-based-instruction are required by IDEA '97, one would question why more teachers are not using it. Wesson et al. (1994) present several suggestions for this discrepancy. It is possible that many teachers do not know how to collect relevant student performance data (i.e., skills deficit). It is also possible that the environments in which the educators practice do not support frequent performance measures and data-based instruction. Such supports would involve the presence of reinforcement contingencies for applying data-based instruction as well as providing the teacher with adequate materials and tools. In the second of the two-part survey, Cooke, Test, Heward, Spooner and Courson (1993) focused on attitudes and practice of special education teachers concerning instructional analysis. Results indicated that 86% of participants consider instructional analysis feasible and 87% indicate that it is desirable within a classroom setting. In the present study, the highest percent of responses indicate that performance charting and use of guidelines was unnecessary. It is possible that the respondents were not aware of how to use this information for data-based instruction.

Study 1 has provided evidence to suggest that data-based instruction is not widely utilized. Considering this information, there is a need to better understand why so few teachers are using this model and a need to evaluate strategies to promote teacher use of data-based instruction. Identifying the variables that interfere with application of data-based instruction would involve a functional assessment. In Study 2, we conduct a functional assessment in the form of an interview to determine the variables that create barriers to data-based instruction.

CHAPTER III

STUDY 2

Several researchers have examined strategies to improve teacher's use of the data-based instruction model. Browder et al. (1989) provided teachers with a written handbook that summarized the data-based instructional process including data-analysis. Training consisted of the subjects applying data analysis to practice data. Mastery of training was determined by successful teacher analysis of novel test data. Following training, the program supervisor told the subjects that they were expected to apply the data-based instructional model. The researchers found that teachers were accurate in identifying the learning patterns over 85% of the time and followed the decision rule correctly in 82% of these cases. Belfiore and Browder (1992) investigated staff training in using data-based-instruction followed by teachers self-monitoring of components of data-based instruction. Training alone resulted in variability of staff performance. Self-monitoring resulted in more consistent and accurate responding by staff. In addition, staff performance with data-based instruction has been improved with expert system computer software (Fuchs, Fuchs, Hamlett, & Stecker, 1991) and feedback provided by research staff (Fuchs & Fuchs, 1993). However, generalizations to specific individuals of the studies (Fuchs et al, 1991; Fuchs & Fuchs, 1993) are limited due to the group design.

Study 1of the current investigation suggested that the data-based decision model is not widely applied by special educators within public school settings. The purpose of Study 2 was to increase the use of data-based instruction through functional assessment and interventions matched to the results of the functional assessment.

Individuals who participated in first study did not participate in the second study of this research.

Method

Subjects

Teachers

Eight female, special education teachers participated in this study. The average teaching experience was 13.5 years (range = 5 - 28) with 5 participants having completed a Bachelor degree and 3 completed a Masters. Subjects were recruited by asking teachers at a center-based special education program to volunteer in a research project. A request for teacher participants was made at a regularly scheduled staff meeting in front of all staff members. During the meeting, a verbal explanation of the research project was provided. Each teacher received a flyer explaining the research project and requirements for participation. Informed consent was obtained prior to beginning the study. An example of the informed consent form is provided in Appendix D. Subjects were told that information would not become part of the employee records and would not be used for the school's employee evaluations. During the process of informed consent, subjects were instructed that they could discontinue participation at anytime during the study. However, they were asked to make a commitment and comply with the requirements of the study for the duration of the experiment.

Students

Each teacher nominated 2 students from a class of approximately 9 students per teacher to take part in this study. Criteria for student participation was based on a

history of consistent school attendance and informed consent obtained from the parent or guardian prior to participation (see Appendix D). Each student was enrolled full time in the special education program and had a diagnosis of severe to moderate mental retardation. The students ranged in age from 4 to 26 years.

Focus Group

The five focus group members were employees of the center based program and included two special education teachers, a special education administrator, and two occupational therapists. Members for this focus group were personally asked to participate by the researcher. Members were selected based upon their longevity in working at the center as well as their willingness to participant in past school committees. The professional experience of the members averaged 19.6 years (range 17 yrs. -- 24 yrs.). Informed consent was obtained prior to participation in this research. An example of the consent form is provided in Appendix D.

Setting

The research was conducted at a center-based, day program for students with moderate to severe mental impairments. In this facility, one special education teacher and one-to-two paraprofessionals were assigned to a class of 7 to 14 students. Each classroom contained various learning materials, chairs, desks, tables and physical therapy equipment. Teacher training took place either in the school's conference room or the teacher's classroom.

Response Definitions and Measurement

Analogue Assessment on Applying Data-Based Decision Rules

Prior to training, each teacher was provided with five examples of student performance data and asked to make a program decision based on this data. Program decisions included: (a) extend performance, (b) make no changes, (c) simplify skill, (d) improve antecedents, and (e) improve motivation. Correct decisions were scored by the experimenter and were based on the data-based instructional model (Browder, 1997) described below in the scoring of teacher records. Results of the pretest were not shared with participants so that this same material could be used after training to test for mastery of data-based instructional procedures. Mastery was considered 4 out of 5 accurate instructional programming decisions identified for the example student data.

Scoring of Teacher Records

The primary measure was the percentage of accurate components of data-based instruction as documented by each teacher's bi-weekly review of student performance on selected IEP objectives. The components of data-based instruction were derived from Browder (1991, 1997). Data-based instruction involves a three step procedure of frequent measures, frequent review and applying a decision rule. The measurement definitions for components of data-based instruction are provided in Table 3. The eight components were: (1) data collected 6 times in two weeks, (2) review period contained no break of 4 or more days, (3) correct percent calculated for each day, (4) correct percent plotted for each day, (5) line of progress correctly drawn, (6) identification of trend, (7) correct calculation of mean, and (8) correct identification of decision rule based on data analysis.

Table 3

Measurement Definitions for Components of Data-Based Instruction

Steps of data-based instruction	Component Measures
Frequent measures of student performance	Data collected 6 times in two weeks. Scored correct if the teacher collected student performance data at least 6 times in two weeks (not scored if student was absent from school) Review period contained no break of 4 or more days Scored correct if the review period contained no break of 4 or more days (not scored if student was absent from school)
Frequent review of performance data	Correct percent calculated for each day. Scored correct if the number of independent student responses was divided by the total number of opportunities to respond and multiplied by 100. Also, there must be eight or more trials per session for the calculation to be correct. Correct percent plotted for each day. Scored correct by calculating the percent of successful trials for the date and plotting the corresponding data. Line of progress correctly drawn. The trendline was scored correct if drawn using the standard quarter intersect method of trend estimation (Haring, Liberty & White, 1980). This method involved finding the mid-day of first 3 days data and the mid-level of first 3 days data (when 2 are the same that is the middle). The intersection of the mid day and mid level data is marked. The mid-day of last 3 days data is identified, followed by the mid-level of last 3 days (when 2 are the same that is the middle). The intersection of the mid day and mid level is marked. Drawing a line from one mark to the next connects the intersections. Identification of trend. Scored correct if one of the following is correctly identified: (a) Insufficient data (less than 6 data point in review period), (b) Accelerating, (c) Decelerating, or (d) Flat Correct calculation of mean. Scored correct if calculation of mean was a result of adding the numerical value of the percent successful for all days in the period and dividing by the number of days- using all days that data were collected.

Table 3--Continued

Steps of data-based instruction	Component Measures	
Application of decision rules to modify instruction.	Correct identification of decision rule based on data analysis. Scored correct if one of the 5 italicized options is correctly identified.	
	• If criteria is achieved during decision phase	• *Extend performance*
	• If same mean as baseline OR no independent responses	• *Makes no change in program (for first review period) otherwise simplify skill.*
	• If trend is accelerating or flat AND mean is higher by 5% or more	• *Make no changes.*
	• If trend is accelerating or flat and mean is higher by less than 5% OR trend is flat, same mean	• *Improve antecedents*
	• If trend is decelerating regardless of mean change OR is accelerating or flat and mean is lower	• *Improve motivation*

Each student averaged 10 educational objectives that were to be addressed during the academic year. These objectives were written into the student's individualized education program (IEP). For the focus of this study, teachers selected two objectives from each participating student's IEP. The teachers were told that they could choose any objective as long as it involved a behavior to increase in frequency. The behaviors for each objective that were identified and monitored by the teacher are provided in Table 4. Progress on two objectives from each participating student's individualized education program (IEP) was evaluated during the bi-weekly reviews. Bi-weekly review documents contained data sheets, charts of student performance, instructional program analysis and instructional program modification decision.

Table 4

Teachers, Students, and Student Behaviors

Teacher	Student	Behavior 1	Behavior 2
Carol	Jan	Look at instructor	Come to instructor
	Stacy	Activate switch	Sign "toilet"
Betty	Kim	Sign "walk"	Choose activity
	Tammy	Choose food	Choose activity
Ann	Linda	Sign "Walk"	Find classroom
	Bob	Sign "Walk"	Give cup to staff
Fran	John	Activate switch	Follow direction
	Timothy	Activate switch	Indicate choice
Elly	Mary	Indicate choice	Puzzle completion
	Jane	Indicate choice	Sign "toilet"
Dawn	Sarah	Grasp object	Activate switch
	Pam	Grasp object	Activate switch
Gail	Thomas	Zipping coat	Time on task
	Susan	Wash hands	Brush teeth
Irene	Wes	Read safety signs	Math problems
	Don	Sorting shape	Sorting colors

Implementation of the data-based instruction model was evaluated by the experimenter analyzing the accuracy of each component of the model for the selected objectives during bi-weekly reviews. Bi-weekly review documents contained data sheets, charts of student performance, instructional program analysis and instructional program modification decision. The percentage of accurate components was calculated by dividing accurate components by accurate plus inaccurate components and multiplying by 100.

Training Satisfaction

A training questionnaire assessed teacher's satisfaction with training on data-based instruction. The training questionnaire consisted of nine items that focused on training presentation (e.g., "ideas and concepts were presented effectively"), and intervention effectiveness (e.g., "I now use the information presented in training"). An example of the training questionnaire is provided Appendix E. Each questionnaire item was rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The training satisfaction questionnaire was conducted at least five weeks after training. Participants were told that this information would be used to evaluate the data-based decision rules training. Directions were provided to circle the appropriate number on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) that best answers each question. Each participant signed and dated the questionnaire.

Feedback Satisfaction

The feedback questionnaire consisted of 5 items that evaluated feedback quality (e.g., "feedback was presented in a form that I understand") and intervention effects on

student learning. A copy of the feedback questionnaire is provided in Appendix F. The questionnaire evaluating feedback satisfaction was completed at least four weeks after implementing the performance feedback condition. Participants were told that this questionnaire would be used to evaluate feedback provided for implementing data-based decision rules and all information would remain confidential. Directions were to circle the appropriate number on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) that best answers each question. Each participant signed and dated the questionnaire.

Functional Assessment Interview

The functional assessment interview consisted of 14 questions (see example in Appendix G) and was based on the Behavior Engineering Model (Gilbert, 1978). This instrument was designed to identify the behavioral repertoire variables as well as environmental supports needed to successfully implement the data-based instruction model. Behavioral repertoire variables included knowledge, capacity (i.e., mental, physical, emotional) and motives. Environmental variables included directional data (i.e., direction and feedback), instrumentation (i.e., tools, materials, procedures), and motivation (i.e., incentives).

Focus Group Questions

A series of questions were provided to members of the focus group for the purpose of social validation. Questions presented prior to implementing the research (pre-intervention) were intended to assess whether the educators perceived that the data-based instructional model was being utilized within the school. For example, the group was asked if teachers assess student performance frequently enough. Additionally,

group members were asked what might be done to increase teachers' use of data-based instruction.

At the end of this research project, members of the focus group were asked questions to confirm that the improvement in teacher's use of data-based instruction was significant. Additionally questions regarding the feasibility of the interventions were asked (e.g., are the interventions practical, should the interventions be continued). Copies of the pre-intervention questions and post intervention questions are provided in Appendix H.

Interobserver Agreement

An independent observer examined photocopies of bi-weekly review documents and recorded the accuracy for each of the eight data-based instructional components. Results of observations from the independent observer and the experimenter were compared. Interobserver agreement was computed by dividing agreements by agreements plus disagreements and multiplying by 100%. The percentage of sessions for which reliability was assessed and the mean agreement percentages for each subject were as follows: Carol (37.5% of records reviewed), $M = 98.5\%$; Betty (33.3% of records reviewed), $M = 90.3\%$; Ann (30.4% of records reviewed), $M = 98.3\%$; Fran (41.7% of records reviewed), $M = 88.7\%$; Elly (30.0% of records reviewed), $M = 100.0\%$; Dawn (33.3% of records reviewed), $M = 95.3\%$; Gail (25.0% of records reviewed), $M = 97.3\%$; Irene (33.3% of records reviewed), $M = 95.7\%$.

Procedure

Formative Research Phase

Focus Group Interview. The focus group met as a group prior to conducting this research. An explanation of the data-based instructional model was provided to the group. Then, questions were asked that confirmed the importance data-based instruction within the school setting.

Members of the focus group concluded that infrequent assessment of student performance and an unsystematic instructional decision process are problematic. Focus group members were asked about possible ways to address this issue. Suggestions from the group included: providing feedback and administrative support, making use data-based instruction simple and quick, providing ongoing consultation, providing direction and goals, and providing incentives for utilizing data-based instruction.

Functional Assessment Interview. A face-to-face interview was conducted individually with each teacher by the experimenter. The initial interview was conducted with each teacher prior to beginning the baseline phase. Only the subjects that participated in the training of data-based instruction were interviewed. A second interview was conducted at the conclusion of the experiment to evaluate if the barriers to implementing data-based instruction were removed by the interventions. Barriers to implementing data-based instruction were similarly reported by each teacher. Subjects reported that they were not familiar with the data-based instructional model and did not have the skills to implement it successfully. The subjects also reported the lack of direction, feedback, materials and incentives. Nonetheless, all subjects reported to be motivated and have the ability to understand the procedures required in data-based

instruction. Each teacher indicated that she was free of emotional limitations that would interfere with implementing data-based instruction.

A follow-up interview was conducted to confirm that barriers to implementing the data-based instructional model were removed. The same functional assessment instrument was used during the formative research phase and the follow-up interview.

Experimental Design

Interventions were evaluated using a multiple baseline design across individuals (Baer, Wolf, & Risley, 1968). Teachers were randomly assigned to three groups. Experimental conditions of baseline, training and performance feedback were implemented sequentially across each group. Teachers were instructed to identify two students and two objectives for each student. The objectives were taken from each student's IEP and involved behavior that the student should acquire or develop. Teacher application of data-based instruction was examined only for these two objectives for participating students. Teachers could instruct students in individual or group sessions at any time during the school day. Students typically received the instruction during 1:1 training sessions or as part of a daily routine sequence. The experiment was conducted during the second half of the school year. Reviews of teachers' records of data-based instructional components were conducted until the final week of school. A follow-up review was conducted during the second month of the subsequent school year.

Experimental Conditions

Baseline

During the baseline period, the experimenter asked the teachers to provide information they collected regarding the selected objectives for each participating student. This request for data took place every two weeks during the baseline phase. The teachers were unaware of what information was being evaluated. No feedback or comments related to implementation of data-based instruction were provided to teachers during this phase of the research.

Training

Training was conducted before or after school hours. The teachers were told that after they had mastered the training materials, they would then implement the data-based procedures within their classrooms. No other programmed contingencies were in effect for training attendance or performance in training sessions. Training continued until the participant correctly identified the data-based decision rule for 4 out of 5 practice examples. The first group participated in 4.5 hours of training over a total of 5 sessions. The second and third groups both participated in 2.5 hours of training each over a period of 4 and 3 sessions respectively. After the training session, a questionnaire was completed by each participant to evaluate the training.

Training began with an overview of data-based instruction. Other topics covered during training included: (a) calculating percent of successful trials, (b) graphing data, (c) trend analysis, (d) calculating mean for review period, (e) comparing magnitude of change with previous review period, and (f) applying data-based decision rules. Teachers received a manual adapted from Browder (1997) containing instructions for applying the data-based instructional model as well as practice data for

calculating, charting and applying the decisions (see Appendix I). Each component of data-based instruction was broken down into sections. The experimenter provided an explanation for each section and then modeled the process for completing the section. The participants practiced examples related to the topic of the section. The experimenter provided feedback on the completed examples by providing the correct answers and answering questions that the participants might have regarding the information. In addition to the training manual, teachers were given a set of materials to be used during training as well as future use in their classroom. Each teacher received a calculator, ruler, marking pens, blank data sheets, and job aides for implementing data-based instruction.

Feedback on Data-Based Instruction

During the feedback condition, the experimenter provided subjects with a checklist that noted the accuracy of each data-based instructional component. A copy of the checklist is provided in Appendix J. The experimenter would present the checklist and explain its contents individually to each teacher on the day after the bi-weekly review documents were collected. The feedback checklist involved the eight components previously identified in scoring of teacher records. These components included: (1) data collected 6 times in two weeks, (2) review period contained no break of 4 or more days, (3) correct percent calculated for each day, (4) correct percent plotted for each day, (5) line of progress correctly drawn, (6) identification of trend, (7) correct calculation of mean, and (8) correct identification of decision rule based on data analysis.

Follow-up

The present experiment was completed at the end of the school year. One month after the beginning of the next school year, teachers were asked to provide documentation of their utilization of data-based instruction. No other programmed directions or contingencies regarding data-based instruction were provided since the end of the previous school year. Additionally, no feedback was provided during the follow-up observation. However, the experimenter asked why the teachers were not using the techniques of data-based instruction.

Results

Informal Assessment

Post-Intervention Functional Assessment Interview

Following the interventions, each teacher reported knowing how to implement the model and knowing it well enough to implement successfully. All teachers reported the presence of direction, feedback, and materials needed for application of data-based instruction. Over half indicated that seeing student progress was an incentive for using the program. Furthermore, most teachers stated that having the bi-weekly data examined by the experimenter provided an additional incentive to implement the program. All teachers stated that they were motivated to use data-based instruction. Four of the eight teachers stated that they would like to continue to use data-based instruction during the up-coming school year. Following the intervention, the primary criticism of data-based instruction was that it required too much time to implement. During post assessment, six of the eight participants reported to feeling stress in their role as teachers.

Focus Group

At the end of the study, the focus group was asked to evaluate the practicality of the intervention as well as the significance of the intervention outcomes. Follow-up discussions by the focus group resulted in confirmation that the interventions were practical for school settings and intervention outcomes were significant. Group members agreed that data-based instruction should be continued and extended for use with other students and in other schools. Two members expressed concern regarding the amount of time to implement the program, particularly if this was to be implemented with every student in the teacher's classroom.

Descriptive Assessments

Analogue Assessments on Applying Data-Based Decision Rules

Each teacher was presented with example student data. No teacher demonstrated mastery in the application of data-based instruction as measured by testing prior to training. All teachers successfully met the criterion of accuracy on first attempt of the post test except for Fran and Irene, who met criterion after further discussion with the experimenter. A summary of results from analogue assessments is presented in Figure 1. The following are respective pre-test/post test scores for each subject: Carol (2/5, 5/5), Betty (2/5, 5/5), Ann (1/5, 4/5), Fran (2/5, 4/5), Elly (2/5, 5/5), Dawn (1/5, 3/5), Gail (3/5, 4/5), Irene (1/5, 2/5). Results for the second post test for Dawn and Irene were 5/5 and 4/5 respectively.

Scoring of Teachers Records

Percentage of accurate components of data-based instruction is presented in Figure 2. Teacher records on bi-weekly reviews were scored for accuracy. Each

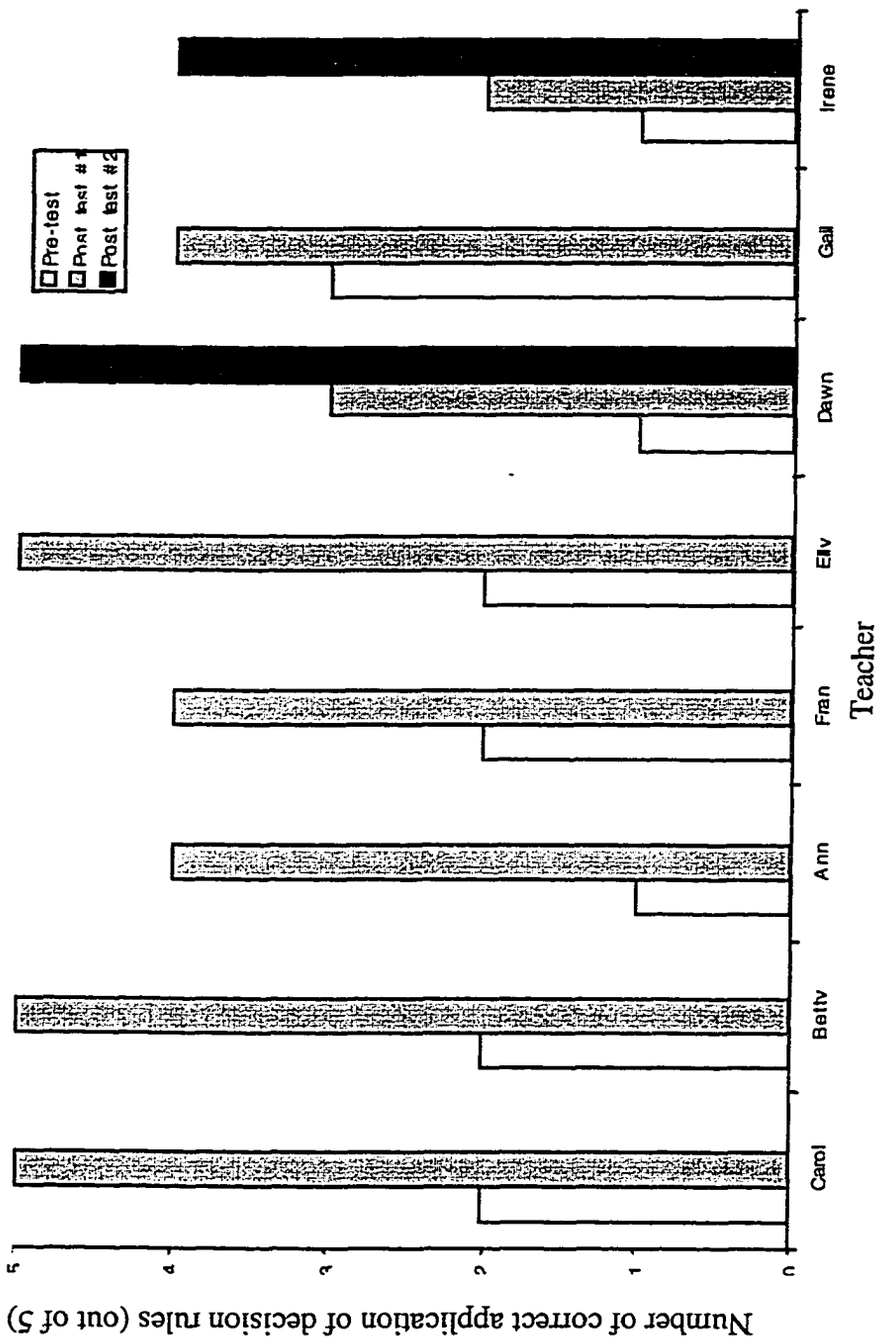

Figure 1. Results of Analogue Assessment.

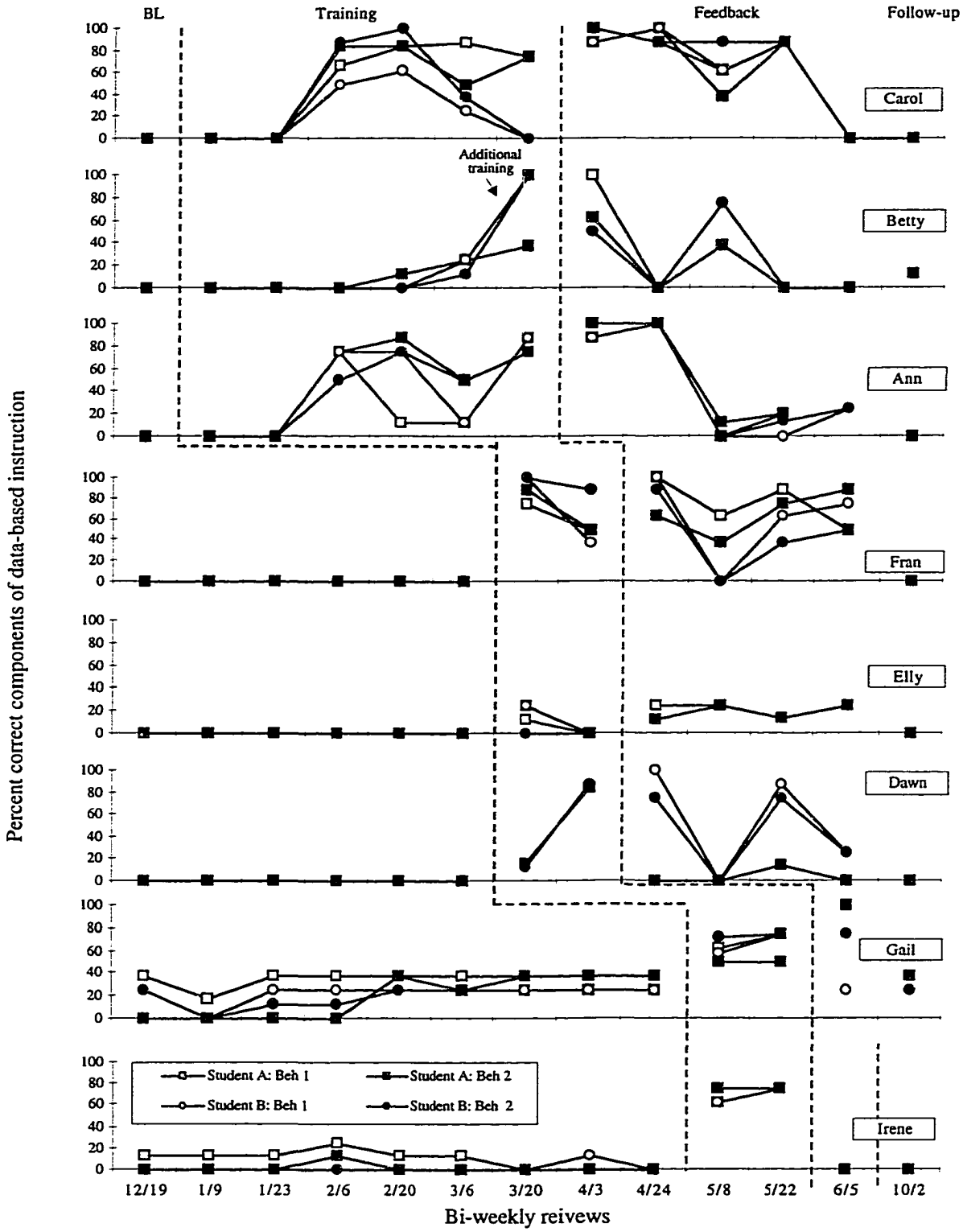

Figure 2. Scoring of Teachers Records.

teacher was responsible for monitoring student performance on two objectives for each of the two students selected to participate in this project.

Baseline. The majority of the teachers were not correctly implementing any of the components of data-based instruction during the baseline phase. Only 2 teachers (Gail and Irene) were implementing at least one component correctly. Gail was averaging approximately 30 percent accuracy on the components for her 2 students. Other teachers did not have records to shown how well their students were progressing.

Training. All teachers significantly increased the level of accuracy on components of data-based instruction following training. The first group displayed a delay in the application of data-based instruction. Betty received an additional hour of training ten weeks after her initial training due to the lack of change in performance from baseline levels and her request for a "refresher" session. The addition session resulted in increasing her performance to similar levels of others in her group.

Feedback. Initial increases in performance following feedback were observed for Carol, Fran, Elly and Gail. The performance of several teachers decreased at the end of the experiment. Reductions in responding occurred primarily during the last bi-weekly review for Carol and Irene. Gradual reduction in responding was displayed for Betty, Ann, and Dawn. Performance levels were maintained during the feedback condition for Fran, Elly.

Follow-up. During the follow-up observation, responding returned to pre-intervention levels for all but one teacher. Betty's use of data-based instruction was slightly above baseline level. Irene was slightly below baseline level in her use data-based instruction.

Teacher Satisfaction Ratings

Training

All teachers were generally satisfied with the training condition, rating it "good" (25%) or "excellent" (75%). Participants either "agreed" (63%) or "strongly agreed" (38%) that the information presented in training had relevancy to her teaching. Teachers indicated that as a result of the training (and implementation of data-based instruction) students improved their performance, slightly (57%) or markedly (43%). A summary of teacher's satisfaction with training is provided in Figure 3.

Feedback

Due to time constraints, Gail and Irene did not complete the feedback questionnaire. Each of the teachers who responded either "agreed" (67%) or "strongly agreed" (33%) that feedback on use of data-based instruction was presented in an understandable format. Most "agreed" (17%) or "strongly agreed" (50%) that feedback was presented in a timely manner; others were "not sure" (17%) or "disagreed" (17%). As a result of the feedback, most teachers reported that their students "improved slightly (43%) or "improved markedly" (29%) while others reported "no change" (29%). A summary of teachers' satisfaction with performance feedback is presented in Figure 4.

Discussion

Only two out of the eight teachers in this study employed at least one component of data-based instruction prior to intervention. A functional assessment

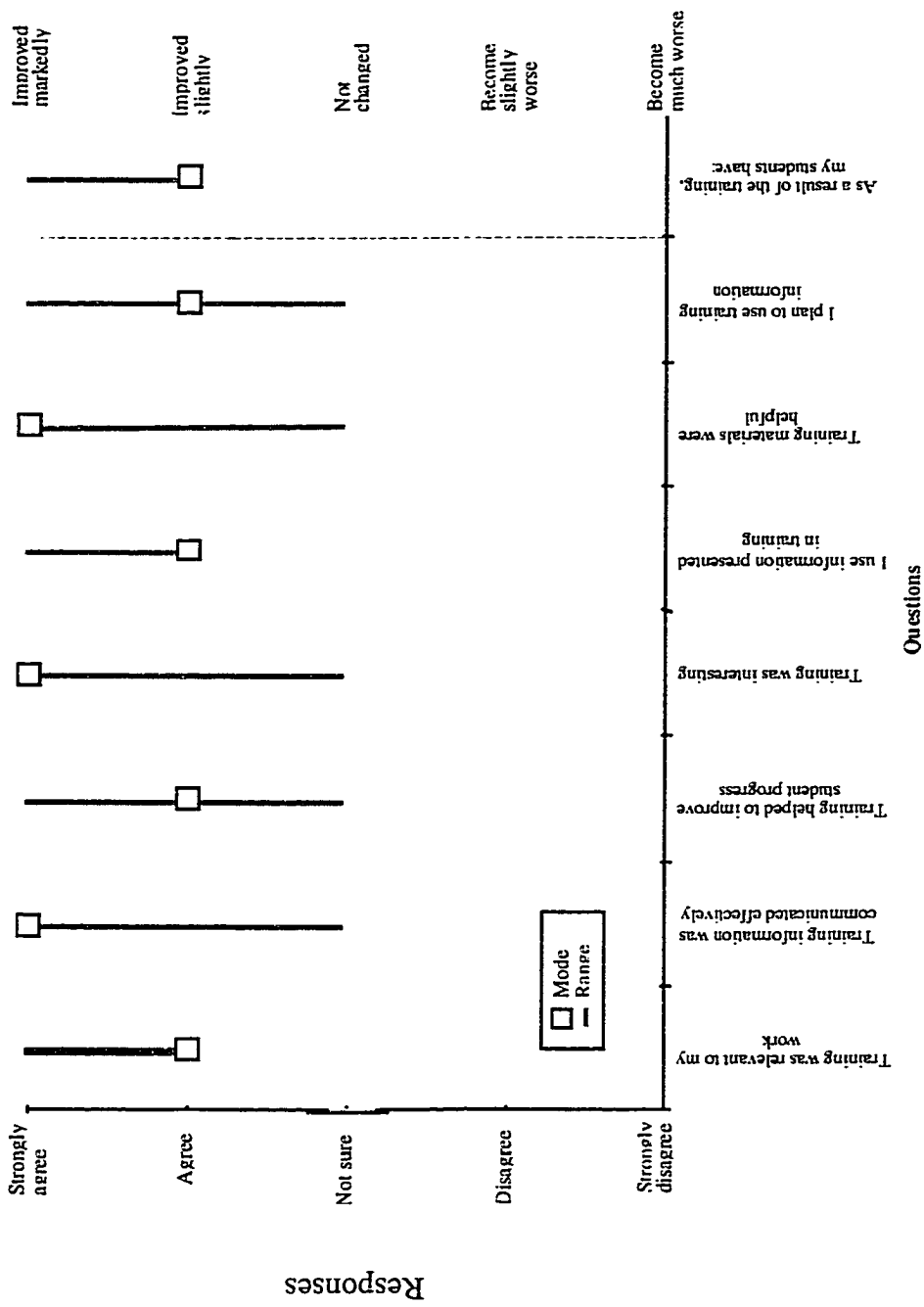

Figure 3. Results of Training Satisfaction Questionnaire.

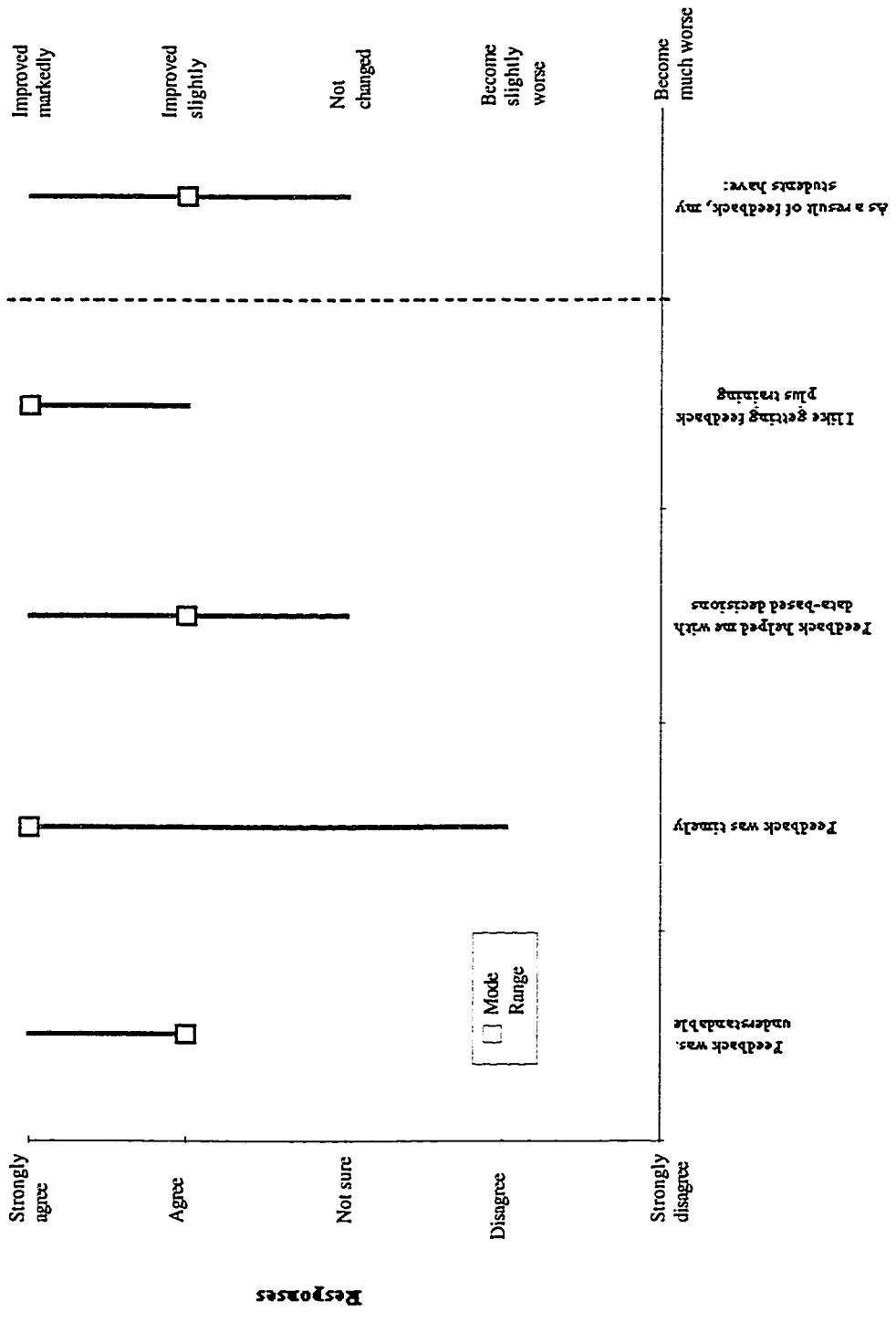

Figure 4. Results of Feedback Satisfaction Questionnaire.

interview identified through self-reports that teachers lacked skills, knowledge, feedback and materials to utilize data-based instruction. Interventions matched to the results of the functional assessment were introduced sequentially to three groups of teachers. Training improved data-based instruction for every teacher. Teachers' performance immediately improved following training for 4 out of 8 subjects. The remaining teachers demonstrated a delayed increase in performance. Each teacher in the first group had a delay in performance improvement following training. Training for this group was completed just before Christmas break. It is possible that difficulty of "getting back into the routine" contributed to the delay in responding.

The addition of performance feedback produced increases in successful implementation of data-based instruction for most of the subjects. These results extend the findings of Witt et al. (1997) who demonstrated that teachers correctly implemented a treatment program immediately following training. However, treatment integrity deteriorated as the number of sessions increased since training. Witt et al. found that the decreasing trend was reversed after teacher performance feedback was provided on a daily basis. It was common for teachers in the present study to repeat an error prior to the feedback condition. After implementation of the feedback condition, subjects would often correct errors made previously.

The follow-up measures of teacher's performance indicated a return to baseline levels. It is likely that collecting the bi-weekly documentation and providing feedback supported responding. Removing the supports resulted in decreased responding. During the follow-up observation the participants were asked why they were not implementing data-based instruction. In response, teachers stated that other events competed with their time. Also, the teachers indicated the need for direction from their administrators before once again applying data-based instruction.

In the natural educational environment, staff regularly attend an inservice training in an attempt to improve performance. After the inservice, a teacher may try to implement the recently presented information within his or her classroom setting without feedback on the accuracy of implementation. The present study differs from the usual inservice approach in three ways. First, the need for training was identified through functional assessment interview and pre-test on data-based instruction. Second, mastery of the subject matter was documented through post test score. Third, feedback on correct implementation of data-based instruction was provided in a timely manner.

No teacher in the study sustained 100% accuracy on implementation of data-based instruction. Interestingly, the low percentage of data-based instructional components often reflected a failure to implement specific components of the model rather than an incorrect implementation of the procedures. Frequently, teachers did not collect enough student performance data or failed to complete the bi-weekly reviews. There are several variables that could have influenced the teachers' performance. One student of Elly's died unexpectedly prior to the experimental feedback condition. The untimely death of the student most likely distressed the classroom staff and students. However, it should be noted that the teacher's performance was low during baseline and following training prior to the unfortunate incident.

The timing of extra curricular events during the school year could affect performance. This study was conducted during the last half of the school year. It is conceivable that teacher and student performance deteriorate at the end of the year due to fatigue and competing events. However the performance of several of the teachers (i.e., Fran, Dawn) was maintained to the final week of school perhaps as a result of performance feedback. Follow up assessments indicated that six of the eight participants reported to having stress in implementing data-based instruction. One

possible reason for this is the additional requirements (of data-based instruction) in an already full teaching schedule, or the timing of the interview occurring at the end of a busy school year.

The use of indirect assessments for identifying barriers to data-based instruction relies on subjective impression of the participants. This approach has limitations in verifying functional relationships. It is noted that, through the assessment interview, each teacher indicated a need for knowledge/skill development. No teacher successfully completed the mastery test prior to training. Performance significantly improved following training in all cases, supporting the hypothesis of a skill deficit contributed to the lack of data-based instruction. An alternative approach to hypothesis development and confirmation has been recently demonstrated (Daly, Martens, Dool & Hintze, 1998; McComas, Wacker, Cooper, Asmus, Richman, & Stoner, 1996). This alternative approach examines the effects of interventions to increase subject successful responding using a brief functional analysis procedure. Several different interventions are presented individually in a rapid reversal design with a goal of determining the most successful treatment Such a hypothesis testing approach could further identify functional relations and the development of individualized treatments to support staff performance.

There are several possible confounding variables that may impact on the results of this experiment. The experimenter has worked as a fellow teacher and teacher consultant with each of the participants prior to the research. It is possible that this relationship has effected the teachers' motivation to improve performance. Also, it is unclear if the training or the collection of teacher's bi-weekly review documents or both contributed to the change in responding. Even though the participants were asked to share their student performance data before and after the training, there appears to be an establishing operation that followed the training regarding verbal responses associated

with sharing data. After training, subjects were more likely to say something like "I'm sorry, I wasn't able to collect much data this week" or "You'll be proud of me this time, I did it right". It seemed as if these responses occurred on a continuum: least likely during baseline, increasing following the training, and most likely during feedback. Perhaps the training provided for rule governed behavior in that subject created rules for themselves stating that there are new performance expectations following training. Additionally, there is a possible effect caused by the process of a limited hold for teacher completing the tasks for data-based instruction. The experimenter would collect the documentation from the teachers on Monday for the previous two week period. One teacher responded that she worked hard to get the data collected before the end of the week because it was soon to be monitored by the experimenter.

CHAPTER IV

GENERAL DISCUSSION

Previous research has determined the effectiveness of data-based instruction (Fuchs et al., 1984; Fuchs & Fuchs, 1986). The present study demonstrated that data-based instruction is not commonly practiced by special educators. One plausible cause for this finding is a deficit in required skills (e.g., teachers do not know how use data-based instruction). It is also conceivable that teachers are not reinforced and/or they are punished for using data-based instruction. Teachers may view data-based instructional procedures as not necessary or too time consuming. The second study found that functional assessments could be used to identify the variables that inhibit data-based instruction. Interventions of training and feedback based on the assessments were successful in improving teacher performance.

Training is often considered to be an important way to improve staff performance (Sparks & Loucks-Horsley, 1990). Educators attend staff development workshops or "inservice" training sessions with the intent of enhancing staff performance. However, training may not be necessary if staff already have the skills and knowledge to perform successfully. Mager (1992) suggests that training should be considered if there is a skill deficit and the individual requires the skill to perform his or her job better. A skills deficit is characterized by the lack of responding as a function of absent or ineffective learning. An individual may not be under effective stimulus control. In the present investigation, teachers were provided with student performance data but did demonstrate the skills prior to the training. Training may not be sufficient to improve performance (Gilbert, 1979; Dean, Dean, & Rebalsky, 1996). A

performance deficit is determined by the subjects demonstrating the response, but only some of the time. Interventions other than training are appropriate for performance problems. Non-training, environmental supports may be needed to improve the special educator's performance. The second study of this study provided feedback as a form of environmental support.

Future research might investigate long term maintenance of data-based instruction. Maintenance occurs when the individual's behavior is changed in a way to elicit natural contingencies of reinforcement or the environment is modified in a way to support a change in behavior. The teachers' environment was modified through performance monitoring and feedback. Closer examination variables that maintain other teacher behaviors may provide insight into the many tasks that compete for data-based instruction.

Additionally, work needs to be done in determining how best to disseminate the methods and procedures of data-based instruction. Teachers in the survey (Study 1.) seemed unaware of data-based instructional procedures as indicated by comments. Not one of the teachers in the second study was familiar with this approach. Even if information on data-based instruction is distributed to educators in the field, it may not be adopted for various reasons (Axelrod, 1992; Lindsay, 1992).

A key premise of data-based instruction is that frequent measures of student performance and modification of instruction based on these measures are necessary in promoting student success. As Macfarlane (1998) points out "Given a once-a-week data collection, it would take 3 weeks for a teacher to identify a potential problem." (p. 241). It is important to find new ways in which teacher act upon student performance to determine the direction for instruction. Data-based instruction incorporates student performance as feedback resulting in a process for continuous quality improvement within the educational setting.

Appendix A

Review of Functional Assessments Within School Settings

FUNCTIONAL ANALYSIS IN THE SCHOOLS: A PROGRESS REPORT AND TRAINING SUGGESTIONS

Introduction

Over the past fifteen years there has been an increased interest in the use of functional assessments in applied settings. Debates over the use of aversive interventions have prompted investigations into effective alternatives to punishment. The use of functional assessments has contributed to improved efficacy of treatment. One setting in which the benefit of functional assessment has been demonstrated is in the schools. Furthermore, the re-authorization of the Individuals with Disabilities Education Act (IDEA '97) has mandated functional assessments in certain cases.

A functional assessment examines the relationship between the behavior and the environment. Functional assessment has been described as a process for identifying the variables that reliably predict and maintain problem behavior (Horner & Carr, 1997). The antecedent events as well as the resulting consequences of the behavior are examined. Once the conditions that contribute to problem behavior have been identified, interventions based on this information can be developed. A functional assessment can involve informal staff interviews as well as more structured, direct observations of student behavior. Functional analysis is experimental manipulation of environmental events while observing the student's behavior under these conditions. Thus, functional analysis is a more rigorous form of functional assessment.

When attempting to analyze problem behavior, it may be useful to understand why an individual would engage in any behavior. Prior to responding there is a condition that establishes motivation. In this condition, the individual is either without a desirable item/event or in the presence of an undesirable item/event. While in this condition the individual makes a response that results in obtaining or escaping,

depending on the motivating condition. The response is then likely to be repeated due to its consequences. Sometimes there are "cues" within the environment, that when present, a response will be more likely to be reinforced. The primarily assumption with functional assessment is that behavior problems are learned. Furthermore, if the student has learned to misbehave then he or she can learn appropriate behavior as well. Behavior is learned as a result of consequences that follow and maintain that behavior. There are basically two categories of events that maintain behavior. The first involves obtaining desirable events such as attention from others, objects, or internal stimulation. The process through which a behavior is maintained by the presentation of desirable events is called positive reinforcement. The second category is escape or avoidance of undesirable events such as attention from others, tasks, or internal stimulation. The process through which a behavior is maintained by escape or avoidance is called negative reinforcement.

There are a number of benefits for conducting functional assessments. Interventions based on information obtained from functional assessments are more effective than interventions that are not based on functional assessments (Repp, Felce, & Barton, 1988). Functional assessment-based treatments may lead to improved treatment maintenance and transfer (Durand & Carr, 1992; Derby et al. 1997). Functional assessments may be useful in enhancing and evaluating existing interventions (Richman et al., 1997; Taylor & Miller, 1997). In addition, students may prefer treatments based on functional assessments (Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997). As noted earlier, the requirements of IDEA '97 mandate the use of functional assessments in cases involving long term suspensions and expulsion from school.

Bowman, Fisher, Thompson, and Piazza (1997) have suggested that functional assessment has lead to the new technologies to address problem behavior, as well as

the refinement of existing procedures. It is more advantageous to design treatments based upon the function of the behavior rather than its appearance (Iwata, Vollmer, & Zarcone, 1990; Vollmer & Smith, 1996). The same form of behavior may serve different functions. For example screaming for one child may obtain attention whereas screaming may result in escape from a demand for another child. Different behavioral functions require different interventions.

Recently, there have been several reviews of published research in the area of functional assessment. Blakeslee, Sugai and Gruba (1994) reviewed six research journals from 1986 to 1992. Fowler and Schnacker (1994) provided historical background on functional analysis (a form of functional assessments) methodology as well as a chronological review of functional analysis studies. Also, Fox, Conroy, and Heckaman (1998) reviewed 18 published studies involving students with emotional/ behavioral disorders. Each of these previous reviews has included functional assessments conducted in school as well as other settings. The purpose of this review is to analyze the characteristics of published functional assessment research conducted in the school settings. Furthermore, suggestions for educational staff implementation of functional assessment are provided based on current research literature.

Review

A total of 36 studies were analyzed in this review. A summary of each study is provided following the bibliography. To be selected for review, the studies must have conducted a functional assessment within the school setting to address student problem behavior. In several studies, investigations were conducted in various settings including classrooms (Carr, Newsom, & Binkoff, 1980; Cooper et al. 1992). Only the sections of those studies that involved functional assessment in the school were reviewed. In addition, only studies that primarily focused on reducing student problem

behavior rather than increased skill development were included in this review. The majority (55.6%) of the articles came from the Journal of Applied Behavior Analysis, followed by School Psychology Quarterly (11%) and Behavioral Disorders (8.3%). The remaining articles were published in seven other journal sources.

Student Characteristics

A combined total of 92 students participated in the reviewed studies. A summary of student diagnoses is presented in Table 1. Most students (64%) had been diagnosed as having developmental disabilities. Approximately 31% of all the students were diagnosed with severe to profound mental retardation. Twenty-three percent of the students were diagnosed with autism or a combination of autism and some degree of mental retardation. Almost 13% of student participants had a diagnostic label of attention deficit, hyperactivity disorder (ADHD), most of which received services in general education classrooms. Other student diagnoses included behavioral/emotional disorders (7.6%), language disorders (4.3%), brain damage (2.2%), and learning disabilities (1.1%). It should be noted that some students had overlapping diagnoses. Due to the students' educational diagnosis, many of the functional assessments were conducted in special education classrooms. Twenty-one percent of students were in a general education setting receiving no special education services. Students ranged in age from 3 years to 20 with an average age of 9 years.

Types of Behavior Problem

Aggression was the behavior problem most reported (22.8%) followed by inappropriate vocalization (18.4%) and out-of-seat (13%). Other problem behaviors included, non-compliance or refusal (10.7%), self-injury (10.7%), destruction of

Table 1.

Summary of Student Diagnoses

Diagnosis	Percent
1. Severe or Profound Mental Retardation	26.1
2. Attention Deficit Disorder	12.0
3. Autism (without Mental Retardation)	9.8
4. Autism with Moderate Mental Retardation	7.6
5. No Diagnosis	7.6
6. Behavioral Disorder	7.6
7. Moderate Mental Retardation	6.5
8. Mild Mental Retardation	5.4
9. Autism with Severe Mental Retardation	5.4
10. Language Disorder	4.3
11. Developmental Delay	3.3
12. Brain Damage	2.2
13. Learning Disability	1.1
14. Autism with Mild Mental Retardation	0

property (8.7%), off task (7.6%), stereotypy (5.4%) and tantrums (4.3%). Fourteen percent of the recorded behaviors also included appropriate student responses, usually "on-task" behaviors. One purpose for recording appropriate as well as inappropriate responding is that reduction in problem behavior may not automatically lead to increases in appropriate behavior.

Type of Assessments

Functional assessment can be divided into three categories. These include (a) indirect assessment procedures, (b) descriptive analysis, and (c) functional (experimental) analysis. Most studies (58%) reported the use of all three types of assessments. Only three studies (Repp & Karsh, 1994; Taylor, O'Reilly & Lancioni, 1996; Wheeler & Wheeler, 1995) conducted indirect and descriptive assessments without functional analysis. Conversely, eight studies (22.2%) employed only functional analysis without indirect or descriptive analysis. There were no studies that exclusively utilized either the indirect assessment and descriptive analysis. These instruments were always used in combination with each other or with a functional analysis.

Indirect assessments.

The first category of assessments involve subjective reports of the problem behavior during normal classroom conditions. Information that is obtained through indirect assessments can indicate the severity of the problem as well as suggesting possible contributing factors to problem behavior. Indirect assessments may include conducting interviews, reviewing academic or medical records, or administering rating scales. During an interview, teachers and sometimes parents or the students themselves are asked to describe the events that occur during problem behavior. Questions involve describing situations when the problem behavior occurs and does not occur, identifying events that follow the occurrence of the problem and other factors that may influence behavior (sleep patterns, diet, health, medications, etc.). Indirect functional assessments generally require little time and effort to complete. However, indirect assessments are considered to be less accurate than direction observation methods such

as a descriptive analysis and functional analysis. It is important to point out that indirect assessments are intended to provide an initial starting point for directing follow-up functional assessments. Once the possible contributing factors are identified, they are confirmed through direct observations.

An indirect assessment was conducted in 44% of the reviewed articles. In each of the studies that conducted indirect functional assessments, the classroom staff were the primary respondents. The interview was conducted with individuals or with a group of staff members. Sixty-seven percent of the investigations that reported the use of an interview employed either the Functional Analysis Interview Form (O'Neill, Horner, Albin, Storey, & Sprague, 1990) or a modified version of this instrument. In addition to interviewing staff, parents were interviewed in two of the articles (Umbreit & Blair, 1996; Vaughn & Horner, 1997). Generally, the duration of the interview was not provided. Studies that did provide time amounts suggested that interviews ranged from 15 to 90 minutes.

Sometimes the student may be able to provide insight into variables that contribute to his or her problem behavior. Four articles included interviews with students (Dunlap et al., 1993; Ervin, DuPaul, Kern, & Friman, 1998; Kern Childs, Dunlap, Clarke, & Falk, 1994; Umbreit, 1995). These investigations involved students with ADHD or severe behavioral disorders. Each student interview was conducted using the Student Assisted Functional Assessment Interview (Kern, Dunlap, Clarke, & Childs, 1994).

Several studies (Conroy, Fox, & Crain, 1996; Durand & Carr, 1992; Wheeler & Wheeler, 1995) administered the Motivation Assessment Scale (Durrand & Crimmins, 1988). The Motivation Assessment Scale (MAS) is comprised of 16 questions based on a Likert scale. The questions correspond to environmental events

that may precede or follow a problem behavior. The results are then categorized into possible maintaining variables of Sensory, Escape, Attention, and Tangible.

Descriptive Analysis.

A more objective form of functional assessment involves directly observing (describing) student behavior within the natural contexts of the classroom. These recording techniques describe antecedent, behavior and consequence (A-B-C) events that take place during a given time period (Bijou, Peterson, & Alt, 1968). A descriptive analysis is most useful when there are repeated observations conducted over a variety of classroom conditions. Because observations are often in 10 to 15 minute periods, occurrences of the problem behavior might occur at times other than during observations. The amount of observation may need to be extended in cases of low rate behaviors. Furthermore, the descriptive analysis involves identification of a correlation between the problem behavior and environmental events. Problem behavior may be more likely to occur in the presence of certain environmental events but this does not mean that it is caused by those events.

There are several forms of descriptive analysis including event recording, partial interval recording or scatterplot recording. A summary of the descriptive analysis techniques and time requirements for conducting the assessment is presented in Table 2. A descriptive analysis was conducted in 55.6% of the articles reviewed. The type of descriptive analysis was unspecified in 11% of these.

In event recording, a discrete event of the problem behavior is documented as it occurs along with the environmental conditions that immediately come before and after the problem behavior. This procedure requires the observer to make a notation only after occasions of problem behaviors. Approximately 29% of the articles utilized event

Table 2.

Summary of Time Requirements for Conducting Descriptive Analyses

Type of Assessment	Common Observation length	Avg. Number of Session	Usual Period of Observation	Who records
Interval recording	10 minutes (range, 10 min. to 90 min.)	7 (range, 3 to 15).	5 day period	researchers
Event recording	15 minutes (range, 15 to 120 min.)	9 (range, 2 to 16)	2 days to 2 months	researchers
Scattorplot	all day (20 min. to 30 min. intervals)		12 hours to 2 weeks	classroom staff

recording. Researchers were responsible for collecting event descriptive analysis data in each study except for Sasso et al. (1992) where the teacher collected data. Most studies reported observation periods of 15 minutes (range, 15 to 120 minutes). The total number of observation sessions averaged 9 (range, 2 to 16) over a period of 2 days to 2 months.

A comprehensive description of interval recording is provided by Mace, Lalli, and Pinter Lalli (1991). In partial interval recording, an observer records the occurrence or non-occurrence of problem behavior as well as antecedent and consequences during a specific time period. The observation period is divided into small intervals of several seconds (e.g., 10 second intervals). Approximately 18% of the studies used an interval recording procedure. Recording was done by the researchers rather than teachers. The number of sessions averaged 7 (range, 3 to 15). Most researchers reported observation sessions of 10 minutes (range, 10 min. to 90

min.). When reported, interval recording assessment was usually completed over a 5 day period.

A third descriptive analysis technique involves recording behavior on a scatterplot during long observation periods (e.g., all day) over several days (Touchette, MacDonald, & Langer, 1985). The purpose is to identify events throughout the day that are correlated in time with problem behavior. Scatterplot recording was used in approximately 16% of the studies, with half of these using the Functional Analysis Direct Observation Form (O'Neill et al., 1990). The Functional Analysis Direct Observation Form not only identifies the temporal distribution of problem behavior but also combines an event recording component to document antecedent and consequent events. Classroom staff were responsible for recording the student behavior in each of the scatterplot assessments. Observations took place during the entire school day broken down into 20 or 30 minute intervals. Scatterplot recordings range from 12 hours to 2 weeks.

Functional Analysis.

The goal of functional analysis is to experimentally identify the environmental effects on behavior. Also, functional analysis allows for identification of causal relationships between behavior and environment. This is done by holding or eliminating as many extraneous variables as possible and varying only one factor at a time in each experimental condition (Mace, Lalli & Pinter-Lalli, 1991). Behavior is recorded during each condition, thereupon, the amount of responding is compared across conditions. Generally, experimental sessions were conducted for ten minute time periods. The functional analysis was usually conducted over five days with a total of 20 session. A summary of the time requirements for conducting functional analyses

is provided in Table 3. Functional analysis conducted in this review used either reversal or multi-element single-case experimental designs (Kazdin, 1982).

For the purpose of this review, strategies for conducting functional analysis were placed into categories of brief or extended analysis. During the brief (or probe) functional analysis, students are exposed to only one or two sessions of each experimental condition. With an extended functional analysis, students are exposed to the same experimental condition for three or more sessions. Extended functional analyses were reported in 80.6% of the articles reviewed. In addition, subcatgories for extended or brief analyses include (a) potential treatment evaluation, (b) extended analogue analysis, (c) extended mixed treatments evaluation/ analogue analysis. With all functional analyses there is a continuum of "natural" to "artificial" conditions.

Under naturalistic conditions, sessions take place in the normal classroom setting with typical individuals, activities, and materials being used during assessments. The results from naturalistic functional analysis are more likely to generalize to typical classroom environments. The functional analyses that test potential treatments are more likely to take place under naturalistic conditions. Analogue functional analyses are less likely to be conducted under naturalistic conditions.

With the potential treatments approach, hypotheses are developed that describe possible antecedent-behavior or consequence-behavior relationships that are probable for reducing problematic behavior. Kern et al. (1994) suggest that hypotheses are based on informal assessments and descriptive analysis. In addition, hypotheses identify specific variables that are testable and could be manipulated by the teachers in the classroom setting. Once identified the hypotheses are tested through a functional analysis. Typically, normal classroom conditions are compared with conditions hypothesized to produce low levels of problem behavior. The primary purpose is to

Table 3.

Summary of Time Requirements for Conducting Functional Analyses

Functional Analysis	Common Observation length	Avg. Number of Sessions	Sessions per day	Who conducts sessions
Potential treatments	10 minutes (range, 5 min. to 25 min.)	18 (range, 5 to 62)	(range, 1 to 3)	Classroom staff
Analogue	10 minutes (range, 2min. to 15min.)	19 (range, 7 to 42)	(range, 2 to 6)	Classroom staff (50%) Researchers (50%)
Mixed	10 minutes	25 (range, 13 to 36)	(range, 1 to 3)	Researchers
Brief	10 minutes (range 1 min. to 10 min.)	6 (range 4 to 9)	all	Classroom staff

evaluate potential treatments for reducing problem behavior. The basic operant mechanisms (i.e., reinforcement contingencies) are sometimes inferred and not always clearly identified. Testing confirms the hypothesized relationship and perhaps indirectly confirms the operant reinforcement contingency. Dunlap and Kern (1996) state that their form of hypothesis testing involves "presenting stimuli and stimulus characteristics that are associated with desirable behavior, and removing or ameliorating those that are associated with problems" (p. 309).

The extended potential treatment technique was conducted in 43.2% of the reviewed articles. The most common reported session duration was ten minutes (range, 5 min. to 25 min.). The average number of sessions was 18 (range, 5 to 62) with a range of 1 to 3 sessions per day. Classroom staff usually conducted the

hypothesis testing sessions. Observers other than the person conducting the sessions would then record student behavior.

The intent of the analogue analysis is to experimentally identify operant reinforcement contingencies maintaining problem behavior. A standard protocol for conducting analogue analysis was developed by Iwata, Dorsey, Slifer, Bauman, & Richman (1982). During the analogue functional analysis, the experimenter attempts to present conditions that maximize the probability that the problem behavior will occur. Analogue analyses are general completed outside of the natural contexts of the classroom and classroom activities.

There were nine studies (24.3%) placed into the extended analogue procedures category. The length of observations was generally 10 minutes (range, 2 min. to 15 min.). The average number of sessions was 19 (range, 7 to 42). Seven of the nine analogue studies utilized Iwata et al. (1982) functional analysis protocol or a variation, evaluating conditions of maintaining conditions of escape, attention, self-stimulation, and sometimes obtaining tangible items. The duration of the functional analysis period was not reported. However, the range of sessions per day was 2 to 6.

Only four studies (10.8%) utilized mixed potential treatments/ analogue extended analysis. The studies reported a session length of 10 minutes. The average number of sessions was 25 (range, 13 to 36) with one to three sessions per day. In the mixed functional analyses, it was typically the researchers who conducted the sessions.

Brief or probe functional analyses are a more expedient means of identifying causal relationships. Five studies (13.8%) reported using brief functional analysis. The most common session length was 10 minutes (range, 1 min. to 10 min.). The average number of sessions was 6 (range, 4 to 9). With brief functional analysis, all sessions were generally run on the same day. There was usually a break of five or more minutes between each session. Classroom staff were responsible for conducting

the sessions in each of the reported brief analyses. One study (Cooper et al., 1992) conducted a brief functional analysis using the evaluating of potential treatments model. Conditions of high demand and low task preference were compared with high demand and high task preference to investigate the effects on behavior. Three studies used the brief analogue procedure. In one of these, Conroy, Fox, & Crain (1996), conducted a series of brief analogue analyses over a period of 1 to 2 months to analyze teacher behaviors that lead to problems of students with developmental disabilities. Only Steege and Northup (1998) used the mixed analogue/potential treatments approach to assess the behavior of a student with learning disabilities.

It is interesting that in the majority of studies involving students with normal or mild disabilities, peer attention was identified as contributing to the problem behavior. To assess the effects of peer attention, Broussard and Northup (1995) observed behavior when peers were present and also absent. Other researchers have used a peer confederate to be "teacher helper" and attend to problem behavior during observations (Broussard & Northup, 1997; Northup, Broussard, Jones, George, Vollmer & Herring, 1995).

Agreements Between Assessment Procedures

Validity and reliability of assessment techniques must be considered. Information obtained from these assessments must be reasonably accurate and consistent in order to prescribe effective treatments. Indirect assessments such as the MAS have been criticized (Zarcone, Rodgers, Iwata, Rourke, & Dorsey, 1991). Lerman and Iwata (1993) compared descriptive and experimental analysis in the treatment of self-injury. The researchers found that an extensive descriptive analysis did not provide data to suggest the function of behavior for 5 out of the 6 subjects. The authors then suggested that a descriptive analysis may not be necessary nor sufficient in

identifying functional relationships. However, Lalli Browder, Mace, & Brown (1993) found that teachers were able to develop and implement successful interventions based on descriptive analysis data

Agreements among the assessment procedures (i.e., indirect assessment, descriptive analysis and functional analysis) were varied. There was consistent agreement among assessments in 47.2% of the articles reviewed. Sometimes two assessment methods were completed within the same category. For example, results from brief functional analysis were consistent with extended analysis in the Cooper et al. (1992) study. Agreements among assessments were inconsistent in eight (22.2%) of the investigations. Conroy, Fox, & Crain (1996) found that data from analogue sessions were not consistent for two of the four students in the study. Additionally, Umbriet (1995) found differing results from brief analogue and extended hypothesis testing. Results regarding agreements between assessment instruments were unspecified in 11% of the studies.

Treatments Based on Functional Assessment

Prior to the development of functional assessments, teachers would apply reinforcers and/or punishers in an attempt to change problem behavior. These treatments were not always successful. One likely reason for inconsistent results may be due the application of reinforcement or punishment techniques that were not powerful enough to impact upon the functional relations that were in effect (Vollmer & Smith, 1996). With the use of functional assessment, new interventions can be developed based on contingencies that reduce the competition with the existing contingencies. If the reinforcer that maintains a problem behavior is no longer applied and is contingent upon an appropriate alternative behavior, competition is reduced.

A total of 46 interventions were reported within this review. However, not all studies investigated interventions based on functional assessment. Twenty-nine studies evaluated interventions in addition to assessment, whereas 7 articles only involved identifying the probable environmental conditions related to problem behavior. Interventions based on functional assessments can be categorized into three main strategies. These involve program modifications in the areas of (a) antecedent events (b) consequences for problem behavior or (c) consequence for alternative appropriate behavior. A summary of interventions based on functional assessments is provided in Table 4.

Change Antecedents.

The likelihood that a student will engage in problem behavior is reduced when the motivating condition is abated. One technique called non-contingent reinforcement (NCR) provides reinforcement on a fixed schedule. In this way the reinforcer is no longer available contingent upon the problem behavior, thus the behavior is unnecessary and should decrease. Boyajian Mace, Shapiro, and Mace (1998) reduced self-injury in a child with autism using a treatment package including access to items or escape from demands for a brief period every 60 seconds. Sometimes problem behavior is reduced by providing a signal to let the student know that a training session is about to end (Carr, Newsom, & Binkoff, 1980) or begin Boyajian Mace et al. (1998).

The curriculum was modified in 8 of the 46 treatments (17.4%). Modifications included shorten tasks (Dunlap et al., 1993), preferred tasks (Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991) and choice of activity (Dunlap et al., 1991, Taylor et al., 1996; Umbreit & Blair, 1996). Additional assessments may be needed to identify and confirm high preference tasks over low preference task as a possible treatment. Several

Table 4

Summary of Treatments Based on Functional Assessment

Area of Modification	Treatment	Percent
Change antecedents	Curricular modification	17.4%
	Non-contingent reinforcement	2.2%
Consequence for problem behavior	Extinction	23.9%
	DRO	8.7%
	Time-out	6.5%
	Response cost	2.2%
Consequence for alternative behavior	DRA	21.7%
	Functional communication training	17.4%

researchers employed preference assessments to identify liked activities for the students (Foster-Johnson, Ferro, & Dunlap, 1994; Umbriet & Blair, 1996, 1997; Vaughn & Horner, 1997). This was done to investigate effects of preferred activities and choice on behavior problems.

Consequences for Problem Behavior.

The most common treatment involved extinction which was the intervention in approximately 24% of the total identified interventions. During extinction, the maintaining consequence does not follow the problem behavior. This process results in a weakening or reduction of the problem behavior. A differential reinforcement of other behavior (DRO) intervention was implemented in 8.6% of the identified

treatments (Broussard & Northup, 1997; Northup et al., 1994; Northup et al., 1995; Richman et al., 1997). During DRO, the maintaining variable for problem behavior is presented contingent upon a specific period of time without engaging in the problem behavior. A time-out procedure was administered in three studies (6.5%). Time-out in each of these studies was successful in the treatment of attention maintained problem behavior. Taylor and Miller (1997) demonstrated that time-out is not effective in reducing problem behavior maintained by escape.

Consequences for Alternative Behavior.

Differential reinforcement of alternative behavior (DRA) was the treatment administered in ten (21.7%) of the interventions. In this treatment procedure a socially appropriate alternative response is followed by the same reinforcer that maintains the problem behavior. Examples of alternative responses included appropriate play (Lalli et al., 1993) task engagement and appropriate transition (Repp & Karsh, 1994). Functional communication training (FCT), sometimes called mand training or functional equivalence training, was implemented in eight (17.4%) treatments. In FCT an appropriate communicative response is taught to the student so that it produces the same reinforcing consequence as the problem behavior. An example presented by Carr and Durand (1985) involves reinforcing the student for asking "Am I doing good work?" to elicit adult attention. It is important that the replacement behavior is more efficient than the problem response (Horner & Day, 1991). Efficiency considers the physical effort involved, schedule of reinforcement and time delay in reinforcer delivery and magnitude (quality) of reinforcement.

Discussion

The results of this review indicate that functional assessment has been conducted with varied problem behaviors as well as student characteristics. Most studies reported combined assessments of indirect, descriptive analysis and functional analysis. A functional analysis was completed in over ninety percent of the studies in this review. These results differ from Desrochers, Hile and Williams-Moseley (1997) who surveyed practitioners responsible for treating problem behavior of individuals with mental retardation. Respondents most frequently reported the use of interviews, A-B-C analyses, and checklists. Stated problems in the field included lack of experimental control, insufficient time, and difficulty collecting data. One reason for the discrepancy between research and practice may be that publication requires more rigorous analysis. Additionally, one might question the availability of time for staff to complete all three levels of assessment.

Recommendations

There are several recommendations can be made for educators wishing to conduct functional assessments:

Informal assessments may provide useful information for developing hypotheses. However, it is recommended that this information be viewed as a starting point requiring following-up assessments. Minimally, a descriptive analysis should always be completed by directly observing the student and recording antecedent-behavior-consequence information. For more challenging problems, a functional analysis is recommended to provide empirical support for treatment development.

Teaching staff may be able to collect descriptive observational data on behaviors that occur at relatively low rates. Event recording or scatterplot techniques may be most

feasible as data collection techniques. High rate problem behavior may require that ancillary staff conduct descriptive analyses using interval recording systems.

Conducting functional assessments requires knowledge, skill and experience. It is recommended that problem behaviors are addressed by a team (classroom staff, ancillary staff, administrators, parent) including a member knowledgeable in the area of behavior analysis.

Procedural safeguards should be in place prior to implementing functional analysis. This may include obtaining informed consent as well as protection from harm for the student or others.

Treating problem behavior is an ongoing process in which progress is periodically evaluated. Additional functional analyses made be required in cases of treatment relapse, as the function of behavior might change over time (Lerman, Iwata, Smith, Zarcone & Vollmer, 1994).

Future research

Future research is needed in the development and validation of functional assessments that are manageable for teachers to conduct. Many schools do not have the extra staff and time to conduct lengthy assessments. However, it is reasonable to argue that with difficult cases, staff are already spending much time attending to problem behavior. Perhaps the transfer of staff attention to assessment and program development may be a better use of time over the long run. The time requirements for conducting indirect assessment, descriptive analysis and brief functional analysis as identified in this review (Tables 2 and 3) correspond to the suggested time requirements provided by Steege and Northup (1998). The use of brief functional analysis can greatly reduce assessment time. Steege and Northup suggest that functional assessment and plan development can take place in ten to sixteen hours.

The use of functional assessment has lead to more effective treatments for problem behavior. To be effective in the schools, implementation and interpretation of functional assessment requires dissemination among educators. In addition, there must organizational supports to administering functional assessments. Resources spend on applying effective technology will result in increased benefits.

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Summary of Functional Assessments within School Setting

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Boyajian Mace, Shapiro, & Mace (1998)	autism, moderate MR (7)	self-injurious behavior	none	none	extended analogue	obtain tangible, escape	extinction, NCR warning stimuli
Broussard & Northup (1995)	no diagnosis, ADHD (6-8)	work completion, talking-out, gestures to others, out-of seat, crying, aggression, destruction, non-compliance	staff interview, academic records review	interval recording	extended potential treatment	teacher attention, peer attention, escape	DRA
Broussard & Northup (1997)	no diagnosis, ADHD (6-9)	inappropriate vocalization, out-of-seat, playing with objects	not specified	interval recording	extended analog	peer attention	DRO

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Carr & Durand (1985)	autism, brain damaged, developmentally disabled, hearing impaired (7-14)	aggression, tantrums, self-injury, opposition, out-of-seat, stripping	teacher reports	informal observation	extended mixed analogue/ potential treatment	escape, attention	FCT
Carr, Newsom, & Binkoff (1980)	severe MR (9)	aggression	none	none	extended analogue	escape	contingent food, toys on compliance
Carr, Yarbrough, & Langdon (1997)	autism, severe-moderate MR (13-20)	aggression, SIB, disruption	staff interview	event recording	extended analog	obtain tangible, escape	none
Cooper, Wacker, Thursby, Plagmann, Harding, Millard, & Derby, (1992)	mild MR (8- 9)	inappropriate behavior, off task behavior	none	none	extended and brief potential treatment	escape (inferred)	DRA
Conroy, Fox, & Crain (1996)	developmental disabilities, autism (5-12)	stereotypy, non-compliance, self-abuse	staff interview, MAS	event recording	brief analogue	attention	none

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Dunlap, Kern, dePerczel, Clarke, Wilson, Childs, White & Falk (1993)	behavioral and emotional disturbances (6-11)	on-task, appropriate verbal, inappropriate verbal. aggression, out of seat, off task, whining, crying, destruction	staff and student interview, records review	event recording	extended potential treatment	teacher attention, peer attention, escape (inferred)	none
Dunlap, Kern-Dunlap, Clarke, & Robbins (1991)	mild MR, emotional disturbance, schizophrenia, ADD (12)	on-task, appropriate social, aggression, elopement, on/off task, inappropriate vocalization	staff interview, rating scales	unspecified observation	extended potential treatment	escape (inferred)	modified curriculum
Durand & Carr (1991).	autism, moderate to severe MR (12-19)	head hitting/ face slapping/head banging, aggression	MAS	none	extended mixed analogue/ potential treatment	escape, escape/ attention	FCT

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Durand & Carr (1992)	mild MR, autism, ADD language disorder (3-5)	aggression, tantrum, destruction, opposition	MAS	none	extended mixed analogue/ potential treatment	adult attention	time-out, FCT
Ervin, DuPaul, Kern & Friman (1998)	ADHD (13-14)	on-task, off-task	staff and student interview	scatterplot recording	extended potential treatment	escape, peer attention,	modified curriculum
Foster-Johnson, Ferro, & Dunlap (1994)	severe MR (9-15)	desirable behavior, self-stimulatory, inappropriate use of materials, inappropriate use of materials, inappropriate vocalization, off-task	none	none	extended potential treatment	escape (inferred)	none
Frea & Hughes (1997)	moderate to severe MR (17-18)	perseverative speech, inappropriate affect	none	none	extended analog	attention, escape	extinction, DRA, self-monitoring

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Hall, Neuharth-Pritchett, & Belfiore (1997)	moderate MR (9)	aggression, destruction	teacher reports	interval recording	extended potential treatment	escape	FCT
Kern, Childs, Dunlap, Clarke, & Falk (1994)	severely emotionally disturbed (11)	on-task, off-task	staff and student interview	event recording	extended potential treatment	escape, peer attention (inferred)	modified curriculum
Lalli, Browder, Mace, Brown (1993)	severe/ profound MR, cerebral palsy (10-14)	aggression, SIB	staff interview	scatterplot recording, Interval recording	extended potential treatment	attention, escape	extinction, DRA
Lewis, & Sugai (1996)	no diagnosis ADHD (7-9)	on-task, off-task	staff interview	event recording	extended potential treatment	peer attention, teacher attention	none
Northup, Broussard, Jones, George, Vollmer, & Herring (1995)	ADHD (7-9)	out of seat, inappropriate vocalization	none	none	extended analogue	peer attention	DRO

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Northup, Wacker, Berg, Kelly, Sasso & DeRaad (1994)	severe- profound MR (5-11)	appropriate behavior, manding, SIB, aggression, non-compliance, crying, stereotypy	staff interview, record review	interval recording	mixed brief analogue/ potential treatment	escape, attention	escape extinction, FCT, DRO modified curriculum
Repp, Felce, & Barton (1988)	severe MR (6-7)	engagement, SIB, stereotypy	none	event recording	extended potential treatment	escape, self stimulation	extinction, pacing
Repp & Karsh (1994)	severe MR (7-9)	appropriate behavior, tantrums, stereotypy, out of seat	staff interview	event recording	none	attention	extinction, DRA, pacing
Richman, Berg, Wacker, Stephens, Rankin, & Kilroy (1997)	moderate MR (9)	appropriate social interaction, aggression	teacher report	unspecified observation	extended potential treatment	teacher attention	DRO, time-out, DRA

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Sasso, Reimers, Cooper, Wacker, Berg, Steege, Kelly, & Allaire (1992)	autism (7-13)	aggression, inappropriate language	none	event recording	extended analogue	escape/ tangible, escape	positive reinforcement, response cost, FCT, escape extinction
Sigafoos & Meikle (1996)	autism, moderate to severe MR (8)	aggression, destruction, inappropriate vocalization, stereotypy, SIB	none	none	extended analog	attention/ tangible	FCT
Sprague, Flannery, & Szidon (1998)	severe disabilities, cerebral palsy (13)	spitting, whining	staff and family interview	unspecified observation	extended mixed analogue/ potential treatment	attention, student paced feeding	DRA, extinction
Sprague & Thomas (1997)	severe MR (10)	responsiveness refusal, aggression, out of seat	staff interview	scatterplot recording	extended potential treatment	setting event	precorrection following setting event

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Steege & Northup (1998)	learning disabilities (9)	on-task, verbal refusal, throwing items, slamming book shut, swearing	staff and student interview, records review	interval recording	brief mixed analogue/ potential treatment	escape	extinction, DRA
Taylor & Miller (1997)	moderate to severe MR, autism (9-12)	aggression, tantrum, screaming, refusal	none	none	extended analog	attention, escape	escape extinction, time-out
Taylor, O'Reilly & Lancioni (1996)	autism (5)	aggression, screaming, self-hitting, head banging	staff interview	scatterplot recording	none	escape	modified curriculum
Umbreit (1995)	ADHD (8)	on-task, talking to others, gestures, walking around room, making noises with objects	staff and student interview	event recording	brief analogue, extended potential treatment	escape, attention	modified curriculum, FCT, extinction

Summary--Continued

Study	Subject classification and age range	Behaviors	Indirect assessment	Descriptive analysis	Functional analysis	Hypothesized function of behavior	Intervention
Umbreit & Blair (1996)	Pervasive developmental disorder, moderate to severe MR (11)	on-task, inappropriate vocalizations, aggression, laying on floor	staff interview and parent interview	event recording	extended potential treatment	escape (inferred)	modified curriculum, skills acquisition
Umbreit & Blair (1997)	normal development (4)	on-task non-compliance, aggression	staff interview	event recording	extended potential treatment	escape (inferred)	modified curriculum
Vaughn & Horner (1997)	moderate to severe MR (7-12)	aggression, throwing, destruction refusal, screaming	staff and parent interview	scatterplot recording	extended potential treatment	escape (inferred)	none
Wheeler & Wheeler (1995)	Severe MR (16)	out-of-seat, inappropriate touching, aggression	staff interview, MAS	scatterplot recording, interval recording	none	escape, attention (inferred)	none

Appendix B

Cover Letter and Survey Questions

Request for Participation in Research Project

Dear Michigan Special Educator,

You are invited to participate in a research project entitled "A comparison of interventions based on functional assessment with training for improving teachers' use of data-based instruction". This project is designed to sample how often special educators measure student performance and how this information is used in the educational setting. This research is conducted by Wayne Fuqua and Steve Goodman from Western Michigan University, Department of Psychology with additional support from Michigan Department of Education- Office of Special Education. Information obtained from this study will assist the Michigan Department of Education in developing state policy for the alternative assessments component as required in the reauthorization of IDEA 1997.

Enclosed is a survey and a stamped, self-addressed return envelope. This survey is comprised of 32 multiple choice questions and will take approximately 20 minute to complete. Your replies will be anonymous, so do not put your name anywhere on the form. You may choose not to answer any question and simply leave it blank. If you choose not to participate in this survey or if you are no longer a special education teacher, please pass the survey on to a current special education teacher.

To encourage your participation, we are conducting a raffle. After you have completed the survey, please fill out the identification card. Return both the identification card and the survey in the envelope provided by. A clerical assistant will open the survey forms and separate the identification cards from the questionnaires before data analysis. Three cash prizes of $25.00 each will be awarded to the names draw from the identification cards. Returning the survey indicates your consent for use of the answers you supply. If you have questions, you may contact Wayne Fuqua at (616) 387-8309, Steve Goodman at (616) 399-2266 ext. 353, the Human Subjects Institutional Review Board (616) 387-8293 or the Vice President for Research (616) 387-8298.

Thank you in advance for your immediate response and assistance.

Sincerely,

Steve Goodman

Lucian Parshall
Coordinator of Technology and Research
Office of Special Education Services
Michigan Department of Education

Survey

Please circle the most appropriate answer.

1) What is the grade level of the students you work with?
   a) Pre-kindergarten
   b) 1 – 3
   c) 4 – 6
   d) 7 – 8
   e) 9 – 12
   f) Post secondary

2) What type of setting do you work in?
   a) Center-based program
   b) Inclusive Classroom
   c) Self-contained classroom
   d) Co-teaching
   e) Resource room
   f) Other (please specify)

3) How many students are you responsible for evaluating IEP objectives?
   a) 1-5
   b) 6-10
   c) 11-15
   d) 16-20
   e) 21-25
   f) 26 or more

4) What is the classification of the majority students that you work with?
   a) Autism
   b) Mental impairments
   c) Emotional impairments
   d) Hearing impairments
   e) Learning disabilities
   f) Physical or health impairments
   g) Pre-primary impairments
   h) Severe-multiple impairments
   i) Traumatic brain injury
   j) Vision impairment

5) What curriculum do you primarily use with your students?
   a) Basal
   b) Direct instruction
   c) Whole language
   d) Cognitive strategy
   e) Phonics
   f) Precision teaching
   g) Curriculum based assessment
   h) Michigan Outcomes Project
   i) Addressing Unique Educational Needs
   j) Other (please specify

6) What endorsements or approvals do you have for teaching special education?
   a) Autism
   b) Mental impairments
   c) Emotional impairments
   d) Hearing impairments
   e) Learning disabilities
   f) Physical or health impairments
   g) Pre-primary impairments
   h) Severe-multiple impairments
   i) Traumatic brain injury
   j) Vision impairment

7) How many years total have you been teaching?
   a) 1 - 5
   b) 6 - 10
   c) 11 – 15
   d) 16 - 20
   e) 21+

8) What is the highest degree earned?
   a) Bachelor
   b) Masters
   c) Specialist
   d) Doctorate

9) Which of the following best describes your theoretical orientation towards instruction?
   a) Behavioral
   b) Cognitive
   c) Developmental
   d) Generalist / eclectic
   e) Psycho-analytic
   f) Other (please specify)

10) How many college credits have you taken in behavior modification or applied behavior analysis?
   a) 0
   b) 1 – 3
   c) 4 – 6
   d) 7 or more

   10 a. If you have taken course work in data collection/student evaluation, where did you receive your training?
      1) College/university class (specify location)
      2) Continuing education workshop (specify location)
      3) Inservice presentation in your district (specify location)
      4) Other program (specify type/location)

When answering the following questions, please think of a specific student of yours. One who is typical of the students you serve. Consider how you generally evaluate his or her progress in regards to the IEP.

11) How often do you assess an individual student's progress/performance as it relates to his or her IEP?
   a) daily
   b) 2 - 3 times per week
   c) once per week
   d) once a month
   e) several times per month
   f) marking period (specify)
   g) annually
   h) never

12) What is your primary method of type of assessment when you evaluate your specific student's performance?
   a) class written assignments
   b) test scores
   c) oral responses
   d) timed performance assessments
   e) direct observation of student performance
   f) diagnostic functional analysis
   g) rating scales
   h) subjective impression/judgments
   i) other (please specify)

13) How often do you collect student performance data when you evaluate your specific student's performance?
   a) daily
   b) weekly
   c) monthly
   d) annually
   e) never
   f) other (please specify)

14) Do you graph student performance data when you assess your specific student?
   a) Always
   b) Almost always
   c) Usually
   d) Sometimes
   e) Never

15) How often do you review graphed student performance data to make instructional decisions when you evaluate your specific student's performance?
   a) daily
   b) weekly
   c) monthly
   d) annually
   e) never
   f) other (please specify)

16) How helpful is reviewing graphed student performance data in planning your instruction?
   a) Always
   b) Almost always
   c) Usually
   d) Sometimes
   e) Never
   f) I do not do it
   g) Other reason(s) (please specify)

17) If you do not graph the student progress data, why not?
   a) it is not necessary
   b) it is too time consuming
   c) I don't know how
   d) it is too difficult to interpret
   e) I don't have the materials
   f) it is too difficult to implement
   g) other reason(s)

18) How often do you review ungraphed student performance data to make instructional decisions when you evaluate your average student's performance?
   a) daily
   b) weekly
   c) monthly
   d) annually
   e) never
   f) other (please specify)

19) How helpful is reviewing ungraphed student performance data in planning your instruction?
   a) Always
   b) Almost always
   c) Usually
   d) Sometimes
   e) Never
   f) I do not do it

20) When you evaluate your specific student's performance do you use specific guidelines for deciding:
   a) When the student has met the objective?
      i) yes
      ii) no
   b) How long to wait before making any changes?
      i) yes
      ii) no
   c) When to change to an easier step?
      i) yes
      ii) no
   d) When to change to a harder step?
      i) yes
      ii) no
   e) When to change instructional procedure?
      i) yes
      ii) no

21) If you do not use specific guidelines in analyzing the student progress data, why not?
   a) it is not necessary
   b) it is too time consuming
   c) I don't know how
   d) it is too difficult to interpret
   e) I don't have the materials
   f) it is too difficult to implement
   g) other reason(s) (specify)

22) Which of the following judgment aids do you use in analyzing the student progress data? (circle all that apply)
   a) aim line
   b) trend line
   c) variability guidelines
   d) mean (average)
   e) other (specify)
   f) I do not use judgment aids

23) If you do not use judgment aids in analyzing the student progress data, why not?
   a) it is not necessary
   b) it is too time consuming
   c) I don't know how
   d) it is too difficult to interpret
   e) I don't have the materials
   f) it is too difficult to implement
   g) other reason(s) (specify)

The remaining questions focus on alternative assessments as required in IDEA 97

24) How familiar are you with Michigan's Special Education Outcomes (Guides or Assessments)?
   a) Have used them
   b) Very familiar
   c) Some what familiar
   d) Not aware of the outcomes

25) How familiar are you with the material calls Addressing Unique Educational Needs (AUEN)?
   a) Have used them
   b) Very familiar
   c) Some what familiar
   d) Not aware of AUEN

26) Does your school district currently have any performance standards for special education?
   a) Yes
   b) No
   c) Not sure

27) If your district has performance standards, how familiar are you with the standards for your students?
   a) Have used them
   b) Very familiar
   c) Some what familiar
   d) Not aware of the standards

28) If your district does not currently use an alternative assessment instrument, does your school district plan to develop an alternative to the MEAP assessment for special education students?
   a) Yes
   b) No
   c) Not sure

29) Do you expect the Michigan Department of Education to develop an alternative assessment to the MEAP for Special Education?
   a) Yes
   b) No

30) About what percentage of your students could take the MEAP assessment?
   a) 80 - 100%
   b) 60 - 80%
   c) 40 - 60%
   d) 20 - 40%
   e) 0 - 20%

31) About what percentage of your students who are capable of taking the MEAP, actually take the assessment?
   a) 80 - 100%
   b) 60 - 80%
   c) 40 - 60%
   d) 20 - 40%
   e) 0 - 20%

32) About what percentage of your students would take an alternative assessment instead of the MEAP?
   a) 80 - 100%
   b) 60 - 80%
   c) 40 - 60%
   d) 20 - 40%
   e) 0 - 20%

Appendix C

Teacher and Focus Group Participant Recruitment Flyers

Participants Needed for Research Study

Focus Group

Purpose:

A focus group will be created of 3-5 special educators. This group will provide input on possible ways to encourage the utilization of data-based decision rules. Data-based decision rules provide guidelines, helping the educator in deciding to continue with current instructional strategies or to modify instruction to meet student needs. Instructional decisions based on student progress are considered a component of quality practice. After interventions to increase decision rule utilization with another participant group, the focus group will meet to provide social validation of the research intervention strategies and outcomes.

Research Procedure:

- Written questions will be provided to the focus group participants prior to the focus sessions.
- The focus group sessions will be structured so that a facilitator will read a question and ask the group to respond.
- Responses will be recorded.

Benefits:

- Better understanding of performance improvement process
- Stakeholder in the design of interventions to improve instruction
- Improve the quality of this research project

Requirements:

To become a involved in this research project the participant will need to:

- Be written in an IEP as person responsible for monitoring student progress
- Meet once in October 1997 for 1 hour session
- Meet once in May 1998 for 1 hour session

If you have you like to take part in this research or if you have further questions please contact Steve Goodman at ext. 353

Participants Needed for Research Study

Implementing data-based decision rules

Purpose:

To evaluate training and interventions based functional assessment in improving the utilization of data-based instruction. Data-based decision rules provide guidelines, helping the educator in deciding to continue with current instructional strategies or to modify instruction to meet student needs. Instructional decisions based on student progress is considered a component of quality practice.

Procedure:

- A confidential interview will be conducted with research participants to identify barriers to the use of data-based decision rules
- A one-hour training session will be presented on the techniques of data-based decision rules.
- The remainder of the research will involve arranging the work environment to support the use of data-based decision rules. This might include providing one or more of the following: information, feedback, training, tools, resources or incentives. Performance improvement interventions will be based on the results of the functional assessment.

Benefits:

- Better understand of skills acquisition technology
- Training manual with data collection sheets as well as job aides describing data-based decision rules
- Improved teaching effectiveness
- Increased student learning

Requirements:

To become a involved in this research project the participant will need to:

- Be a classroom teacher
- Attend a 1 hour training session
- Share information of instructional procedures
- Be observed while working on IEP objectives of two your students
- Participate in research project for approximately 6 months

If you have you like to take part in this research or if you have further questions please contact Steve Goodman at ext. 353

Appendix D

Informed Consent Forms

Western Michigan University
Department of Psychology

Title of Research: "A comparison of interventions based on functional assessment with training for improving teachers' use of data-based instruction"

Principal Investigator: R. Wayne Fuqua, Ph.D.

Student Investigator: Steve Goodman

Informed Consent Form for Focus Group Participation

This letter is written to ask for your permission to participate in a research study. We are investigating the effects of a training procedure and nontraining strategies to improve staff performance in implementing data-based instruction. A focus group will be created of 3-5 special educators. The focus group will meet monthly, for 30 minute sessions (each). The first meeting will take place from January, 1998 to May, 1998. The focus group will provide input to the possible causes for infrequent utilization of data-based decision rules by special educators. The focus group will then provide possible interventions to increase the use of decision rules.

The final meeting will occur in May 1998 after the intervention of the decision rule utilization group. The group will meet to provide social validation of the research intervention strategies and outcomes. The sessions will take place at the Ottawa Area Center.

Written questions will be provided to the focus group participants prior to the focus sessions. The focus group sessions will be structured so that a facilitator will read a question and ask the group to respond. Focus group discussions will be recorded on cassette tape for later transcribed documentation of responses. After the written documentation, the tape will be erased. The written responses will not contain names or other information that identify the participant. Any sharing of the responses from focus group discussions will not identify the individuals who made the specific comments.

As in all research, there may be unforseen risks to the participant. If an accidentital injury occurs, appropriate emergency measures will be taken; however, no compensation or additional treatment will be made available to you except as otherwise stated in this consent form.

Any information obtained in this study will be confidential to the experimenters. The information collected will not become part of the employee records and will not be used for the school's individual employee evaluations. Western Michigan University and Human Subject Institutional Review Board policies require that the data obtained in this experiment be retained for three years before destroying it.

By signing this informed consent document, you give permission for the data to be used in scientific presentations and publications. All identifying information will be removed from any written report of this research project.

Participation is voluntary; your decision will not in any way prejudice or effect your employment with the school system. Participation can be discontinued at any time without effecting your employment status. It is strongly recommended that the commitment will be for the entire study.

You may refuse to participate or quite at any time during the study without prejudice or penalty. If you have any questions or concerns about this study, you may contact either Wayne Fuqua at (616) 387-8309 or Steve Goodman at (800) 400-4422 ext. 353. You may also contact the Chair of Human Subjects Institutional Review Board at (616) 387-8293 or the Vice President for Research at (616) 387-8298 with any concerns that you have. Your signature below indicates that you understand the purpose and requirements of the study and agree to participate.

_____ _____

Signature Date

Western Michigan University
Department of Psychology

Title of Research: "A comparison of interventions based on functional assessment with training for improving teachers' use of data-based instruction"

Principal Investigator: R. Wayne Fuqua, Ph.D.

Student Investigator: Steve Goodman

Informed Consent Form for Decision Rules Utilization

This letter is written to ask for your permission to participate in a research study. We are investigating the effects of a training procedure and nontraining strategies to improve staff performance in data-based instruction. This research project should take place for approximately 6 months. During this time, a confidential interview will be conducted with research participants to identify barriers to the use of data-based decision rules. Interviews will take place in private. Information you provide will be recorded in written form.

A one-hour training session will be presented on the techniques of data-based decision rules. The remainder of the research will involve arranging the work environment to support the use of data-based decision rules. This might include providing one or more of the following: information, feedback, training, tools, resources or incentives. Performance improvement interventions will be based on the results of the functional assessment. You will be asked to share the documentation you collect concerning student IEP objectives. You will also be observed during instructional sessions with your students. You may want your performance data shared with a supervisor. This would only take place if agreed to do so. The shared information would remain confidential between you and your supervisor.

Any information obtained in this study will be confidential to the experimenters. The information collected will not become part of the employee records and will not be used for the school's individual employee evaluations. Western Michigan University and Human Subject Institutional Review Board policies require that the data obtained in this experiment be retained for three years before destroying it.

By signing this informed consent document, you give permission for the data to be used in scientific presentations and publications. All identifying information will be removed from any written report of this research project.

Participation is voluntary; your decision will not in any way prejudice or effect your employment with the school system. Participation can be discontinued at any time without effecting your employment status. It is strongly recommended that the commitment will be for the entire study.

You may refuse to participate or quit at any time during the study without prejudice or penalty. If you have any questions or concerns about this study, you may contact either Wayne Fuqua at (616) 387-8309 or Steve Goodman at (800) 400-4422 ext. 353. You may also contact the Chair of Human Subjects Institutional Review Board at (616) 387-8293 or the Vice President for Research at (616) 387-8298 with any concerns that you have. Your signature below indicates that you understand the purpose and requirements of the study and agree to participate.

_____ _____

Signature Date

Western Michigan University
Department of Psychology

Title of Research: "A comparison of interventions based on functional assessment with training for improving teachers' use of data-based instruction"

Principal Investigator: R. Wayne Fuqua, Ph.D.

Student Investigator: Steve Goodman

Informed Consent Form for Student Participation

This letter is written to ask permission for your son/daughter to participate in a research study. We are investigating the effects of procedures to improve instruction. This research project should take place for approximately 6 months. During this time, the teacher will be monitoring your child's progress on Individualized Educational Program (IEP) objectives. Changes will be made to instruction based on your child's progress.

Past research in this area has demonstrated improved student learning by modifying instruction based on student performance. However, no guarantees can be made that each student will improve his or her learning based on the experimental procedures. Participation in this project will not involve changes in educational placement or Individualized Educational Program. The teacher will be asked to share information on instructional procedures regarding your child's educational programming. Additionally, the researcher will observe instruction within the classroom. Your child's progress will be documented. The only risks anticipated are the possible disruption of instruction by an observer. The observer will try minimize any disruptions during the observation period.

Any information obtained in this study will be confidential to the experimenters. By signing this informed consent document, you give permission for the data to be used in scientific presentations and publications. All identifying information will be removed from any written report of this research project. The policies of Western Michigan University and the Human Subject Institutional Review Board require that data collected in this experiment be retained for three years before destroying it

Participation is voluntary; your decision will not in any way prejudice or effect your child's involvement with the school system. Participation can be discontinued at any time without effecting your child's educational status. It is strongly recommended that the commitment will be for the entire study.

You may refuse to have your son or daughter participate or quit at any time during the study without prejudice or penalty. If you have any questions or concerns about this study, you may contact either Wayne Fuqua at (616) 387-8309 or Steve Goodman at (800) 400-4422 ext. 353. You may also contact the Chair of Human Subjects Institutional Review Board at (616) 387-8293 or the Vice President for Research at (616) 387-8298 with any concerns that I have. Your signature below indicates that you understand the purpose and requirements of the study and agree to participate.

_____
Student name

_____ _____
Parent/guardian Signature Date

Appendix E

Training Satisfaction Questionnaire

Data-Based Decision Rules Training Participant Questionnaire

Name: _____ Date: _____

This form helps in evaluating the Data-Based Decision Rules training. Please circle the appropriate number that best answers the question. All information will remain confidential. Thank you.

1. The information presented during the data-based decision rules training session has relevancy to my work.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

2. The ideas, concepts, etc., were communicated effectively during the training.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

3. This training was helpful with improving student progress on IEP objectives.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

4. I found the data-based training to be interesting.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

5. I now use the information presented in the training.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

6. The materials were helpful in teaching the concepts of data-based decisions

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

7. I plan to use the data based decision model with other students:

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

8. As a result of the training my students have:

Become much worse	Become slightly worse	Not changed	Improved slightly	Improved markedly
1	2	3	4	5

9. Overall, I would rate the training as:

Inferior	Poor	Fair	Good	Excellent
1	2	3	4	5

10. Comments (optional):

Appendix F

Feedback Satisfaction Questionnaire

Feedback Questionnaire

Name: _____ Date: _____

This form helps in evaluating the feedback provided for implementing data-based decision rules. Please circle the appropriate number that best answers the question. All information will remain confidential. Thank you.

1. The feedback was presented in a form that I can understand.

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

2. Feedback on my use of the data-based decisions was presented in a timely manner (i.e., often enough so that I can improve my use of the decision rules).

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

3. The feedback procedure helped me to improve the quality of using the data-based decision model

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

4. I like having feedback in addition to the training rather than simply having the training without feedback

Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1	2	3	4	5

5. As a result of being provided with feedback my students have:

Become much worse	Become slightly worse	Not changed	Improved slightly	Improved markedly
1	2	3	4	5

6. Comments (optional):

Appendix G

Functional Assessment Interview

Questionnaire for Determining Barriers for Implementing Data-Based Instructional Decision Making

Data-based decision rules provide guidelines, helping the educator in deciding to continue with current instructional strategies or to modify instruction to meet student needs. It involves data collected daily on Individualized Education Program (IEP) objectives. Instructors then make biweekly data-based instructional decisions. A minimum of 6 data points is needed to analyze the data trend. A biweekly schedule of data review allows no more than 2 weeks to pass before ineffective instruction is changed. This particular project is concerned only with the acquisition of a new skill. The deceleration of problem behavior or extending performance (generalization or fluency) is not addressed with this component of instruction. Instructional modification based on formative evaluation is considered a component of quality practice.

PROBE Questions
Questions About the Behavioral Environment

Directional Data

1. Are you provided with directions (including standards of good performance) to apply the data-based decision model? (clear-understandable?)

2. If you have tried to implement the data-based decision model, have you been provided with feedback your efforts? (timely-understandable?)

Instrumentation

3. Are you provided with the tools, materials and assistance to help you utilize the data-based decision model? (usable, reliable?)

4. If you do use the data-based decision model, the procedures are easy and efficient?

Motivation

5. Are there non-pay incentives (recognition, and so on) for successful utilization of data-based decision model?

6. If you do receive incentives are they presented often enough?, too often?

7. Are there factors in your work environment that punish the use of data-based decision rules (comments from others, too hard to do, too time consuming)?

Questions About Behavioral Repertoires

Knowledge and Training

8. Do you know what the data-based decision model is and how to employ it?

9. If you do know what the data-based decisions model is, do you feel you know it well enough to implement it successfully?

Capacity

10. Do you feel that you are able to understand the components of data-based decision model?

11. Do you feel that you are able to physically carry out the procedure necessary to implement the data-based decision model?

12. Do you feel that you are free of emotional limitation that would interfere with utilization of data-based decision rules.

Motives

13. Did you feel motivated to implement the data-based decision model prior to beginning this project?

14. Do you continue to feel motivated to implement the data-based decision model?

Appendix H

Focus Group Questions

Focus Group Questions/Coding Sheet (pre-intervention)

Questions:

1. Do you think that special educators assess student performance of frequent enough?

Focus Group Responses:

a) Do you think this is a problem?

Focus Group Responses:

b) Why or why not?

Focus Group Responses:

2. Do you think special educators use data-based decision rules?

Responses:

a) Is this a problem to you if data-based decision is not used?

Focus Group Responses:

b) Why or why not?

Focus Group Responses:

3. What are some ways to address this problem?

Focus Group Responses:

4. What sort of thing will help you to collect/use data and use decision rules? Can you suggest something that would help? (e.g., workshop training, reward system, supervisor review-feedback and praise)

Focus Group Responses:

5. How acceptable are these possible interventions?

Focus Group Responses:

Focus Group Questions/Coding Sheet (post-intervention)

Questions:

1. Do you think that the results of this research project are important concerning improvement of student learning?

Focus Group Responses:

2. Are the interventions employed in this research project practical in the school setting?

Focus Group Responses:

3. Should this school system continue with the interventions applied in this project?

Focus Group Responses:

4. Do you think other schools should implement similar programs to increase the use of data-based decision rules?

Focus Group Responses:

5. What could be done make the interventions from this project more practical?

Focus Group Responses:

Appendix I

Training Manual

Supplemental Training Manual Based on Diane Browder's (1997) Teacher's Handbook for Ongoing Evaluation of Data to Make Instructional Decisions

Table of Contents

What are decision rules?

- ✓ *Guidelines to continue or modify instruction*
- ✓ *Requires data collection with biweekly review*
- ✓ *Summarize data using phase mean and trend analysis*

Data-based decision rules provide guidelines, helping the educator in deciding to continue with current instructional strategies or to modify instruction to meet student needs. This model involves data collected at least three times per week on Individualized Education Program (IEP) objectives. Instructors then make biweekly data-based instructional decisions. A minimum of 6 data points is needed to analyze the data trend. A biweekly schedule of data review allows no more than 2 weeks to pass before ineffective instruction is changed. This particular project is concerned only with the acquisition of a new skill. The deceleration of problem behavior or extending performance (generalization or fluency) is not addressed with this component of instruction. Instructional modification based on formative evaluation is considered a component of quality practice.

Why use data based decision rules?

- ✓ *Browder and colleagues (1989, 1986) found that students of teachers who made rule-based decisions made substantially more progress than those of teachers who did not follow rule-based decisions.*
- ✓ *Haring et al. (1981) study found that teachers were 2.2 times more effective when they followed their decision rules.*
- ✓ *Fuchs and Fuchs (1986) applied a meta-analysis of 21 controlled studies. They found that when teachers employ data decision rules, effects were more desirable as compared to teachers subjective judgments.*
- ✓ *The use of decision rules can save time (Haring et al., 1981).*

Calculating percentage of successful trials

- ✓ *Count the number of independent responses*
- ✓ *Count the number of total learning trials (opportunities to respond)*
- ✓ *Divide the number of independent responses by the total number of opportunities to respond*
- ✓ *Multiply the result by 100*

$$\frac{\text{Number of correct responses}}{\text{Total number of responses}} \times 100 = \text{percent of correct response}$$

OR

On your calculator,

1. - Enter number of independent responses,
2. - Press the divide symbol
3. - Enter total number of opportunities to respond
4. - Press percent key (%)

Example 1.

Behavior: Stack lunch trays

Procedure: Constant time delay

Code: + = Independent

M = Model at 2 second delay

Date	10/5	10/6
Percent successful trials		
5. Stack tray	M	M
4. Wipe tray	+	+
3. Remove dishes	M	M
2. Remove paper	M	+
1. Get tray	+	M
5. Stack tray	+	+
4. Wipe tray	M	M
3. Remove dishes	M	M
2. Remove paper	+	+
1. Get tray	+	+

Example 2.

Behavior: Drink from adaptive cup

Procedure: Graduate guidance

Code: + = Independent

P1 = Shadow hand

P2 = Fingertip guidance

P3 = Hand over hand

Date	10/5	10/6
Percent successful trials		
8. Release grasp	+	+
7. Set on table	P3	+
6. Remove cup	P2	P2
5. Take a sip	+	+
4. Open mouth	P1	P1
3. Put cup to lips	P1	P1
2. Lift cup	P1	P1
1. Grasp cup	P2	P2

Calculating percentage of successful trials

- ✓ Count the number of independent responses
- ✓ Count the number of total learning trials (opportunities to respond)
- ✓ Divide the number of independent responses by the total number of opportunities to respond
- ✓ Multiply the result by 100

$$\frac{\text{Number of correct responses}}{\text{Total number of responses}} \times 100 = \text{percent of correct response}$$

Example 3.

Behavior: Use of money machine

Procedure: Constant time delay

Code: + = Independent

M = Model at 2 second delay

Date	10/5	10/6
Percent successful trials		
15. Take receipt	M	M
14. Take card	+	+
13. Take money	M	M
12. Press "OK"	M	+
11. Press "OK"	+	+
10. Press "0"	+	+
9. Press "1"	+	+
8. Press "Checking"	M	+
7. Press "Withdraw"	M	+
6. Press "OK"	+	M
5. Press "2"	+	+
4. Press "6"	M	M
3. Press "6"	M	M
2. Press "3"	+	+
1. Put card in	+	+

Example 4.

Behavior: Stuff envelopes

Procedure: System of least prompts

Code: + = Independent

V = Verbal

G = Gesture

M = Model

P = Physical guidance

Date	10/5	10/6
Percent successful trials		
6. Place in bin	V	+
5. Close envelope	+	V
4. Insert paper	V	V
3. Pick up paper	+	M
2. Open envelope	M	P
1. Pick up envelope	V	V
6. Place in bin	+	+
5. Close envelope	+	+
4. Insert paper	V	V
3. Pick up paper	+	+
2. Open envelope	+	+
1. Pick up envelope	V	P

Graphing data

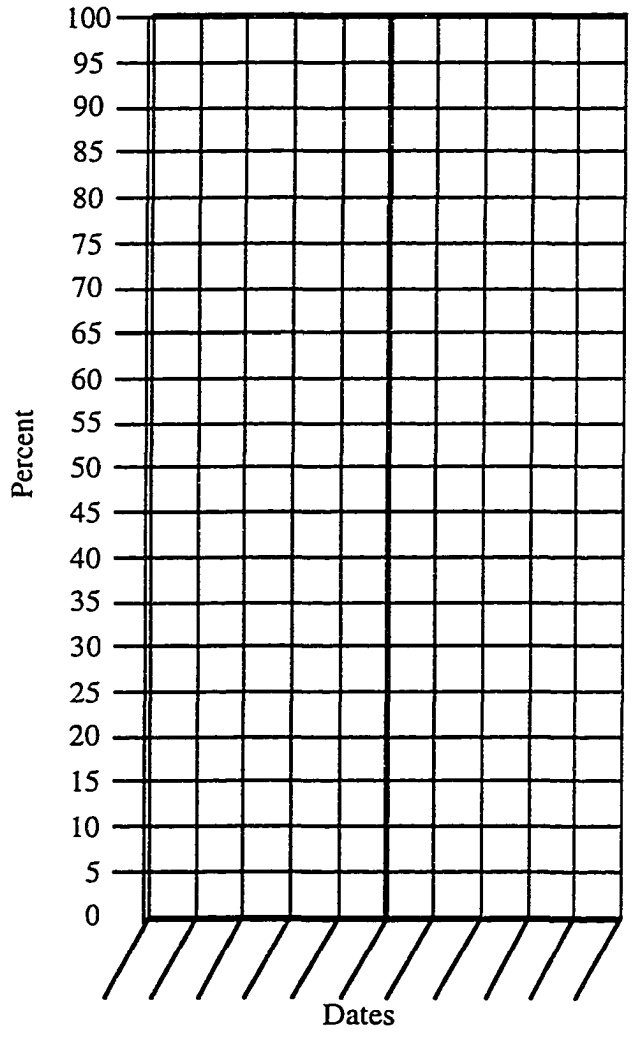
- ✓ *Write the date(s) across the bottom axis.*
- ✓ *Calculate the percent of successful trials for the date.*
- ✓ *Mark a small, closed circle on the graph line that corresponds with this count.*
- ✓ *Connect these dots across days by using a ruler.*

If the criteria for mastery is less than 100 percent, draw a horizontal line across the top of the graph at the level of mastery (e.g., 90%). If major disruptions in the schedule or the student's problem behavior prevent opportunities to respond, record "no opp" (no opportunity to collect data) at the bottom of the graph. To indicate program modifications such as new prompting or reinforcement procedures, draw a dashed vertical line at the date where the program has been changed.

Example #1.

Graph the following data.

Date	Percent
10/3	no opportunity
10/4	50
10/5	60
10/6	60
10/7	90
10/10	80
10/11	100
10/12	100
10/13	100
10/14	90



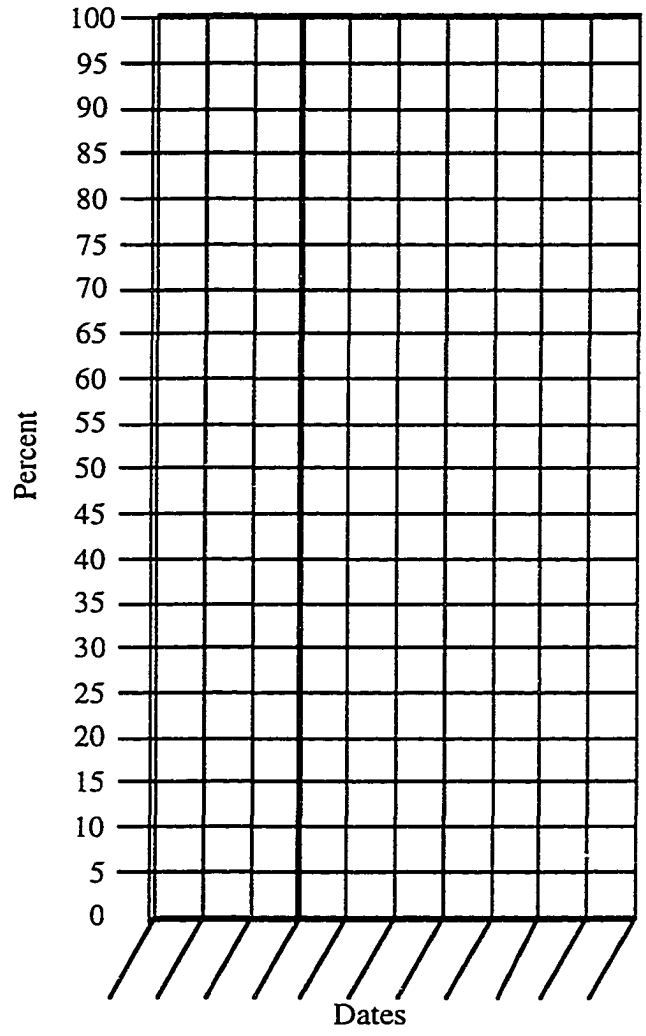
Graphing data

- ✓ *Write the date(s) across the bottom axis.*
- ✓ *Calculate the percent of successful trials for the date.*
- ✓ *Mark a small, closed circle on the graph line that corresponds with this count.*
- ✓ *Connect these dots across days by using a ruler.*

Example #2.

Graph the following data.

Date	Percent
10/3	33
10/4	20
10/5	no opportunity
10/6	25
10/7	12
10/10	no opportunity
10/11	no opportunity
10/12	20
10/13	7
10/14	27



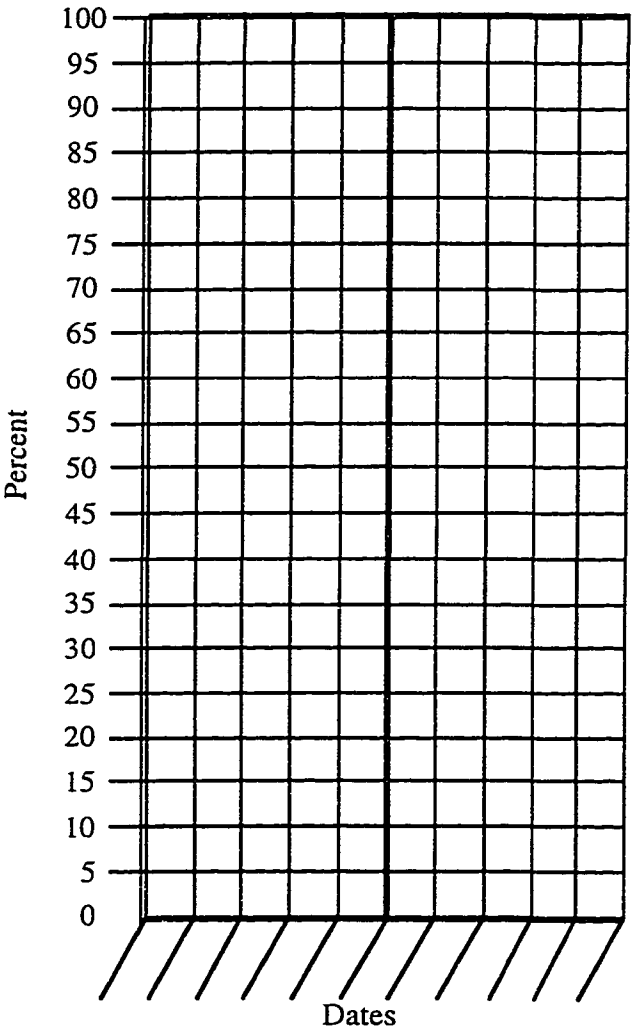
Graphing data

- ✓ *Write the date(s) across the bottom axis.*
- ✓ *Calculate the percent of successful trials for the date.*
- ✓ *Mark a small, closed circle on the graph line that corresponds with this count.*
- ✓ *Connect these dots across days by using a ruler.*

Example #3.

Graph the following data.

Date	Percent
10/3	80
10/4	no opportunity
10/5	60
10/6	70
10/7	40
10/10	60
10/11	40
10/12	no opportunity
10/13	60
10/14	30



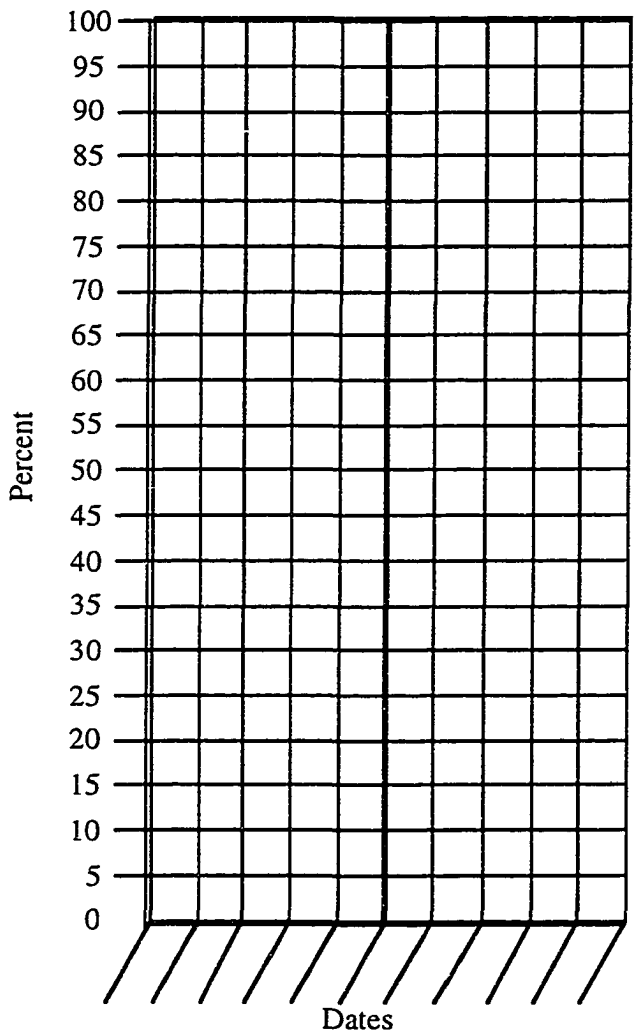
Graphing data

- ✓ *Write the date(s) across the bottom axis.*
- ✓ *Calculate the percent of successful trials for the date.*
- ✓ *Mark a small, closed circle on the graph line that corresponds with this count.*
- ✓ *Connect these dots across days by using a ruler.*

Example #4.

Graph the following data.

Date	Percent
10/3	30
10/4	46
10/5	38
10/6	62
10/7	no opportunity
10/10	69
10/11	46
10/12	62
10/13	no opportunity
10/14	74

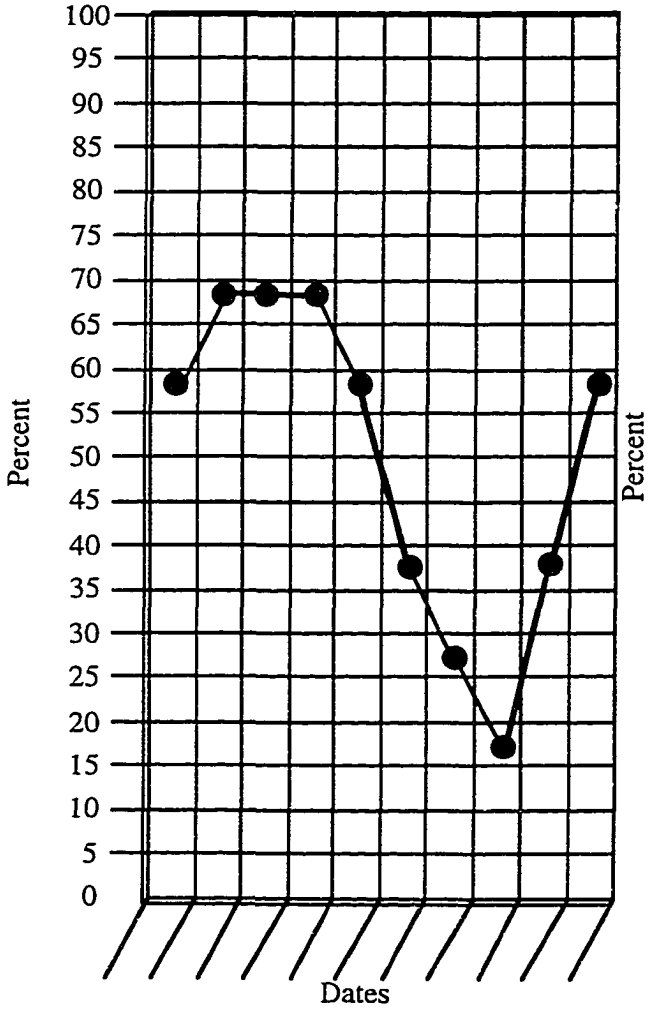


Trend analysis

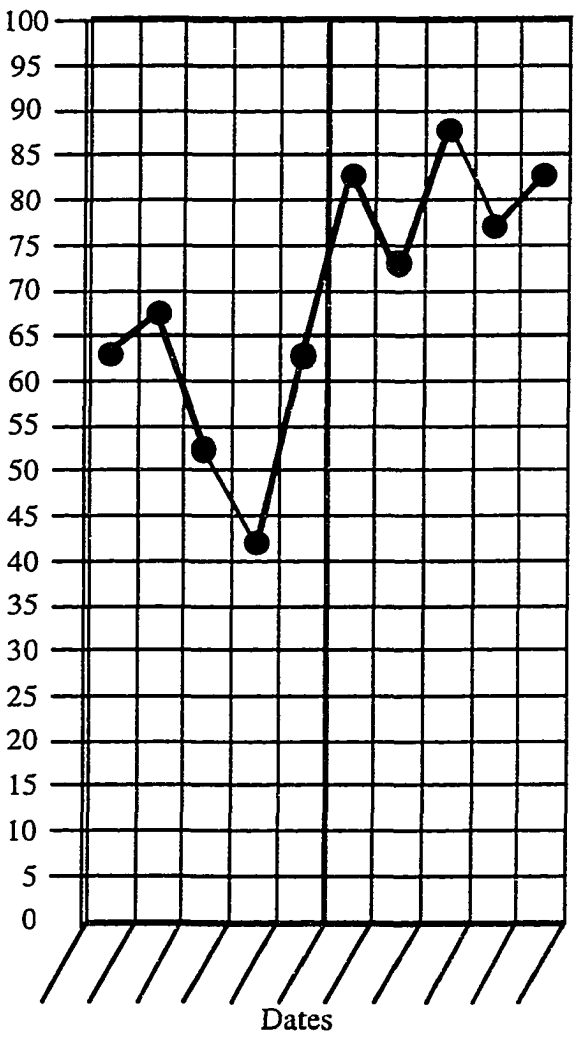
- ✓ *Find the mid-day of first 3 days*
- ✓ *Find the mid-level of first 3 days (When 2 are the same that is the middle)*
- ✓ *Mark an "X" at the intersection of the mid day and mid level*
- ✓ *Fine the mid-day of last 3 days*
- ✓ *Find the mid-level of last 3 days (When 2 are the same that is the middle)*
- ✓ *Mark an "X" at the intersection of the mid day and mid level*
- ✓ *Connect the intersections (the "x")*

The trend should be drawn for a series of no more than 10 points and for a period of two weeks. If you neglected to do a trend and now have a month of data (e.g., 20 points) evaluate the last two weeks' trend. Do not reuse the data points from a previous period to get sufficient data. This data is probably too infrequent to give you an accurate picture of the student's performance. The trend line will be **accelerating** (going up from left to right), **decelerating** (going down from left to right) of **level** (flat).

Example #1.



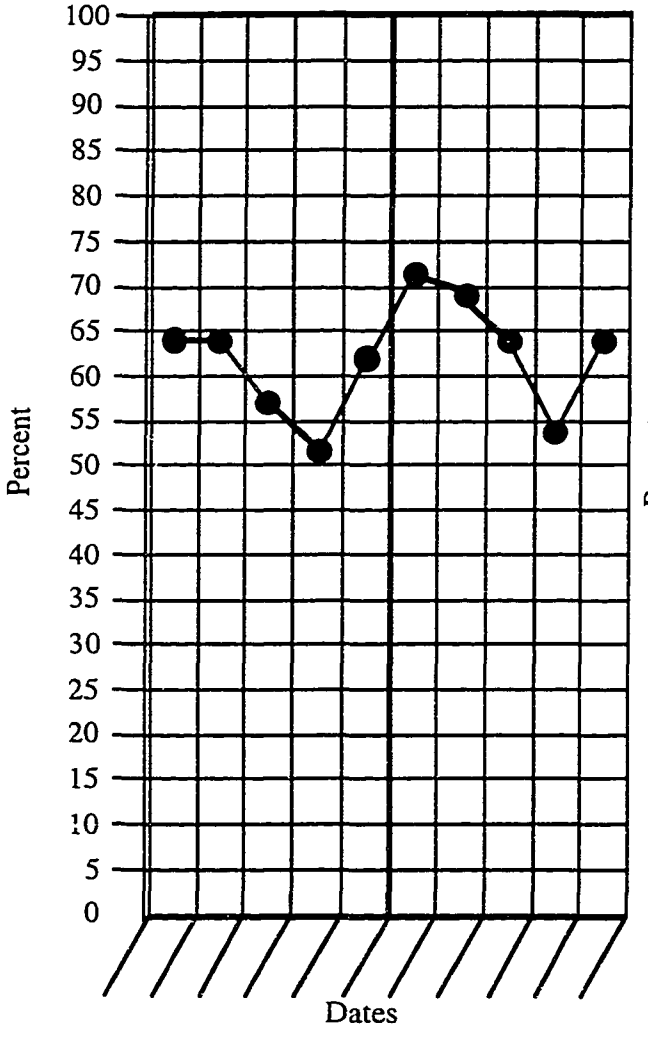
Example #2.



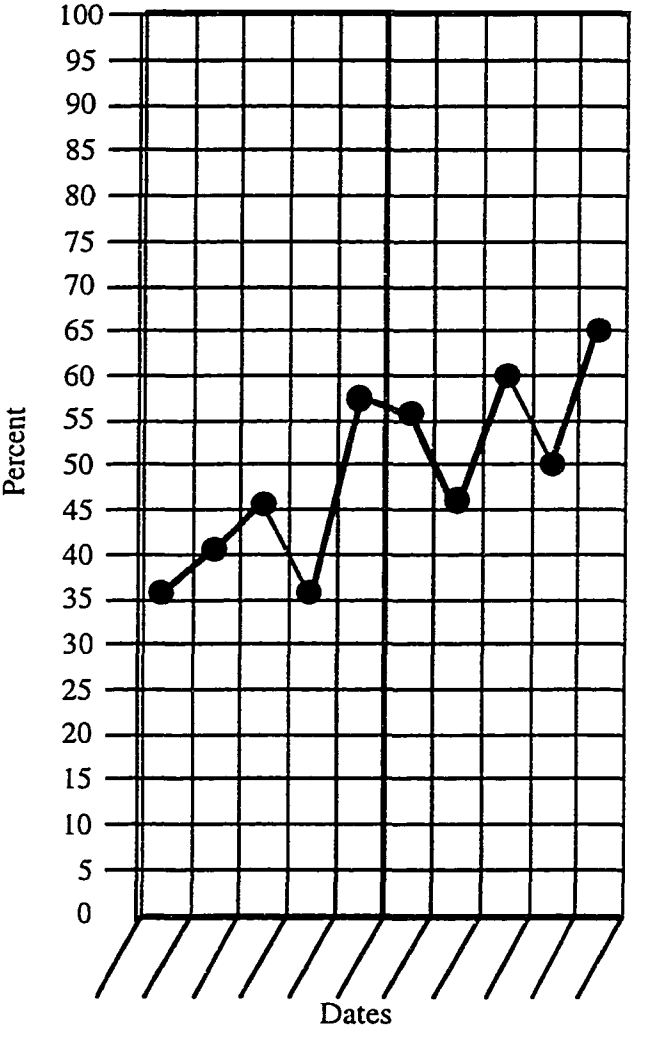
Trend analysis

- ✓ *Find the mid-day of first 3 days*
- ✓ *Find the mid-level of first 3 days (When 2 are the same that is the middle)*
- ✓ *Mark an "X" at the intersection of the mid day and mid level*
- ✓ *Fine the mid-day of last 3 days*
- ✓ *Find the mid-level of last 3 days (When 2 are the same that is the middle)*
- ✓ *Mark an "X" at the intersection of the mid day and mid level*
- ✓ *Connect the intersections (the "x"s)*

Example #3. *Draw the trendline*

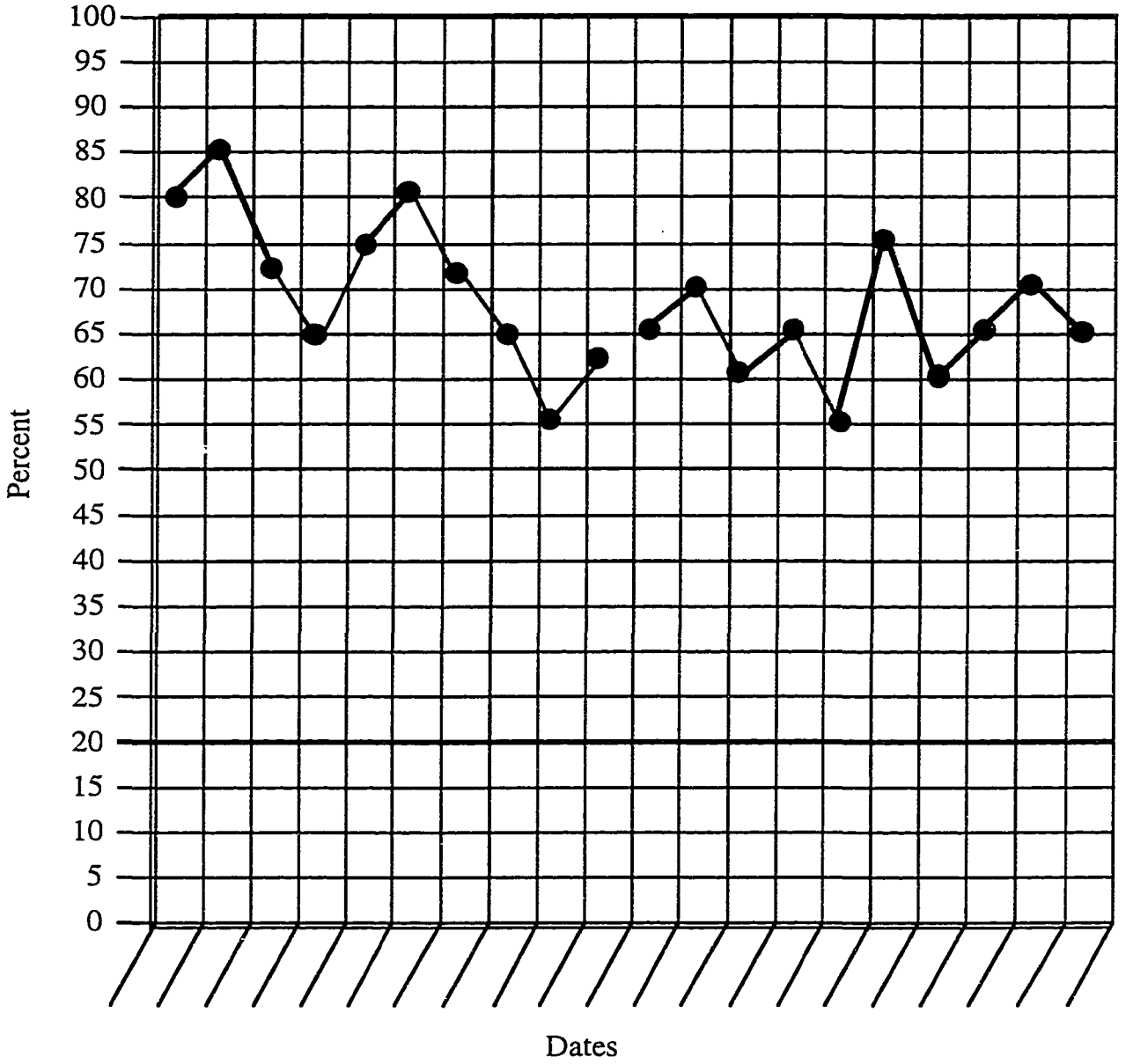


Example #4. *Draw the trendlins*



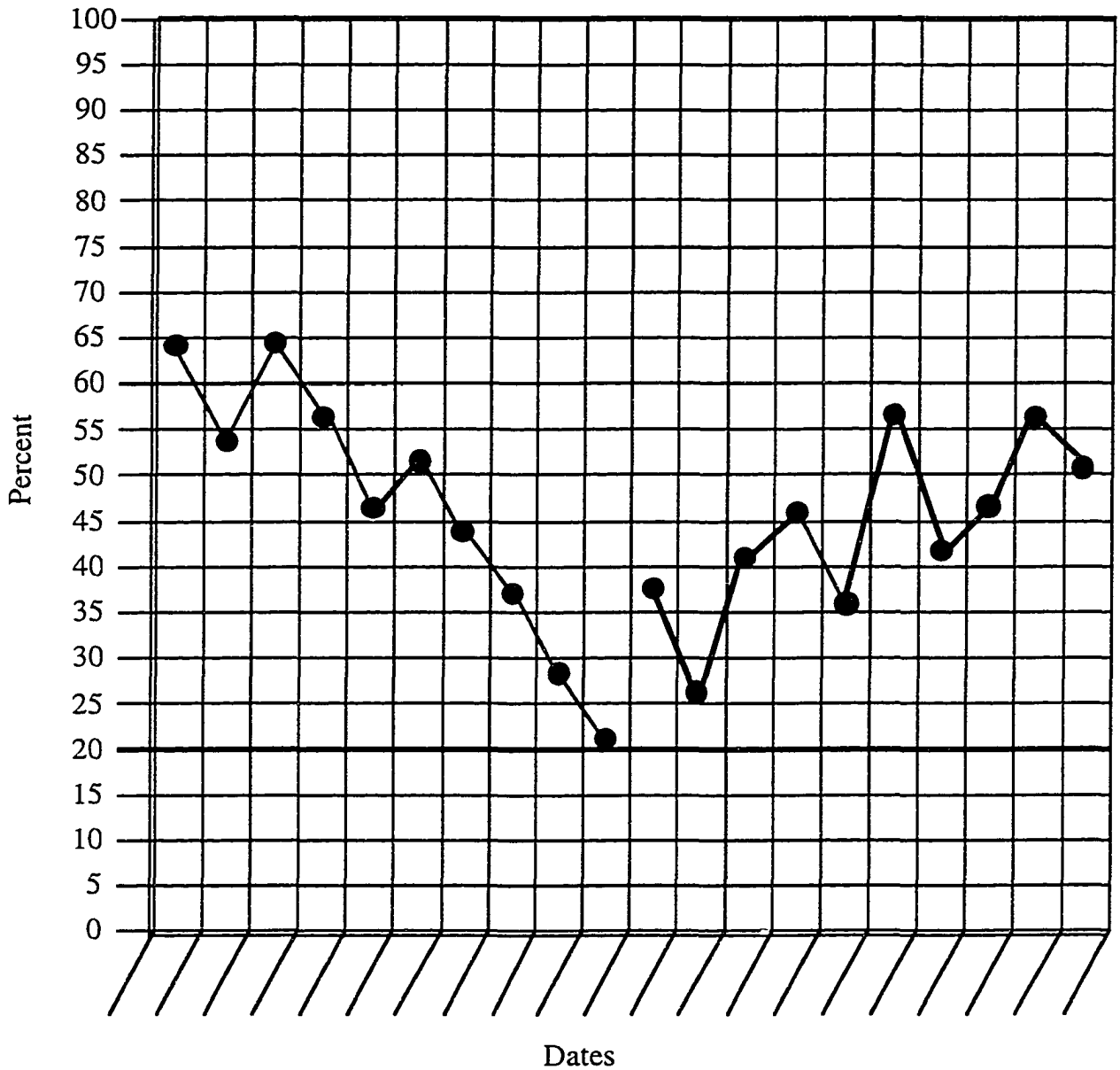
Trend analysis

Example #5 *Draw the trendline*



Trend analysis

Example #6. Draw the trendline.



Calculating mean for review period

- ✓ *Add the numerical value of the percent successful trials for all days in the period.*
- ✓ *Divide by the number of days- use all days that data were collected, not just the six points used for trend review.*
- ✓ *When you compare the current mean to the mean of the previous period of review, it will be either higher, lower, or the same.*

Example 1. *Calculate the mean for the review period*

Previous Mean 38%	**1st review period mean** _____%					
Date	10/3	10/4	10/5	10/6	10/7	10/10
Percent successful trials	10%	20%	40%	30%	50%	40%
Make request	P	P	P	P	P	P
Make request	P	P	+	P	P	P
Make request	P	P	P	P	+	P
Make request	P	P	P	P	P	P
Make request	P	P	P	+	+	P
Make request	P	+	P	+	+	+
Make request	P	+	P	+	P	+
Make request	P	P	+	P	+	+
Make request	P	P	+	P	P	+
Make request	+	P	+	P	+	P
Task or Opportunity to Respond						

Calculating mean for review period

- ✓ *Add the numerical value of the percent successful trials for all days in the period.*
- ✓ *Divide by the number of days- use all days that data were collected, not just the six points used for trend review.*
- ✓ *When you compare the current mean to the mean of the previous period of review, it will be either higher, lower, or the same.*

Example 2. *Calculate the mean for the review period*

Previous Mean 16.5%	**1st review period mean _____%**									
Date	10/3	10/4	10/5	10/6	10/7	10/10	10/11	10/12	10/13	10/14
Percent successful trials (%)	37.5	25	25	25	/	25	37.5	12.5	50	/
CLEAN-UP										
4. Release bag	P	V	V	P		V	+	V	G	
3. Walk to trash can	+	P	P	G		G	P	P	+	
2. Carry bag	G	V	V	G		P	V	G	G	
1. Grasp trash bag	+	+	+	G	*n*	+	+	V	+	*n*
WORK PREP					*o*					*o*
4. Release box	P	P	P	+		P	G	G	+	
3. Walk to table	P	G	P	G	*o*	V	V	V	V	*o*
2. Carry box	P	P	P	P	*p*	P	G	G	G	*p*
1. Grasp box	+	+	+	+	*p*	+	+	+	+	*p*
Task or Opportunity to Respond										

Calculating mean for review period

- ✓ *Add the numerical value of the percent successful trials for all days in the period.*
- ✓ *Divide by the number of days- use all days that data were collected, not just the six points used for trend review.*
- ✓ *When you compare the current mean to the mean of the previous period of review, it will be either higher, lower, or the same.*

Example 3. *Calculate the mean for the review period*

Previous Mean 22%	**1st review period mean _____%**									
Date	10/3	10/4	10/5	10/6	10/7	10/10	10/11	10/12	10/13	10/14
Percent successful trials (%)	33.3	/	25	25	16.7	/	25	/	41.7	41.7
12. Hangs up coat	G		G	G	V		G		G	+
11. Requests help finding hook	V		+	G	P		G		G	G
10. Takes off coat	+		G	+	G		G		+	+
9. Puts away lunch box	P		P	G	P		+		G	+
8. Walks to classroom	+		P	G	P		P		+	P
7. Enters building	G		V	G	V		V		G	G
6. Requests help with door	+	*n*	+	G	+	*n*	+	*n*	+	V
5. Walks to building entry	V	*o*	V	V	V	*o*	V	*o*	V	+
4. Exits bus	P		P	+	P		G		+	G
3. Picks up lunchbox	P	*o*	P	G	G	*o*	V	*o*	V	V
2. Walks down aisle	P	*p*	P	P	P	*p*	G	*p*	G	G
1. Requests help w/seatbelt	+	*p*	+	+	+	*p*	+	*p*	+	+
Task or Opportunity to Respond										

Calculating mean for review period

- ✓ *Add the numerical value of the percent successful trials for all days in the period.*
- ✓ *Divide by the number of days- use all days that data were collected, not just the six points used for trend review.*
- ✓ *When you compare the current mean to the mean of the previous period of review, it will be either higher, lower, or the same.*

Example 4. *Calculate the mean for the review period*

Previous Mean 61%	**1st review period mean _____%**									
Date	10/3	10/4	10/5	10/6	10/7	10/10	10/11	10/12	10/13	10/14
Percent successful trials (%)	50	50	50	63	/	75	50	63	88	/
CLEAN-UP										
4. Release bag	P	+	+	+		+	+	+	+	
3. Walk to trash can	+	+	P	G		G	P	+	+	
2. Carry bag	G	V	V	+		+	V	G	G	
1. Grasp trash bag	+	+	+	+	*n*	+	+	+	+	*n*
WORK PREP					*o*					*o*
4. Release box	P	P	P	+		+	G	+	+	
3. Walk to table	+	G	+	G	*o*	+	+	V	+	*o*
2. Carry box	P	P	P	P	*p*	P	G	G	+	*p*
1. Grasp box	+	+	+	+	*p*	+	+	+	+	*p*
Task or Opportunity to Respond										

Calculating mean for review period

- ✓ *Add the numerical value of the percent successful trials for all days in the period.*
- ✓ *Divide by the number of days- use all days that data were collected, not just the six points used for trend review.*
- ✓ *When you compare the current mean to the mean of the previous period of review, it will be either higher, lower, or the same.*

Example 4. *Calculate the mean for the review period*

Previous Mean 38%	**1st review period mean _____%**									
Date	10/3	10/4	10/5	10/6	10/7	10/10	10/11	10/12	10/13	10/14
Percent successful trials (%)	37.5	25	25	25	/	25	37.5	12.5	50	/
CLEAN-UP										
4. Release bag	P	V	V	P		V	+	V	G	
3. Walk to trash can	+	P	P	G		G	P	P	+	
2. Carry bag	G	V	V	G		P	V	G	G	
1. Grasp trash bag	+	+	+	G	*n*	+	+	V	+	*n*
WORK PREP					*o*					*o*
4. Release box	P	P	P	+		P	G	G	+	
3. Walk to table	P	G	P	G	*o*	V	V	V	V	*o*
2. Carry box	P	P	P	P	*p*	P	G	G	G	*p*
1. Grasp box	+	+	+	+	*p*	+	+	+	+	*p*
Task or Opportunity to Respond										

Calculating magnitude of change

To evaluate the magnitude of change, there are three possible results of comparing the mean of the previous review period (previous mean) with the mean of the current review period (current mean):

- ✓ *Current mean is less the previous mean*
- ✓ *Current mean is the same as the previous mean*
- ✓ *Current mean is higher than previous mean*

Compare the means below and check the statement that correctly defines the relationship between the previous and current means.

Example 1.

Previous mean = 39%

Current mean = 30%

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean

Example 2.

Previous mean = 43%

Current mean = 51%

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean

Example 3.

Previous mean = 72%

Current mean = 72%

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean

Example 4.

Previous mean = 22%

Current mean = 26%

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean

Calculating magnitude of change

Now consider the relationship of the current mean higher than the previous mean. To use the decision rules it is important to break down this relationship into two possibilities: 1) the current mean is higher than 5% or more **OR** 2) the current mean is higher by less than 5%. To determine this relationship, do the following calculations.

✓ *Multiply previous mean by .05 (5%)*

✓ *Add the amount above (5%) to previous mean*

✓ *Compare the mean for the current review period with previous mean added with 5%.*

Example 5.

Previous mean = **50%**

Current mean = 58%

1. Multiply previous mean by .05 (5%)

```
  50
x .05
 2.5
```

2. Add the above sum to the previous mean.

```
  50
+ 2.5
 52.5
```

3. Compare the mean for the current review period with previous mean.

Previous mean = 50%

Previous mean (+5%) = **52.5%**

Current mean = 58%

Check one of the following statements:

- ☐ Current mean is less than the previous mean
- ☐ Current mean is the same as the previous mean
- ☐ Current mean is higher than previous mean, but **not** by 5%
- ☐ Current mean is higher than previous mean by 5% **or** more

Example 6.

Previous mean = **66%**

Current mean = 68%

1. Multiply previous mean by .05 (5%)

```
  66
x .05
```

2. Add the above sum to the previous mean.

```
  66
+ ___
```

3. Compare the mean for the current review period with previous mean.

Previous mean = 66%

Previous mean (+5%) = _____

Current mean = 68%

Check one of the following statements:

- ☐ Current mean is less than the previous mean
- ☐ Current mean is the same as the previous mean
- ☐ Current mean is higher than previous mean, but **not** by 5%
- ☐ Current mean is higher than previous mean by 5% **or** more

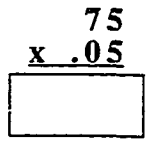
Calculating magnitude of change

Example 7.

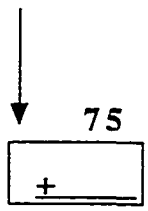
Previous mean = **75%**

Current mean = 77%

1. Multiply previous mean by .05 (5%)



2. Add the above sum to the previous mean.



3. Compare the mean for the current review period with previous mean.

Previous mean = 75%

Previous mean (+5%) = _____

Current mean = 77%

Check one of the following statements:

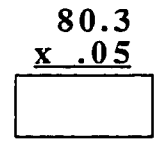
- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 8.

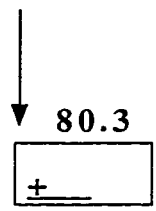
Previous mean = **80.3%**

Current mean = 83.5%

1. Multiply previous mean by .05 (5%)



2. Add the above sum to the previous mean.



3. Compare the mean for the current review period with previous mean.

Previous mean = 80.3%

Previous mean (+5%) = _____

Current mean = 83.5%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Calculating magnitude of change

Example 9.

Previous mean = 15%

Current mean = 20%

1. Multiply previous mean by .05 (5%)

2. Add the above sum to the previous mean.

3. Compare the mean for the current review period with previous mean.

Previous mean = 15%

Previous mean (+5%) = _____

Current mean = 20%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 10.

Previous mean = 54%

Current mean = 56%

1. Multiply previous mean by .05 (5%)

2. Add the above sum to the previous mean.

3. Compare the mean for the current review period with previous mean.

Previous mean = 54%

Previous mean (+5%) = _____

Current mean = 56%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Calculating magnitude of change

Example 11.

Previous mean = 20.6%

Current mean = 22.4%

1. Multiply previous mean by .05 (5%)

2. Add the above sum to the previous mean.

3. Compare the mean for the current review period with previous mean.

Previous mean	=	20.6%
Previous mean (+5%)	=	_____
Current mean	=	22.4%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 12.

Previous mean = 30%

Current mean = 31.5%

1. Multiply previous mean by .05 (5%)

2. Add the above sum to the previous mean.

3. Compare the mean for the current review period with previous mean.

Previous mean	=	30%
Previous mean (+5%)	=	_____
Current mean	=	31.5%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Calculating magnitude of change

Example 13.

Previous mean = 33.6%

Current mean = 33.6%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 14.

Previous mean = 17.6%

Current mean = 18.3%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 15.

Previous mean = 11.5%

Current mean = 14.2%

Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Example 16.

Previous mean = 66.7%

Current mean = 71.7%

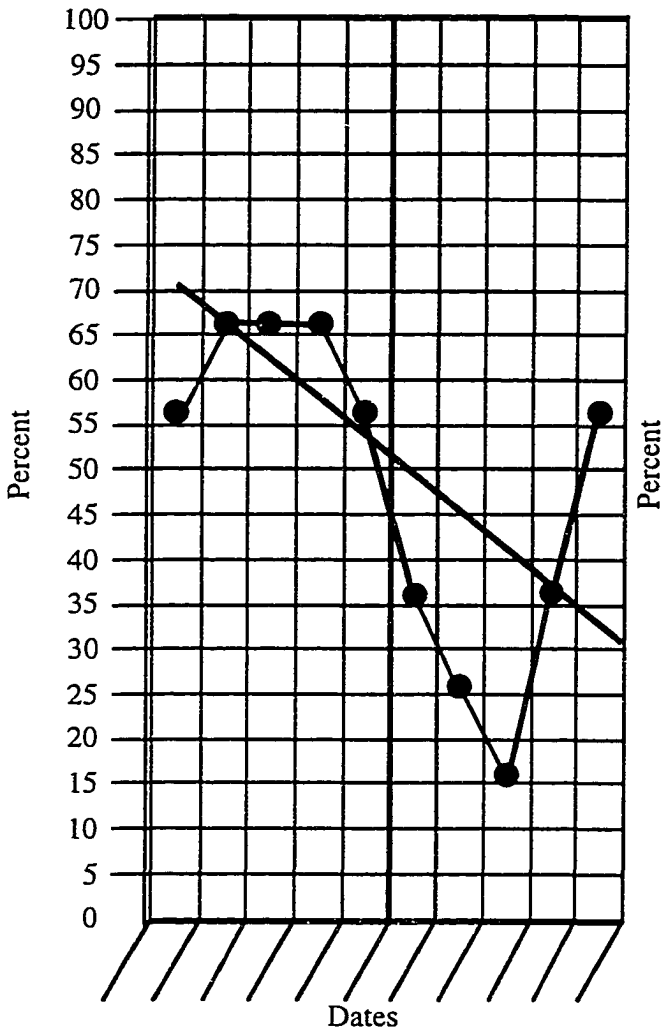
Check one of the following statements:

- ❑ Current mean is less than the previous mean
- ❑ Current mean is the same as the previous mean
- ❑ Current mean is higher than previous mean, but **not** by 5%
- ❑ Current mean is higher than previous mean by 5% **or** more

Decision Rules

Apply the decision rules to the following examples.

Example #1.



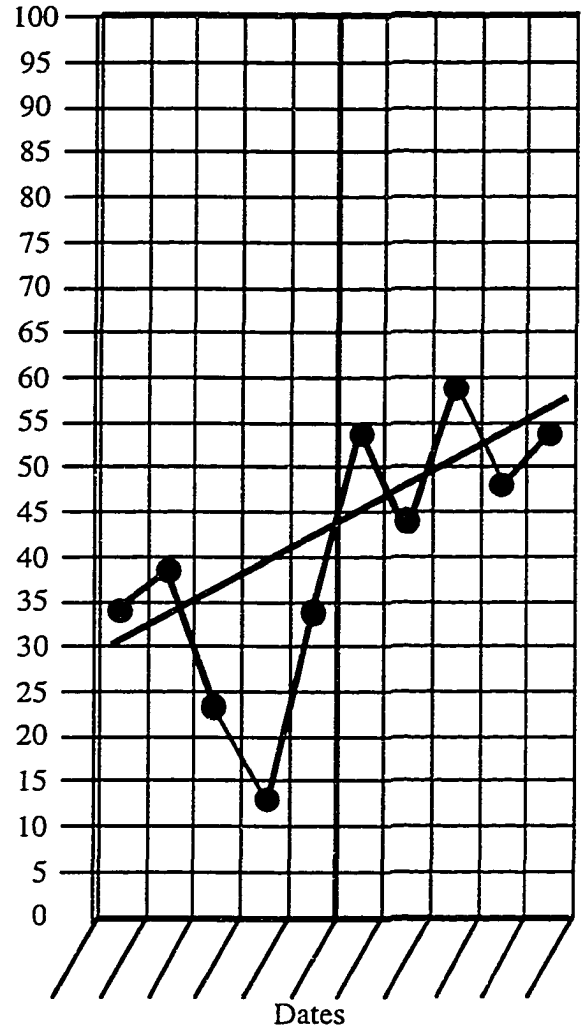
Previous mean = 44.5%

Current mean = 45.9%
(higher by less than 5%)

Current trend = Decelerating

Decision rule:

Example #2.



Previous mean = 32.1%

Current mean = 36.8%
(higher by more than 5%)

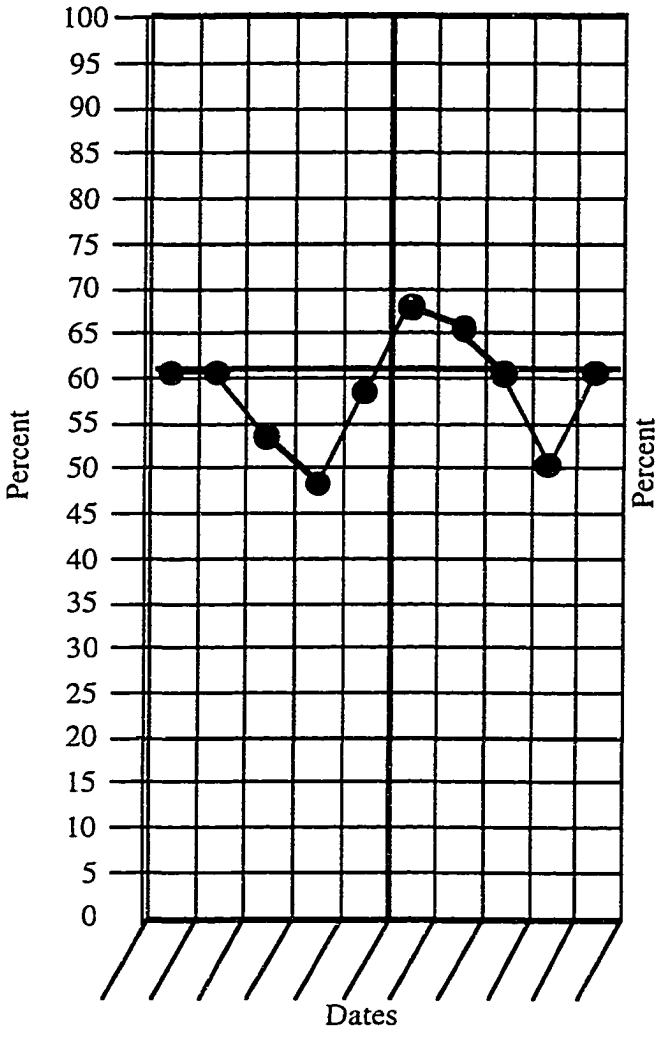
Current trend = Accelerating

Decision rule:

Decision Rules

Apply the decision rules to the following examples.

Example #3.



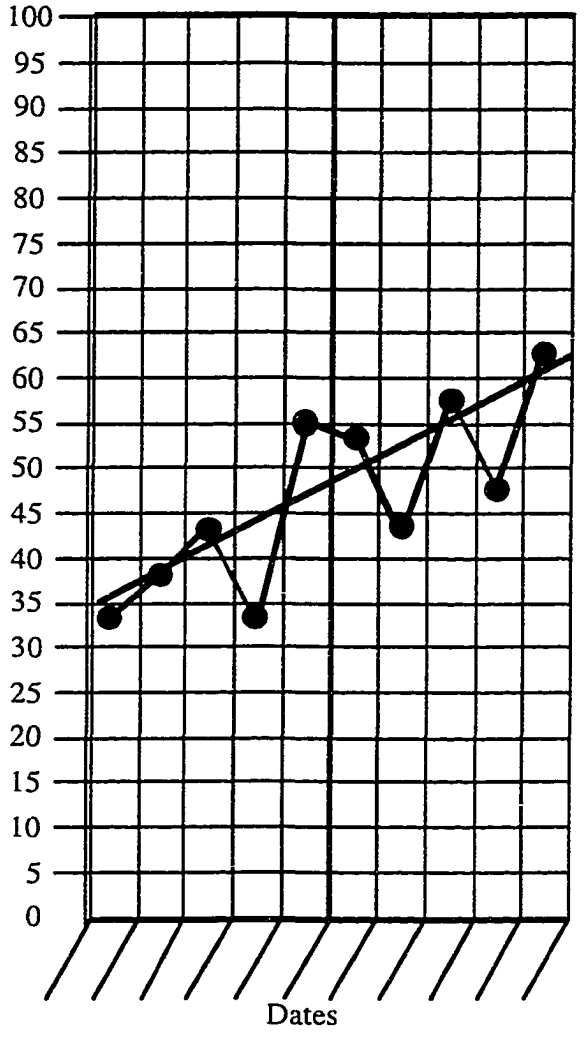
Previous mean = 53.3%

Current mean = 53.3%
(means are the same)

Current trend = Flat

Decision rule:

Example #4.



Previous mean = 38%

Current mean = 43.9%
(higher by more than 5%)

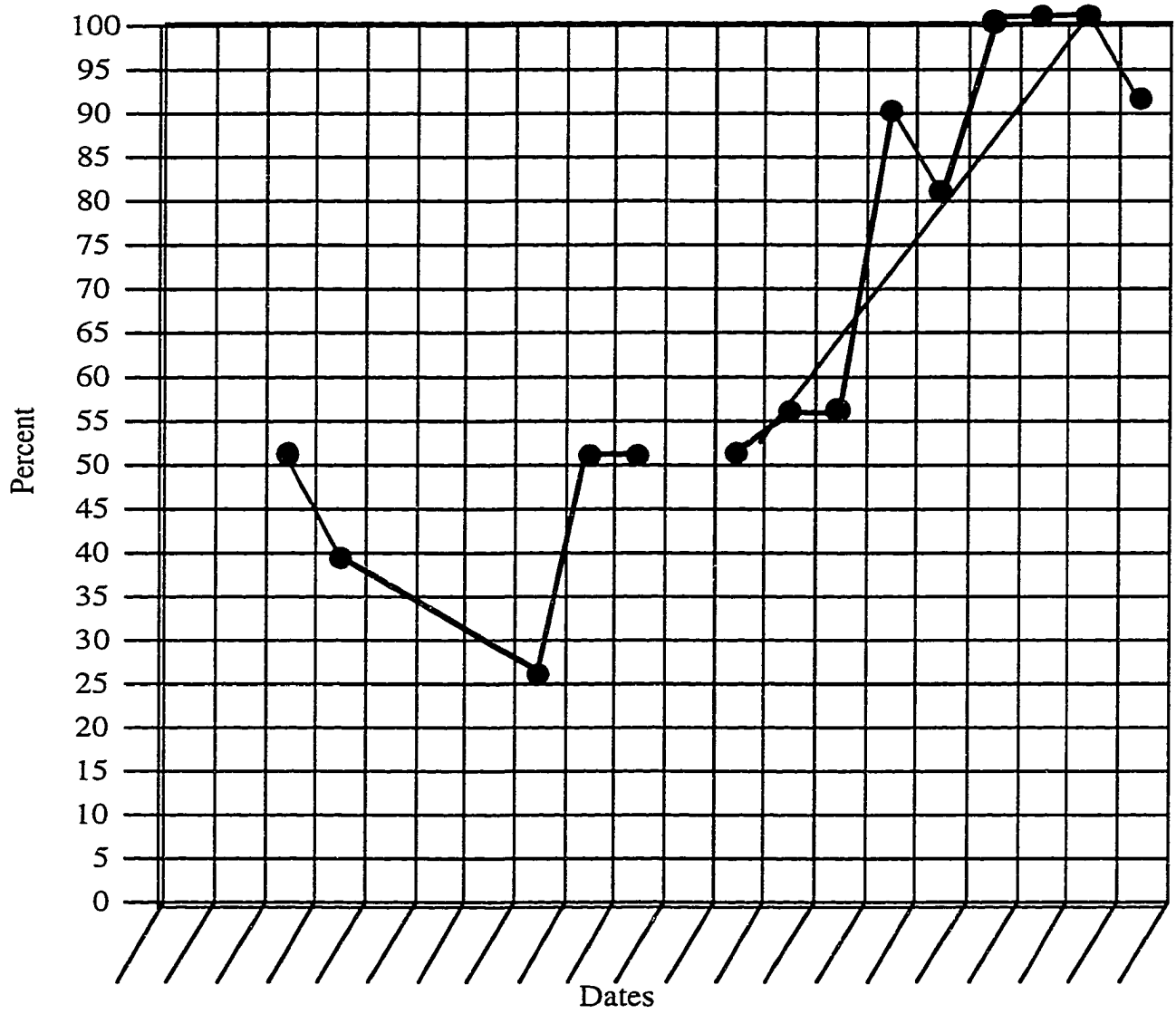
Current trend = Accelerating

Decision rule:

Decision Rules

Apply the decision rules to the following examples.

Example #5.



First Review Period

Previous mean = N/A (baseline)

Current mean = 42.6%

Current trend = insufficient data

Decision rule:

Second Review Period

Previous mean = 42.6%

Current mean = 81.1%

Current trend = Accelerating

Decision rule:

Decision Rules

Apply the decision rules to the following example. *(note 6a and 6b refer to the same example)*

Example #6a.

Behavior: Use of money access machine
Procedure: Constant Time Delay

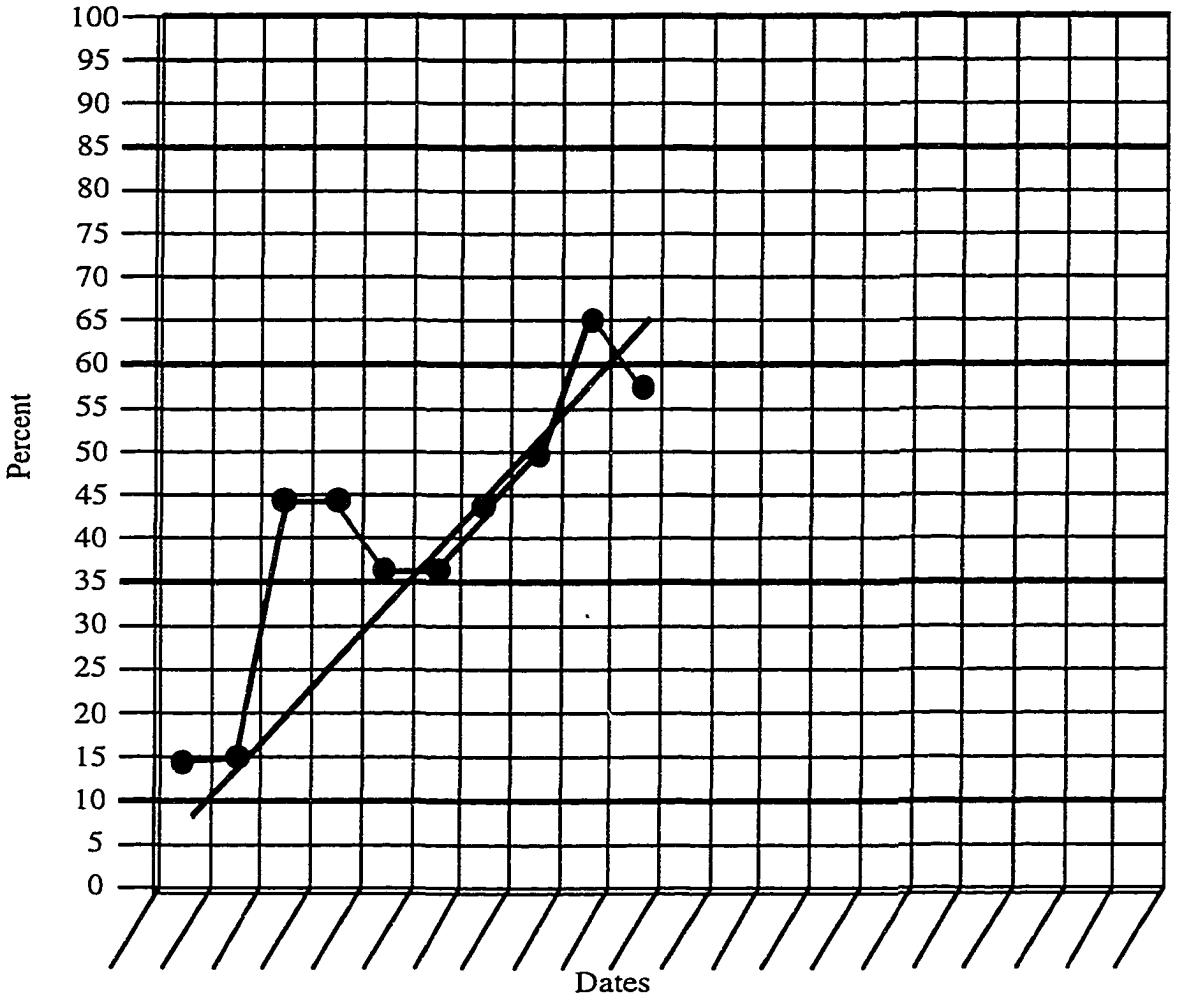
Mastery: 100% for 3/3 days
Code: + = Independent M = Model with second delay

Previous Mean 33%	**1st review period mean 44.1 %**										**2nd review period mean _____%**									
Date	3	4	5	6	7	10	11	12	13	14										
Percent successful trials	20	20	47	47	40	40	47	53	67	60										
15. Take receipt	+	+	+	+	+	+	+	+	+	+										
14. Take card	M	+	+	+	+	M	+	+	+	+										
13. Take money	M	M	+	+	+	+	+	+	+	+										
12. Press "OK"	M	M	+	M	M	+	M	+	+	+										
11. Press "OK"	M	M	M	+	M	M	+	M	+	+										
10. Press "0"	M	M	M	M	M	M	M	M	M	M										
9. Press "1"	M	M	M	M	M	M	M	M	M	M										
8. Press "checking"	M	M	M	M	M	M	M	M	+	M										
7. Press "withdraw"	M	M	M	M	M	M	M	+	+	+										
6. Press "OK"	+	M	+	+	+	+	+	+	+	+										
5. Press "2"	M	M	+	+	+	+	+	+	+	+										
4. Press "6"	M	M	M	M	M	M	M	M	M	M										
3. Press "6"	M	M	M	M	M	M	M	M	M	M										
2. Press "3"	M	M	M	M	M	M	M	M	M	M										
1. Put card in	+	+	+	+	+	+	+	+	+	+										
Task or Opportunity to Respond																				

Decision Rules

Apply the decision rules to the following example.

Example #6b.



First Review Period

Previous mean = 33%

Current mean =

Current trend = Accelerating

Decision rule:

Decision Rules

Apply the decision rules to the following example. *(note 7a and 7b refer to the same example)*

Example #7a.

Behavior: Drink from adaptive cup Mastery: 100% for 3/3 days

Procedure: least to most prompt

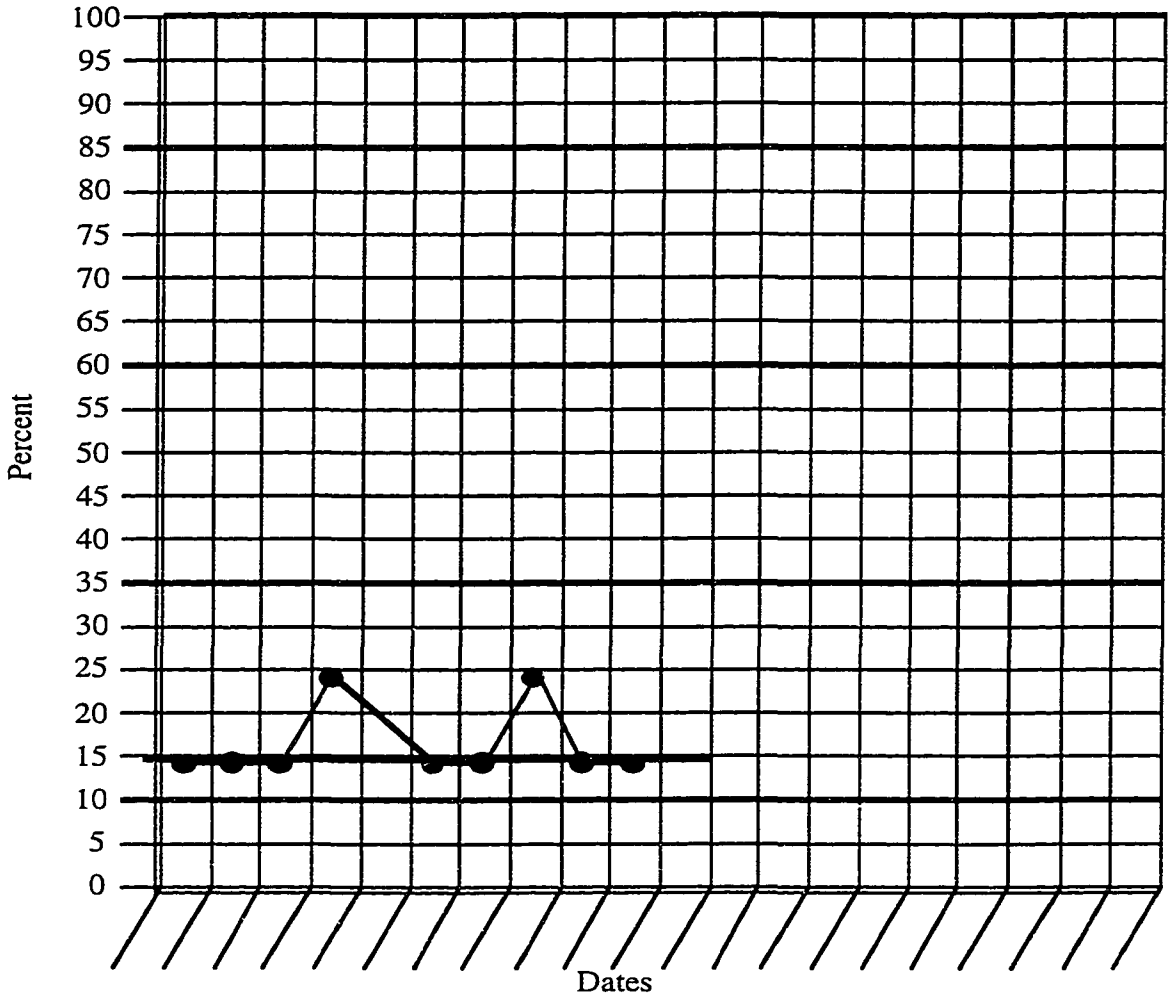
Code: + = Independent V = Verbal G = Gesture P = Physical

Previous Mean 13 %	**1st review period mean 15.7 %**										**2nd review period mean _____ %**									
Date	3	4	5	6	7	10	11	12	13	14										
Percent successful trials																				
8. Release grasp	P	G	G	P		P	G	G	P	P										
7. Set on table	P	P	G	+		P	G	P	P	G										
6. Remove cup	P	G	G	G	*n*	G	G	G	G	G										
5. Take a sip	+	+	+	+	*o*		+	+	+	+										
4. Open mouth	G	V	V	G		G	G	+	G	V										
3. Put cup to lips	G	V	G	V	*o*	V	V	V	V	V										
2. Lift cup	G	P	G	G	*p*	P	G	P	G	G										
1. Grasp cup	P	P	P	P	*p*	P	P	P	P	P										
Task or Opportunity to Respond																				

Decision Rules

Apply the decision rules to the following example.

Example #7b.



First Review Period

Previous mean =

Current mean =

Current trend =

Decision rule:

Data Collection Form

Name: *One* Dates: *10 / 3 / 97* to *10 / 14 / 97*

Behavior: *Stack lunch trays (vocational)* Mastery: *100% accuracy for 3/3 days*

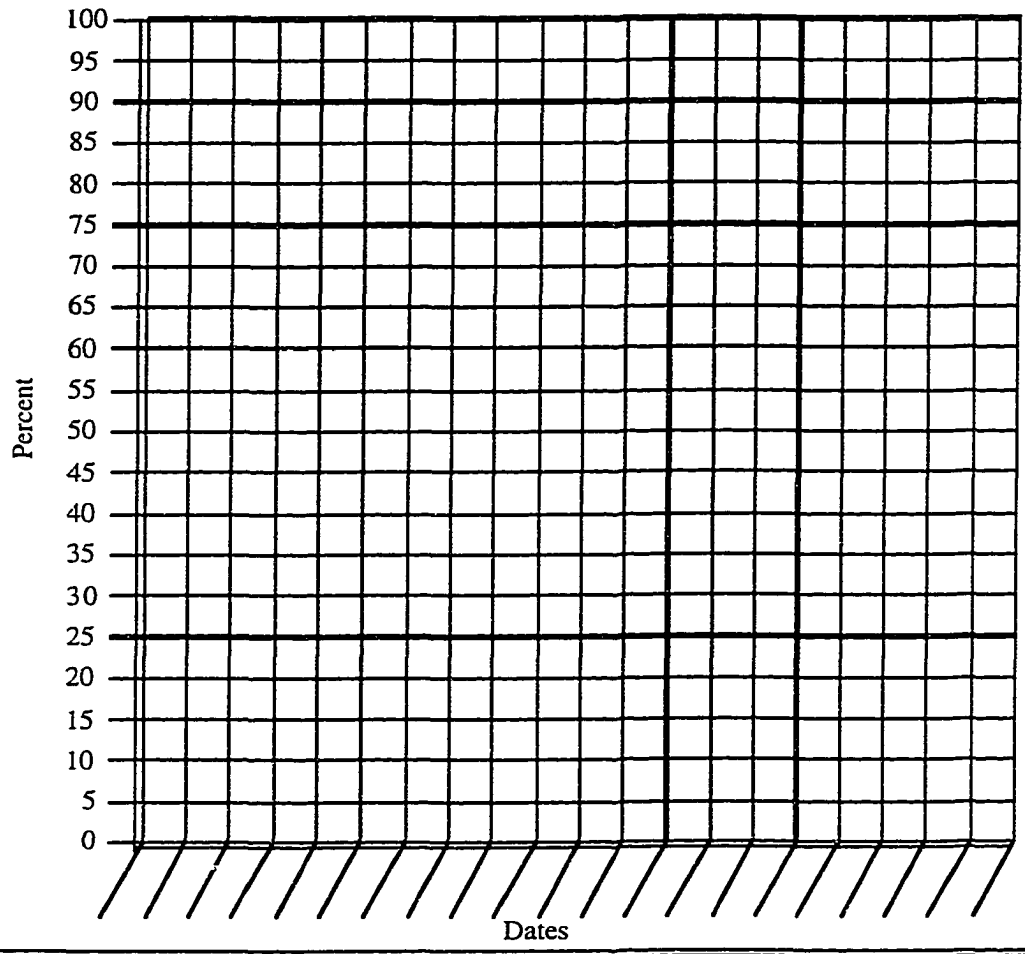
Procedure: *Constant time delay* Code: *+ = independent, m = model at 2 second delay*

Previous Mean *42%*	**1st review period mean** _____%										**2nd review period mean** _____%									
Date	*3*	*4*	*5*	*6*	*7*	*10*	*11*	*12*	*13*	*14*										
Percent successful trials																				
4. Stack tray			+	+				+	+	+										
3. Wipe tray			M	M				M	M	M										
2. Remove paper	*n*	*n*	M	M	*n*	*n*	*n*	M	M	M										
1. Get tray	*o*	*o*	+	M	*o*	*o*	*o*	+	+	+										
4. Stack tray			+	+				M	+	+										
3. Wipe tray	*o*	*o*	M	M	*o*	*o*	*o*	M	M	M										
2. Remove paper	*p*	*p*	M	M	*p*	*p*	*p*	M	M	M										
1. Get tray	*p*	*p*	+	+	*p*	*p*	*p*	M	+	+										
Task or Opportunity to Respond																				

Standard Equal-Interval Graph

Behavior: _____ Name: _____ Mastery: _____

Objective:



Reviews

Past Mean= *Past Decision=*

Date	Trend	Current Mean	Decision

Data Collection Form

Name: Seventeen Dates: *10/3/97* to *10/14/97*

Behavior: *Use picture wallet to request break* Mastery: *80% accuracy for 3/3 days*

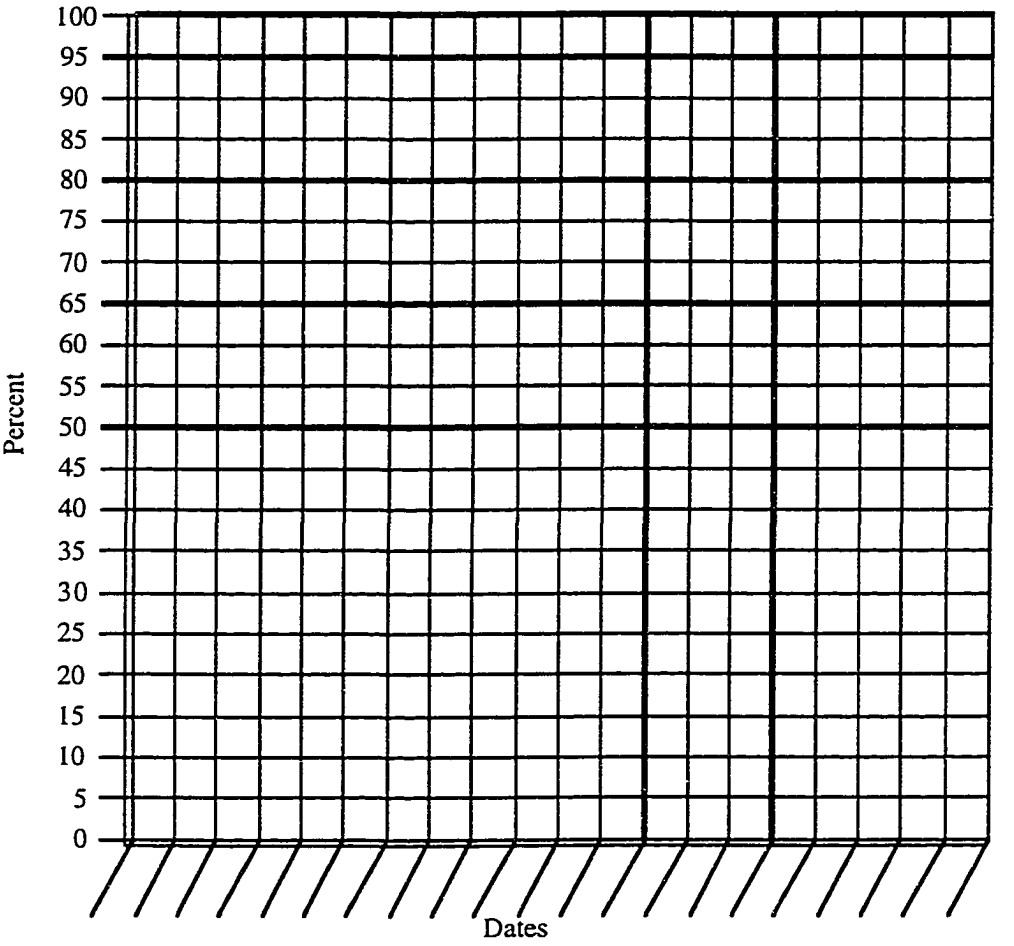
Procedure: *Constant time delay 2 second delay* Code: + = *independent* *P = physical prompt after*

Previous Mean 38%	**1st review period mean** _____%										**2nd review period mean** _____%									
Date	3	4	5	6	7	10	11	12	13	14										
Percent successful trials																				
Make request	P	P	P	P	P	P	P	P	P	P										
Make request	P	P	+	P	P	P	+	P	P	P										
Make request	P	P	P	P	P	P	P	P	+	P										
Make request	P	P	P	P	P	P	+	P	P	P										
Make request	P	P	P	P	+	P	P	P	+	P										
Make request	P	P	P	P	+	+	P	P	P	P										
Make request	P	P	P	P	P	P	P	P	+	+										
Make request	P	P	P	+	P	P	P	P	P	P										
Make request	P	P	+	P	+	P	+	+	P	+										
Make request	+	+	P	P	P	P	P	P	P	P										
Task or Opportunity to Respond																				

Standard Equal-Interval Graph

Behavior: _____ Name: _____ Mastery: _____

Objective:



Reviews

Past Mean= *Past Decision=*

Date	Trend	Current Mean	Decision

Blanks Forms

- ✓ *Systematic Instructional Plan*
- ✓ *Data collection form*
- ✓ *Standard Equal-interval Graph*

Systematic Instructional Plan

Name: _____ Date: ___/___/___

Instructional objective

What is the specific skill area as stated on IEP goal:

What is the situation or condition in which the behavior should occur?

What is the specific response (describe what the behavior should look like- consider latency, intensity, duration, etc.)?

What is the criteria for mastery?

Antecedents

Setting and schedule

What is the location and time of day instruction will take place?

Is this task part of a routine or will it be worked on in isolation of other tasks? (describe)

Direction

What is the specific instructor provided direction or environmental cue to signal that the response is to occur?

What additional prompt(s) will be provided (if any)?

Motivation

What will happen if the behavior is correct?

What will happen if the behavior is not correct?

Data Collection Form

Name: _____ Dates: ___/___/___ to ___/___/___

Behavior: _____ Mastery: _____

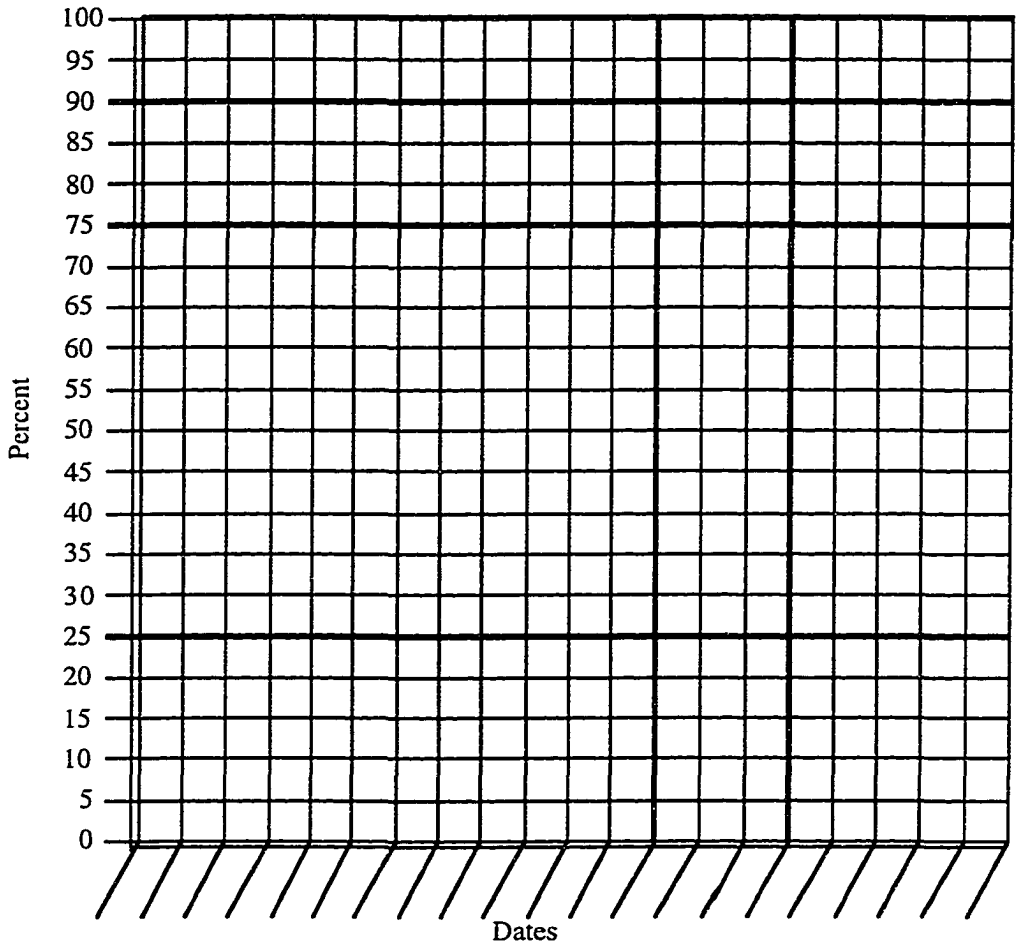
Procedure: Code:

Previous Mean _____%	1st review period mean _____%	2nd review period mean _____%
Date		
Percent successful trials		
Task or Opportunity to Respond		

Standard Equal-Interval Graph

Behavior: _____ Name: _____ Mastery: _____

Objective:



Reviews

Past Mean= *Past Decision=*

Date	Trend	Current Mean	Decision

Appendix J

Data-Based Decision Rules Percent Correct Rule Components Feedback Form

Data-Based Decision Rules
Percent Correct Rule Components

Name: _____ Review Period: from ___ / ___ / ___ to ___ / ___ / ___

Components of Analysis	Student:				Student:			
	Beh:		Beh:		Beh:		Beh:	
Data collected 6 times in two weeks *(Don't count if student was out sick for five days or more within two week period)*	Yes	No	Yes	No	Yes	No	Yes	No
Review period contains no break of 4 or more days *(Don't count if student was out sick or program breaks were cause of program break)*	Yes	No	Yes	No	Yes	No	Yes	No
Correct percent calculated for each day *(cannot calculate daily percent when less than 8 trials per day)*	Yes	No	Yes	No	Yes	No	Yes	No
Correct percent plotted for each day	Yes	No	Yes	No	Yes	No	Yes	No
Line of progress correctly drawn for review *(Record yes if no line is drawn when less than 6 data points present)*	Yes	No	Yes	No	Yes	No	Yes	No
Correct identification of data pattern (trend) *(Choices include: Insufficient data, Accelerating, Decelerating, or Flat)*	Yes	No	Yes	No	Yes	No	Yes	No
Mean for review period calculated correctly	Yes	No	Yes	No	Yes	No	Yes	No
Correct decision based on data analysis *(Choices include: Extend performance, Make no changes, Simplify skill, Improve antecedents, Improve motivation)*	Yes	No	Yes	No	Yes	No	Yes	No
Percent Correct =								

Appendix K

Human Subjects Review Proposal and Approval Letters

IV. HSIRB PROTOCOL OUTLINE: Prepare a proposal for review by HSIRB that follows the outline below.

PROJECT DESCRIPTION: Includes purpose, research procedure (including what exactly participants will do as part of the study), research design, location and duration.

This research project attempts to answer two questions. The first question will determine how often do special education teachers employ data-based decision rules. The second question looks at how to get special educators to utilize the data-based instructional decision model. Data-based decision rules provide guidelines, helping the educator in deciding to continue with current instructional strategies or to modify instruction to meet student needs. Instructional modification based on formative evaluation is considered a component of quality practice. This project will be divided into two experiments. The first experiment will identify the current practices of collecting frequent student performance information through a mail questionnaire. The second experiment will focus on increasing special educators' utilization of data-based decision rules. Increase use of decision rules should improve student progress on Individualized Educational Program (IEP) objectives. Special educators are federally mandated to collect student performance on IEP objectives to evaluate progress. The second experiment will involve the use of three sets of participants. First is a focus group, next is the decision rule utilization group and the third set includes special education students.

All data obtained from this research project will be retained for a period of at least 3 years before destroying it. The data will be held by the student investigator in a secured location.

Survey

Sampling the current practice of decision rule utilization will be accomplished through a survey to Michigan special educators. The survey will ask for information on the frequency of performance assessment and how this information is used in modifying instruction. The survey contains 22 multiple choice questions and will take approximately 10 minutes to complete. This survey will be mailed out after Human Subjects Institutional Review Board (HSIRB) approval. It is expected that the survey will be completed by December 1, 1997. Participants in the survey are asked to return an identification card and a completed survey that does not contain name or address. A clerical assistant will separate the identification card from the survey prior to data analysis. The purpose of the identification card is record returned forms for a follow-up reminder. A follow-up reminder will take place by comparing the identification cards with the master list then mailing a reminder to individuals who did not return the cards and questionnaires. Also, to increase the likelihood of participation, a raffle of prize money will take place with the cards.

Focus Group

A focus group will be created of 3-5 special educator volunteers from the Ottawa Area Center staff. The focus group will meet two times. The first meeting will take place at after HSIRB approval and before training of the decision rule utilization group. A focus group of special educators will provide input to the possible causes for infrequent utilization of data-based decision rules by special educators. The focus group will then provide possible interventions to increase the use of decision rules. The second meeting will occur in May 1998, after the intervention of the decision rule utilization group. After the intervention to increase decision rule utilization, the focus

group will meet to provide social validation of the research intervention strategies and outcomes. The sessions will take place at the Ottawa Area Center, a public center-based school serving students with mental retardation. The focus group will meet for approximately one hour for each session.

Decision Rule Utilization Group

Prior to taking part in this phase of the experiment, participants will be interviewed on the possible barriers to the utilization of decision rules in modifying instruction for their students. Barriers include the lack of information, feedback, training, tools, resources or incentives for using data-based decision rules. A one hour training session will take place to ensure that special educators participating in this study have the skills to collect and interpret student performance assessment. The remainder of the research will be application of interventions to increase the use of decision rules by special educators. Performance improvement interventions will involve working with the participant to remove the barriers to implementing decision rules.

This part of the study will employ a multiple baseline across subjects research design. The primary measure will be the percentage of accurate decisions made by each teacher on the biweekly review of student performance data. Furthermore, teacher instructional effectiveness will be evaluated using the total percentage of biweekly student progress on IEP objectives. Two IEP objectives will be randomly selected for each student. Student performance on the two objectives will determine percentage of student progress.

The participant interviews will begin after HSIRB approval. Training of staff will take place after the interviews have been completed. Staff performance improvement interventions will continue throughout the school year until May 1998. This study will take place at the Ottawa Area Center.

BENEFITS OF RESEARCH: Briefly describe the expected or know benefits of the research. This section should indicate benefits specific to the research participant in addition to longer term or more general benefits.

Survey

The results of the survey would provide evidence on how well educators implement a proven component of quality instruction: frequent measure of student performance and data-based instruction. This results obtained would provide information for teacher educators and administrators on the current status in the field of special education. Respondents of the questionnaire are also given the opportunity to win a cash prize in the form of a $25.00 check.

Focus Group

A focus group is intended to improve the quality of the research by verification that the interventions and results are significant. The focus group is a stakeholder in the design of the intervention. Suggestions for interventions are made with consideration of peers from the same working environment. As an added benefit, it is likely that the participants of the focus group will increase their understanding of staff performance problems based on experience in this research project.

Decision Rule Utilization Group

The benefit of participation in the decision rule utilization group is the development of skills in tracking the educational objectives and modifying instruction

as regards to a student's Individualized Education Program. This procedure should result in better learning from the special education students. The organization should benefit by documenting systematic evaluation of training and non-training procedures in staff development. The organization will also obtain the materials used in training. Information obtained from this study will be employed by the organization in future staff development programs.

SUBJECT SELECTION: Describe in detail how you intend to go about contacting and recruiting participants. Attach all written advertisements, posters and oral recruitment scripts.

Survey

This survey will involve 400 special education teachers from public schools located throughout Michigan. The teachers will be employed in center-based facilities as well as local public schools with classrooms providing services along a continuum of inclusiveness of special education. Participants will be randomly selected from a 3000 subscriber mailing list from the Center for Educational Networking (CEN) Newsline publication. Newsline is an informational newsletter produced for Michigan Office of Special Education through a state initiated grant at no cost for subscribers.

Focus Group

Special education staff at the Ottawa Area Center will be asked to volunteer for participation in a focus group. An announcement will be made at a staff meeting by reading a recruitment flyer. Following the staff meeting, the recruitment flyer will be posted in the school. Informed consent will be obtained prior to participation in this research project.

Decision Rule Utilization Group

Teacher participant. Subjects will be recruited by asking the special education staff for volunteers to participate in a research project. An announcement will be made at a staff meeting by reading a recruitment flyer. Following the staff meeting, the recruitment flyer will be posted in the school. All participants in this section of the study will be current employees of the Ottawa Area Intermediate School District. Subjects will be special educators who are required to report on the progress of several students pertaining to Individualized Education Program goals. Subjects will be asked to comply with the requirements for the study for the duration of this research project. Informed consent will be obtained prior to participation in this research project.

Student participant. It is a standard of the profession that special educators evaluate all their students on IEP objectives. The student participants will range in age from 3 years to 26 years. All have been diagnosed with mental retardation and are receiving special education services. Two student participants will be randomly selected from each teacher's caseload. Once selected, a letter will be sent to the student's parent or guardian. The letter will explain the research project and also request permission to monitor the student's progress on IEP objectives. Informed consent will be obtained prior to student participation in this research project

RISKS TO SUBJECTS: Describe the nature and the likelihood of possible risks. (e.g., physical, psychological, social) as a result of participation in the research. Risks include even mild discomforts or inconveniences, as well as potential for disclosure of sensitive information.

Survey

There are no physical risks associated with this survey. Inconvenience of completing the survey is minimized by keeping the number of questions low. Psychological and social risks of potential disclosure of sensitive information are minimized through the confidentiality of the responses.

Focus Group

There is a minimal potential for disclosure of sensitive information in that focus group participants will be expressing their opinions towards a work behavior. This risk will be addressed through procedures to ensure confidentiality.

Decision Rule Utilization Group

Teacher participant. The subjects are at no risk of physical harm for participating in this study. Staff workshops on the implementation of Individualized Education Programs are an accepted and ongoing practice within this organization. There is a minimal potential for discomfort in that participants will be disclosing sensitive information on personal work behavior. Steps will be taken to keep this information confidential. A minimal potential for discomfort exists when staff are observed during instruction. There is a possibility that participant performance information would be shared with the individual's supervisor for the purpose of providing supervisory feedback. The sharing of information will take place only with the consent of the participant.

Student participant. Students are accustomed to working on IEP activities, therefore, no unusual discomfort or inconveniences will be presented. There is a possibility that researcher observation will disrupt student participation in the IEP activity. There is minimal potential for disclosure of personal student information. This risk will be addressed through procedures to ensure confidentiality.

PROTECTION FOR SUBJECTS: Describe measures to be taken to protect subjects from possible risks or discomfort.

Survey

To minimize discomfort, the survey will not be lengthy and will not require much time to complete. The survey will be sent to participants two months after the beginning of the school year so that respondents have had time to acclimate to their classroom and schedules. The purpose of the of the survey will be explained to participants and informed consent will be obtained.

Focus Group

The duration of the focus group sessions will be no more than 1 hour, to reduce possible discomfort. Discussions will take place in private conference room to minimize the possibility of others hearing the conversation. Participants will be told that the information they provide will be recorded and all identifying information will be removed. The subjects will also be told that information provided will remain confidential. No information obtained from this study will be used for employee evaluations and it will not go into the employee's file. The purpose of the of the focus group will be explained to participants and informed consent will be obtained.

Decision Rule Utilization Group

Teacher participant. Interviews will take place in private conference room to minimize the possibility of others hearing the conversation. Participant will be told that

the information they provide will be recorded and all identifying information will be removed. The subjects will also be told that information provided will remain confidential. Observations of instructional sessions will be as unobtrusive as possible. Participants in this study may want their performance data shared with a supervisor. This would only take place if agreed upon by the individual participant. The shared information would remain confidential between participant and supervisor. No information obtained from this study will be used for employee evaluations and it will not go into the employee's file. The purpose of the of the decision rule utilization group will be explained to participants and informed consent will be obtained.

Student participant. Observations of student performance will be as unobtrusive as possible. Student performance will remain confidential.

CONFIDENTIALITY OF DATA: Describe the precautions that will be taken to ensure the privacy of subjects and confidentiality of information. Be explicit if data are sensitive. Describe coding procedures for subject identification numbers.

Survey

Survey participants will be sent a questionnaire and an identification card. The questionnaire will not contain identifying information (e.g., name, address). The respondents are asked to return both the card and questionnaire in the same envelope. A clerical assistant will open the survey forms and separate the identification cards from the questionnaires. The researcher will not see the completed survey forms until after separation from the identification cards. A follow-up reminder will take place by comparing the identification cards with the original list and then mailing a reminder to individuals who did not return the questionnaires.

Focus Group

Focus group discussions will be recorded on cassette tape for later transcribed documentation of responses. After the written documentation, the tape will be erased. The written responses will not contain names or other information that identify the participant. Any sharing of the responses from focus group discussions will not identify the individuals who made the specific comments. The researcher will keep the specific individual communication confidential. No information obtained from this study will be used for employee evaluations and it will not go into the employee's file.

Decision Rule Utilization Group

Teacher participant. Confidentiality will be ensured by the removal of the subjects' names and any other identifying information if this study is to be published or presented in other forms. The participant might request supervisor feedback on decision rule utilization performance. When using supervisor feedback, the supervisor will agree to keep the information confidential. Participant performance in this study will not become part of the employee's records and will not be used for individual employee evaluations.

Student participant. Confidentiality will be ensured by the removal of the subjects' names and any other identifying information if this study is to be published or presented in other forms.

INSTRUMENTATION: All questionnaires, interview scripts, data collection instruments, should be identified and attached. Coding sheets for video or audio-tape and other data collection procedures are required.

See examples of forms and assessment attached

Survey

Survey questions

Focus group

Focus group recruitment flyer
Focus group questions (before intervention)
Focus group questions (after intervention)

Decision Rule Utilization Group

Decision rule utilization group recruitment flyer
PROBE interview-questionnaire
Teacher implementation of instruction form
Student progress data collection form rule identification form

INFORMED CONSENT: A copy of all consent/asset forms must be provided. For all research regardless of whether or not a signed consent form is required, describe the process by which informed consent will be obtained. If the participant is a child or mentally retarded, explain how the parents/guardians will be contacted for consent and how the researcher will insure that the participant understands to what s/he is assenting. This is especially important if the participant is unable to sign or understand language. For further information on writing consents (assents not covered), see Informed Consent by T. M. Grundner, on reserve at Waldo Library. Refer also to the checklist on bask of this page and examples included in the HSIRB packet. Attach a copy of the informed consent and assent (if applicable) form(s). Each participant and/or parent/guardian must be given a signed copy of the consent form at the time of involvement in the study.

Survey

Informed consent will be obtained by providing instructions with the survey form. The instructions state that by returning the survey is an indication of consent for use of the answers supplied.

Focus Group

Each individual participant will be presented with the informed consent form prior to the first focus group session. The experimenter will meet with each participant and explain the procedures as well as answer questions regarding the research. The participants will be given the opportunity to take the form with them for review. The signed consent form will be returned at another time, giving the participant opportunity to consider their participation.

Decision Rule Utilization Group

Teacher participant. Each individual participant will be presented with the informed consent form prior to the interview. The experimenter will meet with each participant and explain the procedures as well as answer questions regarding the research. The participants will be given the opportunity to take the form with them for review. The signed consent form will be returned at a later time.

Student participant. In a discussion with the parent or guardian of each student participant, the experimenter will explain the procedures as well as answer questions regarding the research. The participants will be given the opportunity to take the form home for review. The signed consent form will be returned at a later time.

Human Subjects Institutiona Rev ew Board

Kalamazoo Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: 24 October 1997

To: Wayne Fuqua, Principal Investigator
Steve Goodman, Student Investigator

From: Richard Wright, Chair

Re: HSIRB Project Number 97-09-14

This letter will serve as confirmation that your research project entitled "A Comparison of Interventions Based on Functional Assessment with Training for Improving Teachers' Use of Data-Based Instruction" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 24 October 1998

WESTERN MICHIGAN UNIVERSITY

Date: 27 January 1998

To: Wayne Fuqua, Principal Investigator
Steve Goodman, Student Investigator

From: Richard Wright, Chair

Re: Changes to HSIRB Project Number 97-09-14

This letter will serve as confirmation that the changes to your research project "A Comparison of Interventions Based on Functional Assessment With Training for Improving Teachers' Use of Data-Based Instruction" requested in your memo dated 15 January 1998 have been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: 24 October 1998

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