

GENERALIZATION OF STUDENT QUESTION ASKING FROM SPECIAL CLASS TO REGULAR CLASS SETTINGS

DENNIS R. KNAPCZYK

INDIANA UNIVERSITY

This study investigated the use of videotaped exemplars taken from a regular education mathematics class to teach generalization of question asking. Three mildly handicapped fourth-grade students who asked few questions in the regular education class served as subjects. Measures of the frequency of question asking and percentage of accuracy on assignments were obtained in the regular class. Treatment included showing the videotapes to the subjects, structuring opportunities for rehearsing question asking, and providing feedback. The results showed training procedures implemented in the learning resource room were effective in increasing the level of participants' question asking and in improving their scores on assignments in the regular mathematics class.

DESCRIPTORS: question asking, generalization, videotaped samples, handicapped children, accuracy scores, mathematics

Student question asking is among the skills identified by classroom teachers as being critical for successful participation in regular education programs (Salend & Lutz, 1984; Schumaker & Hazel, 1984b). Question asking promotes participation in instructional activities, provides information to the teacher regarding learner competence, and creates opportunities for application and clarification of instructional content (Knapczyk & Livingston, 1974). Schumaker and Hazel (1984a) noted that deficiency in student question asking is a characteristic of many special education students who have been mainstreamed into regular education programs. Even though the students have demonstrated effective performance of question asking in special education programs, generalization to regular education either does not occur or is characterized as inadequate (e.g., ill-timed, not focused on subject matter, insufficient to meet the instructional needs of the student). Schumaker and Hazel (1984a) and others attribute lack of generalization of question asking to differences in the discriminative properties between special and regular class settings. For example, special and regular education programs can differ considerably in the types of teaching formats

used to provide instruction and assess learner competence.

Berler, Gross, and Drabman (1982), Masters, Burish, Hollon, and Rimm (1987), and Wahler (1969) have stated that producing generalization to conditions with different characteristics requires systematic assessment of the performance requirements of the transfer setting and specific training activities. For example, Knapczyk (1988) and Sulzer-Azaroff and Mayer (1986) suggested that assessment should address both the skills required for performance and the learner's ability to perform the skills under conditions existing in the transfer setting. Similarly, it is often necessary to incorporate features of the transfer setting into the strategies used to promote generalization (Knapczyk, in press). One promising approach involves training learners to respond to exemplars representing the characteristics of the transfer setting. Exemplars can be used to demonstrate the conditions of performance and create opportunities for responding. Stokes and Baer (1977) stated that providing sufficient exemplars as part of training can be efficient and effective in producing generalization effects.

This study investigated the use of exemplars drawn from the regular class setting to teach generalization of student question asking. Videotapes of classroom activities provided the context for presenting the exemplars, and a rehearsal procedure

Correspondence and requests for reprints should be addressed to Dennis Knapczyk, Department of Special Education, Indiana University, Bloomington, Indiana 47405.

was devised to create opportunities for practicing the response and refining performance. Students were given feedback concerning the timing and appropriateness of the questions they asked. Treatment occurred in the special education classroom, and assessment of generalization was made in a regular mathematics class. Measures of generalization were made with regard to two types of instructional activities: teacher presentation of mathematics concepts and assigned seatwork. Permanent product measures obtained in the regular class were used to determine whether the students used their question-asking skills to address their instructional needs.

METHOD

Setting

The study was conducted in a learning resource room and fourth-grade mathematics class in a rural elementary school of approximately 250 students. Twenty-two mildly handicapped children were enrolled in the resource room, but most of these students were mainstreamed into two to six regular education classes. The special education students attended the resource room for both academic instruction (e.g., reading, language arts) and a study period devoted to training in social skills, study habits, or other deficiency areas identified by the special or regular education teachers. Seven to 10 students were present in the resource room during each period.

The mathematics class was part of the regular education program. Twenty-four students were enrolled in the class, 4 of whom were from the learning resource room program. The content of instruction focused on developing computation skills in beginning multiplication and division and on application of the skills to functional activities (e.g., grocery shopping). The 55-min class period was usually divided into two 20- to 30-min instructional segments. During the first segment the teacher presented the mathematics concepts that were the topic of the day's class and provided a variety of drills and other practice activities based upon

the concepts. In addition, the teacher showed how the concepts could be applied to everyday situations or integrated with skills previously learned. During this segment, the teacher encouraged a high level of student participation in the instructional activities. The second segment of the class was primarily devoted to independent seatwork (e.g., completing worksheets or exercises assigned from the text). Typical assignments included 20 to 30 one- and two-digit multiplication or division problems and 5 to 10 word or picture problems requiring application of multiplication or division concepts. From 25 to 30 problems were assigned each day and students usually completed the assignments in the time allotted. During this time, the teacher circulated among the students and offered assistance.

Participants

Three fourth-grade students from the learning resource room served as participants. All were classified as learning disabled in accordance with guidelines established by the state education agency. They attended the special education program for reading, language arts, and a study period and the regular education class for the other grade-level subjects. Achievement test scores and teacher reports indicated that the students were performing 1 to 1.5 years below grade level in mathematics. In addition, all were functioning below the performance standards of the class (i.e., their levels of work production and work accuracy were considerably below those of other students). The regular and special education teachers indicated that the students had the potential to perform successfully in the class. The regular class teacher characterized the subjects as having good work habits and as typically completing assignments once they understood the instructions. However, she stated that many of the problems displayed by the students in starting their work and performing it correctly resulted from their poor participation in the instructional activities. In contrast, the special education teacher indicated that all the students performed effectively in the learning resource room program (e.g., readily volunteered answers, participated in discussions, and asked questions when needed).

Response Definitions and Recording Procedures

During each mathematics period, the regular class teacher tallied the question-asking responses of the participants and calculated the percentage of accuracy of the assigned seatwork completed. Question asking was defined as a student raising his or her hand, waiting to be acknowledged by the teacher, and, when acknowledged, verbalizing a question relating to the material presented or assigned. Separate recordings were made for each instructional segment of the class period (i.e., teacher presentation and assigned seatwork). Percentage of work accuracy was calculated as the number of problems correctly answered to the number of problems assigned during class.

Interobserver agreement. Measures of reliability for the question-asking response were made once each week by the special class teacher (or by the aide who worked in the class as a part-time tutor for the special education student who was not participating in the study). They were seated in an instructional area in the back of the room and were able to record observations without the knowledge of the regular class teacher. Reliability measures were obtained by dividing the smaller frequency recorded by the larger frequency and multiplying by 100. The mean percentages of agreement for Subject 1 were 100%, 96%, and 94% (range, 87% to 100%) across experimental conditions. Reliability measures for Subject 2 were 95%, 92%, and 94% (range, 85% to 100%) across conditions and for Subject 3 were 89%, 93%, and 92% (range, 84% to 100%) across conditions.

Each week the special education teacher obtained one or two work samples from the regular class teacher and used them to determine reliability of percentage accuracy scores. Measures of interobserver agreement were obtained by dividing the number of problems observers agreed were correct or incorrect by the number of problems attempted and multiplying by 100. The mean percentages of agreement for accuracy scores for Subject 1 were 100%, 100%, and 92% (range, 90% to 100%) across experimental conditions. Reliability measures

for Subject 2 were 95%, 100%, and 93% (range, 85% to 100%) across conditions and for Subject 3 were 92%, 100%, and 100% (range, 88% to 100%) across conditions.

Experimental Design and Treatment Procedures

Prior to the start of the baseline condition, videotapes were made of the teacher presentation segment of three successive mathematics classes. The regular class teacher viewed the videotapes and indicated that the segments showed the types of presentation formats that were typically used during the first segment of the class. The videotapes were used to analyze the performance requirements for question asking in the regular education program and to provide a framework for presenting exemplars to the participants.

A multiple baseline across subjects design was used to evaluate the treatment procedures, as described below.

Baseline. During baseline the regular education teacher obtained daily measures of student question asking and percentage accuracy scores in the manner described above.

Treatment. During the first 4 days of treatment, each student participated in a series of 45- to 55-min training sessions conducted in the learning resource room. During the first session, the student and special education teacher viewed the first videotaped teacher presentation segment. The student was asked to identify points in the presentation where he had questions about the information presented (e.g., did not understand what the teacher had said, was unsure how to complete a problem, was unclear about what was being asked). During the beginning of the session, the teacher periodically stopped the videotape, asked the student if he understood the preceding presentation, and requested examples of questions he might ask. The student was directed to attend to several elements of asking questions, including (a) identifying natural breaks in an instructional activity when questions could be asked, (b) listening for prompts the teacher gives to evoke student questions, (c) considering the types of questions that could be asked,

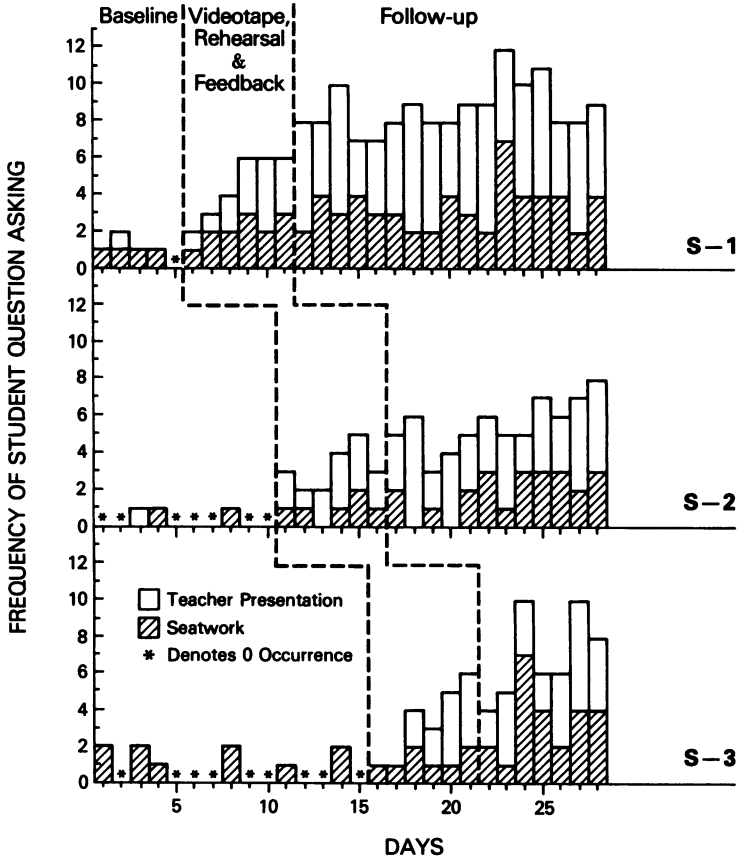


Figure 1. Daily frequency of student question-asking responses across experimental conditions for teacher presentation and seatwork activities.

and (d) formulating a question that corresponds to the instructional content. During the remainder of the session, when the student indicated that he or she had a question, the videotape was stopped and the student asked the teacher for clarification of the material presented. Throughout the session the student was encouraged to ask questions and was given praise and feedback for doing so. In addition, when the student asked a question that was poorly timed or incorrectly formulated, the teacher replayed a portion of the videotape and demonstrated correct performance.

During the second training session, the student and special education teacher viewed the same teacher presentation segment shown during the first session. In addition, the student was instructed to stop the videotape when he or she had a question about the material presented and ask the teacher

for clarification. The teacher answered the question and viewing of the videotape continued until the next point at which the student had a question. During the third and fourth training sessions, the teacher and student used this procedure while viewing the other videotaped segments. Throughout these sessions the teacher continued to provide feedback regarding performance and demonstrated correct question-asking skills as needed.

During the last 2 days of treatment, the special education teacher met with the student immediately before the mathematics class and reviewed the major elements of asking questions. After the mathematics class, the special class teacher conferred with the student about his or her performance in the class and provided praise for asking questions.

Follow-up. Follow-up measures were obtained to examine potential maintenance effects of the

intervention. Procedures were the same as those used during baseline.

RESULTS

Figure 1 shows the frequency of question-asking responses for each participant across the experimental conditions. During baseline, the average daily frequencies of question asking for each student were 1.0, 0.3, and 0.67, respectively. Most questions were asked during seatwork activities. During treatment, the level of question asking for each participant averaged 4.5, 3.1, and 3.3, respectively. Subject 1 asked an average of 2.4 questions during the teacher presentation segment of the class and 2.1 during seatwork activities. Subject 2 averaged 2.1 questions during teacher presentation and 1.0 during seatwork. Subject 3 averaged 2.0 questions during teacher presentation and 1.3 during seatwork. During follow-up the mean frequency of question asking for each participant was 8.8, 5.6, and 8.4, respectively. Subject 1 asked an average of 5.5 questions during the teacher presentation segment of the class and 3.3 during seatwork. Subject 2 asked an average of 3.7 questions during teacher presentation and 1.9 during seatwork. Subject 3 averaged 5.0 questions during teacher presentation and 3.4 during seatwork. After a gradual increase during the training sessions, question asking attained a generally consistent level with day-to-day variations in the number of questions asked during the seatwork activities.

Figure 2 presents the percentage accuracy scores on assigned seatwork activities. These measures were obtained to determine whether the students were asking the type and number of questions needed to improve their academic performance. During baseline, Subject 1 attempted the assigned work on 2 of 5 days. The average percentages of accuracy for work handed in by Subjects 2 and 3 were 50% and 52%, respectively. Each had 2 days on which they did not attempt the assigned work. On days when work was turned in, the participants answered all the problems assigned. During treatment, a gradual increase in the percentage accuracy scores was observed. The average percentage accuracy

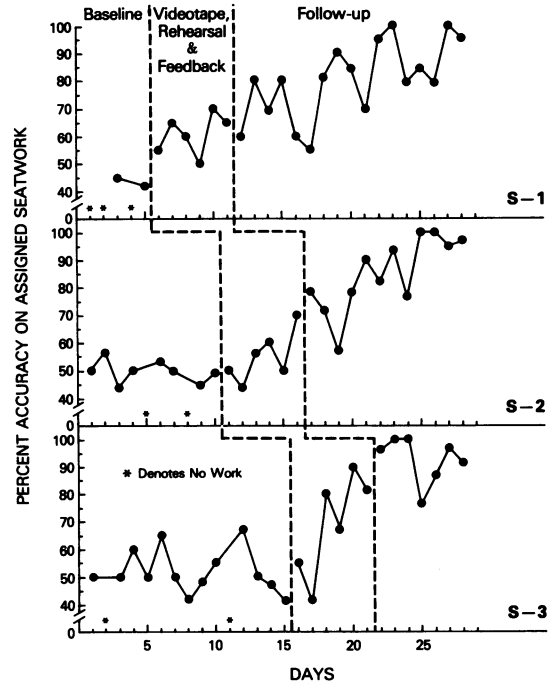


Figure 2. Daily percentage accuracy scores on assigned seatwork activities across experimental conditions.

scores during treatment were 65%, 55%, and 69%, respectively. During follow-up the percentage accuracy scores on assignments continued to increase. The average percentages were 80%, 85%, and 93% for each student. During both treatment and follow-up conditions, the subjects answered and turned in all the assigned work.

DISCUSSION

Results of this study indicated that selecting exemplars from the regular education program and using them to create opportunities for response rehearsal was an effective strategy for facilitating generalization of student question asking. The exemplars allowed the students to focus on the discriminative properties of the transfer setting and coordinate their responses to performance opportunities. Using a rehearsal procedure in association with the exemplars gave the students a chance to practice, adapt, and refine their question asking to conform to the changing conditions occurring in the instructional presentations.

The results corroborate the findings of Knapczyk and Livingston (1974), who showed that student question asking can be easily developed and is readily maintained by natural contingencies. During follow-up, the students maintained a fairly stable level of question asking without additional training or encouragement from their teachers. The results also provide additional evidence of a strong relationship between the levels of question asking and academic performance. These results, and those presented by Knapczyk and Livingston (1974), indicate that student question asking serves an important information acquisition and feedback function within an instructional activity.

The study extends the findings of Knapczyk and Livingston (1974) to include performance in regular education programs that use group teaching formats. Knapczyk and Livingston (1974) studied student question asking in a self-contained special education classroom during individually assigned seatwork activities. The present investigation showed that special education students can be taught to ask questions within the context of an ongoing instructional presentation. This finding is encouraging because in most school settings it is probably more efficient for learners to ask questions during the instructional lesson than to wait until after work has been assigned.

The strong relationship between the frequency of questions asked by the students and their accuracy on assigned work provides evidence of the social validity of treatment effects. For question asking to be a useful skill, the student must ask the number and type of questions that correspond to his or her instructional needs. The high levels of accuracy attained after treatment indicated that the participants learned to use their questioning skills to obtain sufficient information about the instructional content to achieve consistently high scores on assignments.

Another aspect of social validity concerns the relationship between the number of questions a student asks and the type of instructional activity used to present content. For example, a student may ask so many questions during an activity that

his or her performance disrupts the continuity of instruction. A comparison of the frequency of questions asked by a student with the mean and range of questions asked by the rest of the class could provide an indication of whether a student's performance was excessive. In this study, no comparisons were made between the participants and the other students. However, the regular class teacher indicated that she was very pleased with the improvement in the participants' performance. After treatment the regular class teacher noted that both the participants and the class as a whole were asking more questions during the presentation segment of the class. She stated that the increase in question asking seemed to improve the attentiveness of other students who did not frequently participate in activities and allowed her to direct instruction more closely to the needs of all students. Future research needs to examine systematically the degree to which increased question asking of one group of students can produce carryover effects to other students. Future research should also investigate the points at which higher levels of question asking can have a facilitative or disruptive effect on the presentation of instruction.

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