DOCUMENT RESUME

ED 262 751 IR 011 829

AUTHOR	Kinzer, Charles K.; And Others
TITLE	Different Logo Learning Environments and Mastery: Relationships between Engagement and Learning.
INSTITUTION	George Peabody Coll. fcr Teachers, Nashville, TN. Learning Technology Center.
SPONS AGENCY	National Inst. of Mental Health (DHHS), Bethesda, Md.
PUB DATE	[84]
GRANT	NIMH-MH-38253
NOTE	24p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Academic Achievement; Classroom Observation Techniques; Comparative Analysis; Computer Software; Elementary Education; Grade 5; *Intermode Differences; *Mastery Learning; *Microcomputers; Programing; *Programing Languages; Skill Development; Teaching Methods
IDENTIFIERS	*Instructional Effectiveness; *LOGO Programing Language; *Tutorial Mode

ABSTRACT

This paper discusses the results of research on learning LOGO programming language by two groups of fifth grade students who were taught using either a structured tutorial mode or an unstructured discovery method. Previous results showed mastery differences between the structured and unstructured teaching methods with the results favoring the structured approach. Using classroom observational techniques, the present study examines how students in the LOGO classes compare with students in traditional situations for such factors as time on task, discipline, and organization. Additionally, this research asks whether techniques other than mastery measures can be used to differentiate LOGO classes taught by structured and unstructured techniques, and whether there are observable classroom behaviors that differ in classes taught using the two different teaching methods. Findings indicate that while traditional methods of classroom observations may be appropriate to differentiate traditional classrooms from LOGO classrooms, they may be inappropriate to differentiate various LOGO learning environments; and that, while it may be possible for LOGO classrooms to look as if adequate learning is taking place, mastery may not happen. It is suggested that research in LOGO to specifically measure mastery is needed before claims of transfer can be taken seriously. (JB)

Different Logo Learning Environments and Mastery: Relationships Between Engagement and Learning

Charles K. Kinzer, Joan Littlefield, Victor R. Delclos, and John D. Bransford

Vanderbilt University

Author Notes

Kinzer is Assistant Professor of Reading Education and Research Scientist in the Peabody/Vanderbilt Learning Technology Center. Littlefield is Research Assistant in the Psychology Department of Peabody College, Vanderbilt University and Delclos is Research Associate in the Psychology Department, Vanderbilt University. Bransford is Professor of Psychology and Education and is Director of the Peabody/Vanderbilt Learning Technology Center.
The authors wish to thank Jane Stallings for the use of her classroom observation instrument and Leith Patton, Marsha Zenanko and Mark Smylie for their help in data collection. Special thanks go to George Curcie, principal, and the teachers, staff and students of Carter Lawrence Elementary School. This study was made possible by a grant from NIMH (MH-38253) awarded to John Bransford, Keith Clayton and Jeffery Franks.

Running head: LOGO ENVIRONMENTS AND MASTERY

Abstract

This study examined whether a widely used classroom observation instrument would differentiate fifth grade classrooms in which Logo was taught using a structured or an unstructured teaching method. The Logo classrooms were also compared to traditional classrooms. It was previously demonstrated that the structured group demonstrated significantly better mastery of Logo. Although there were differences between the Logo classrooms and traditional situations, no differences were found between the two different Logo environments even though the students in the two Logo classes showed different degrees of Logo mastery. The findings have specific implications for studies of transfer. Since observation of classroom behavior does not differentiate between efficacy of learning, specific measures of Logo mastery must be obtained before transfer claims related to Logo are made. Additionally, there is a need for development of monitoring systems to measure learning in Logo classrooms, as well as for the modification of traditional observational systems if we desire to make observationally-based statements about different Logo learning environments.

Different Logo Learning Environments and Mastery: Relationships Between Engagement and Learning

Logo is receiving an increasing amount of attention from both educators and parents. One reason is that it is inexpensive and has become available for a wide variety of microcomputers. Another is that Logo is simple enough for relatively young children to learn, yet can be challenging even for adults. In addition, educators such as Papert (1980) have argued that in the course of learning Logo, students develop ways of thinking and solving problems that will help them in other areas. This claim about potential benefits of Logo has generated considerable enthusiasm, in part because of a growing concern with the need for schools to develop effective thinking and problem solving skills (e.g., see Bransford & Stein, 1984; Shipman, Segal & Glaser, in press; Segal, Shipman & Glaser, in press). However, wholesale, uncritical adoption of Logo is potentially dangerous. Little is known about many aspects of Logo, including such important issues as the effect of different methods of teaching Logo, mastery of the language across different instructional situations, and possible differences between what takes place in Logo classrooms compared to traditional classrooms.

Several authors have cautioned against unbridled enthusiasm about the effects of computers on learning. As Maddux (1984) notes, "... uncritical and unrealistic optimism [for microcomputers in general] is doomed from the start and could result in a backlash reaction against educational computing" (p.36). Similarly, David Morsund's (1983-84) editorial in The Computing Teacher emphasizes the dangers of unrealistic expectations about Logo. He states:

> It feels to me like Logo has been oversold. Marketing experts have done their job, but that isn't what has oversold Logo. Educators have done it to themselves. In looking for "the answer" in computing, these teachers have latched onto Logo. It obviously is part of the answer, but transforming a partial solution into a panacea is damaging, both to education and to the potential of Logo. (p. 3)

One of the consequences of generating unrealistic expectations about educational innovations is that, ultimately, the good may be discarded along with the bad. People may be diverted from looking into potential benefits and, instead, focus only on the fact that Logo may have fallen far short of its initially-stated (but possibly unrealistic) goals (e.g., see Euchner, 1983).

In this paper we focus on the level of mastery of the Logo language across two methods of instruction, and on the need for clear description of what takes place in Logo classrooms compared to traditional academic classes. Documenting mastery and observing general classroom behaviors in Logo instruction warrants special study for at least two reasons. First, different instructional techniques in Logo may result in different amounts of learning. A popular method of instruction in Logo involves the open, discovery method of teaching. The reason for teaching Logo in this way is based on observations of children who appear to be successful at learning generalizable thinking skills when taught Logo in this type of environment (Papert, 1980). These observations have led to claims that the open method of teaching Logo is an effective one. While this may be true, it is nevertheless possible that the uses of other methods to teach Logo may result in more effective learning outcomes. Research in other areas indicates that instructional methods can be a major influence on what is learned (Arbitman-Smith, Haywood & Bransford, 1984; Bransford, Stein, Arbitman-Smith & Vye, in press; Brown, Bransford, Ferrara & Campione, 1984; Delclos, Bransford & Haywood, 1984).

A concern with mastery and with observation of classroom learning is also important for the issue of whether Logo facilitates the development and transfer of problem solving skills. Studies of transfer must specify the method of teaching Logo, plus provide some measure of whether learning of Logo has actually taken place. In recent research studies using the open, discovery teaching method, students who received training in Logo failed to show any transfer to tasks involving planning and other problem solving (Pea, 1983; Pea & Kurland, 1983). However, most studies have either failed to assess the degree to which students learned Logo programming or have found that most students' abilities to understand and generate Logo programs was considerably lower than anticipated (Pea & Kurland, 1983). It seems clear that if students fail to learn Logo in the first place, one should not expect transfer to occur.

Studies conducted at Vanderbilt University with fifth grade students of varying academic ability show that different methods of teaching Logo have important effects on mastery (Delclos, Littlefield & Bransford, in press; Delclos & Littlefield, 1984). All students received one hour of Logo instruction per day for a total of 25 school days. None of the children had received any previous instruction in Logo. Two different methods of teaching Logo were used. The unstructured method was based on a discovery learning model. In this method, the instructor introduced new Logo commands or concepts, completed one or two concrete, illustrative examples, and related new material to the previous day's work. Students then completed an example which made use of the new material. The remaining class time (approximately 40 of the 60 minutes) was unstructured, allowing students freedom as long as they were using Logo. The teacher's role during the unstructured, exploration time was to observe and answer questions.

The structured method was based on a structured tutorial model. Each day the students used an interactive tutorial computer program which presented the same material and used the same examples as those used in the unstructured method. However, when the lesson was completed students were given a sheet containing sample figures that made use of the presented material. Students were instructed to select one of the sample figures and to write a program that would draw it. The teacher's role was to ensure that the students worked on the assigned task, and also answered questions as they arose.

Three kinds of programming mastery were assessed across both instructional methods: mastery of Logo commands, comprehension mastery, and the ability to produce Logo programs. Command mastery refers to knowing the meaning of specific commands and the requirements for their use (e.g., knowing that FD means FORWARD and that a number must be used with this command). Comprehension mastery refers to an understanding of what given commands will produce, i.e., the ability to predict the figure that would result from a given set of commands. The production of programs aspect of mastery refers to the ability to write Logo programs which produce specified figures.

The results of the mastery tests indicated that the method used to teach Logo had an effect on what was learned. Specifically, there were no differences between the two instructional methods in command mastery, but there were significant differences in comprehension mastery and in the ability to produce Logo programs. Both groups knew the commands, but students in the unstructured group were less able to predict the effects of commands and use then in writing programs. Given this evidence that the method of instruction affects the degree to which Logo programming skills are acquired, it becomes important to ask how obvious it is to outside observers that students are or are not learning Logo. It may be the case that students who are taught Logo under certain instructional conditions (e.g., open instruction) may appear to learn Logo without really acquiring the level of understanding needed to predict and produce Logo programs. Further, our traditional methods of observing traditional classrooms may not be appropriate if the goal is to describe what is taking place in classrooms where students spend a great deal of time interacting with computers. If these two possibilities are true, then teachers, administrators and parents will need to be especially careful in monitoring the progress that students seem to make.

This paper presents and discusses the results of further research on learning Logo by the two previously-mentioned groups of students taught using either the structured or unstructured methods. As noted earlier, mastery differences were shown between the structured and unstructured teaching methods with the result favoring the structured approach. The present study examines how students in the Logo classes compare to students in traditional situations in factors such as time on task, discipline and organization. Additionally, this research asks whether techniques other than mastery measures can be used to differentiate Logo classes taught by structured and unstructured techniques; are there observable classroom behaviors that differ in classes taught using the two different teaching methods? Such results are important for separating engagement time from learning time.

Method

Subjects

Subjects for this study were two classes of fifth grade students. Subjects were varied in their level of academic achievement and included students who were academically less successful as well as academically successful as defined by achievement tests and teacher ratings. Both groups were equal in their initial knowledge of Logo. None of the students had prior experience with Logo. The groups were also equal in their general knowledge of microcomputers and their use.

Instructional Techniques

All subjects received the same number of hours of instruction: one hour per school day for 25 days. The two different instructional procedures discussed earlier were used. Twenty subjects were taught Logo using the structured approach and 18 were taught using the unstructured method.

Instrument and Data Collection

Both fifth-grade classes were observed using the Stallings Observation System (SOS) (Stallings, 1983). This instrument has been widely used during the past 10 years:

> The SOS has been used in all grades from kindergarten through twelfth grade, in nearly all subject areas, in all types of school districts (including urban, suburban and rural districts) and in all parts of the country. It has been used as an evaluation tool and as a guide to improve teachers' in-class instruction. Essentially, it is diagnostic, prescriptive, and evaluative. (Stallings, 1983, p. 8).

In short, the instrument used in this study is a widely used and respected observational measure that allows detailed description of both teachers' and students' classroom behavior. Further, criterion norms have been established that indicate optimal levels of behavior to which the class being observed may be compared. For example, the criterion for behavior statements, that is, the statements that a teacher makes to control student behavior in order to keep them on task, may be 15% (15% of the teacher's statements are used to control student behavior). If a teacher's behavior statements rise to 30%, then more time is being used for controlling students than is optimal for learning to occur. The criterion levels have been carefully developed and extensively tested. They are one reason for the popularity of the Stallings' instrument; most classroom observational systems do not provide a "yardstick" to which to compare observed behaviors.

In the SOS, criteria have been developed for several different types of classes, from academic areas through shops courses. The criteria used in this study represent classroom interactions and time allotments appropriate for academic, intermediate-grade (grade 4-6) classrooms containing students of average ability.

The SOS is also stringent in its observational technique. Observers must be trained and undergo checks to ensure at least 85% interrater reliability. Three independent observers observe a class three times during data collection. Data is gathered using both a "snapshot" and a "five-minute interaction" observation. The snapshot records everyone in the classroom at a given moment and tabulates each person's activity and with whom they are interacting. This is done five times during a one-hour class period. Observation takes place over three different days, resulting in 15 snapshots, and provides valid and stable data (Stallings & Kaskowitz, 1974). The five minute interaction describes and quantifies the interactions among students and teacher. These data are also gathered across five regularly-spaced time periods in each class session.

In this study, both the structured and the unstructured classes were observed by three different observers on three successive days. The observers did not know which method of instruction they were watching.

Results

The Stallings Observational System provides a method for coding a large number of possible classroom behaviors. In analyzing the data for this study, several different categories of behaviors were targeted for comparison with the norm, or "criterion". These were

- Teacher's Academic Statements.
- Organizational Statements.
- Behavior Statements.
- Students' Academic Response.
- Students' Academic Comments.

As required by the SOS, each interaction was coded, and a percentage of the total number of interactions was determined for each of the above categories.

Further, the following areas were targeted for examination of teachers' and students' time allocations:

- Teacher involvement with one student.
- Teacher involvement with whole class.
- Students involved in practice/drill.

- Students receiving instructions.
- Students involved in social interaction.
- Students involved in discussion/review.
- Students being disciplined.
- Students uninvolved.

The SOS indicates the percentage of instructional time spent in each area.

The instrument provides a method of coding interactions across four general areas and a wide variety of subcategories. In order to classify classroom behaviors for the purposes of this study, the four general classifications and two of the subcategories (students' academic responses and comments) of potential interactions were determined a priori to be the categories of interest. The eight time on task categories were similarly chosen.

INSERT TABLE 1 ABOUT HERE

Table 1 presents percentage scores for the interactions and time on task observations. Table 2 presents the results of chi-square analyses performed on the percentage figures across the structured, unstructured, and criterion groups. Normally, as in most traditional measures of classroom behavior, the percentage figures are simply compared to the criterion in a descriptive manner. The chi-square analysis was performed in order to make statements about differences between the two methods of teaching Logo, as well as to compare the Logo classroom to a traditional academic classroom.

INSERT TABLE 2 ABOUT HERE

In interpreting Tables 1 and 2, decisions concerning whether it is better for the observed data to be at, above, or below the criterion levels must be based on a consideration of the nature of each specific category and our current knowledge of good educational practice. For example, it is appropriate to have academic statements in a classroom where learning is the goal. In general, therefore, it is good if the criterion level for academic statements is exceeded. Conversely, in the behavior statement category where the teacher attempts to establish discipline or modify behavior, a smaller number of statements relative to the criterion may be viewed as appropriate. This is also true of the other categories (organizing/management statements and social statements) which take time away from direct, academically-oriented activities.

The numbers in Table 1 quantify the type of interactions observed across the four general categories. Criterion levels are also presented. Regardless of the method of teaching Logo, academic statements were over 17 percentage points higher than the criterion. In all of the other general categories, the number of interactions was significantly lower than the criterion. These data indicate that the Logo group in toto spent more effort on academic or instructional behaviors than on non-instructional behaviors such as social interactions, behavior modification and organizational/management behaviors. In effect, these results suggest that Logo classrooms exhibit more learning-oriented interactions than do normal classrooms as represented by the criterion.

In the two categories involving student responses, "student responds academically" and "student academic comments", the observed data are within 1.6 percentage points (averaged across the two Logo groups) of the criterion. The fact that no statistically significant differences were found when the two instructional groups were compared to the criteria indicates that the number of students' academic statements and comments appear to be optimal for learning (see Table 2). The number of students' statements and comments are neither disproportionately large, indicating that they are taking place at the expense of other, potentially desirable behaviors, nor small, indicating that other, potentially undesirable interactions are not dominating the Logo classrooms.

Averaging across the two classes, teachers were 25 percentage points above the criterion in the amount of time spent working with one student, and were over 22 percentage points below the criterion in amount of time they spent with the whole class. The chi-square analyses indicate that these are statistically significant differences. According to the criteria, slightly more time should be spent in whole group situations than in individual situations. Nevertheless, the observational data indicate that significantly more time is spent in individual interactions in the Logo classrooms. When the nature of the material in the Logo classes is considered, it becomes reasonable to expect teachers to spend more time with individuals than with the whole group. Furthermore, the large amount of hands-on practice required to learn Logo necessitates a smaller amount of time spent on formal, whole group instruction, and a greater amount of time allowed for practice than is normally found in traditional classrooms. This is reflected in the observational data. The remainder of teacher-time was spent in non-student related activities, such as trouble shooting on equipment, organizing software, etc.

The remaining section of Tables 1 and 2, Time Allotments, presents time-on-task measures in the two Logo classrooms. In each category, the data indicate that there are clear differences between the Logo classes and the traditional classroom represented by the criterion. For example, the students spent more time on practice, as well as on discussion/review of the concepts. They spent significantly less time receiving instructions. Their on-task behavior, therefore, was significantly better than the criterion, while their time spent on off-task behavior, such as being disciplined, being uninvolved or in social interactions, was essentially at criterion, optimally placed at 0% time.

Thus far the discussion has centered around the differences between the Logo classes and the criterion. In all cases, the Logo classes either match the criterion or move in the "best" direction, i.e., are significantly higher or lower, as pedagogically appropriate. The remaining discussion centers around the second question raised in the introduction: Are there observable differences between Logo classrooms which use different instructional methods?

As noted in the introduction, previous research reported on this group of students has clearly indicated significant, measurable differences in learning outcomes across structured and unstructured Logo environments. The question, therefore, is whether there are observable differences between such environments that can be detected by an observer while instruction is taking place. In this study, both methods of instruction in Logo resulted in classroom environments that looked desirable in relation to traditional classrooms(i.e., had fewer behavior statements, more time on task, etc.). Therefore, a lack of observable differences between instructional methods could result in the illusion of learning when in fact the best method of instruction was not being used. The chi-square results in Table 2 indicate that no statistically significant differences were found between the two Logo instructional situations.

Discussion

This study has several implications. First, although the Stallings Observational Instrument differentiated between Logo and traditional classrooms as represented by the criterion, there were no observable differences found between the two Logo classes. Traditional methods of classroom observation may therefore be appropriate to differentiate traditional classrooms from Logo classrooms, but may not be appropriate to differentiate various Logo learning environments.

One reason for this possibility is that observations across Logo environments may not be appropriately coded on traditional measures. Although students in the unstructured group were almost always on task, they frequently engaged in trial and error behavior (e.g., "I'll see what this does") rather than first planning a design and then attempting to program. In contrast, students in the structured group were frequently prompted to plan, program and debug. In short, the quality of specific activities involving the microcomputer was not assessed with the traditional observational measure. The degree to which students use microcomputers in ways that optimize learning thus needs to be incorporated in traditional classroom observational instruments.

A second important implication of the present results involves studies dealing with the issue of transfer. As noted earlier, most such studies have used the open instructional method. Their general finding of no significant transfer may be due to inadequate mastery of Logo rather than to a lack of transfer effect. This possibility would not be very probable if observers in Logo classrooms could easily see that inadequate learning was taking place under conditions of open instruction. Based on the present data, however, it seems clear that Logo classes can look excellent despite the fact that mastery may not be taking place. An important implication is that research in Logo must specifically measure mastery before claims of transfer (or a lack thereof) can be taken seriously. Research on different instructional procedures for teaching Logo can have important implications for the teaching of other subjects (e.g., science, mathematics) as well.

References

Arbitman-Smith, R., Haywood, H.C., & Bransford, J.D. (1984). Assessing cognitive change. In P. Brooks, C.M., R. Sperber & C. McCauley (Eds.), Learning and cognition in the mentally retarded (Vol. 1, pp. 433-471). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bransford,J.D., Stein, B.S., Arbitman-Smith, R., & Vye, N.J. (in press). Three approaches to improving thinking skills. In J. Segal, S. Shipman, & R.. Glaser (Eds.), Thinking and learning skills: Vol. 1. Relating instruction to basic research. Hillsdale, NJ: Lawrence Erlbaum Associates.

Bransford, J.D., & Stein, B.S. (1984). The IDEAL problem solver. New York: W.H. Freeman & Co.

Brown, A.L., Bransford, J.D., Ferrara, R.A., & Campione, J.C. (1984). Learning, remembering, and understanding. In J.H. Flavell & E.M. Markman (Eds.). Handbook of child psychology (4th Ed.): Vol III. Cognitive development (pp. 77-166). New York: Wiley.

Delclos, V.R., & Littlefield, J. (1984, April). Does Logo lead to better learning? Paper presented at the Spring conference of the Tennessee Association for Educational Data Systems, Nashville, Tennessee.

Delclos, V.R., Bransford, J.D., & Haywood, H.C. (1984). Instrumental enrichment: A program for teaching thinking. Childhood Education, 60, 256-259.

Delclos, V.R., Littlefield, J., & Bransford, J.D. (in press). Teaching thinking through Logo: The importance of method. Roeper Review.

Euchner, C. (1983, November 23). Debate grows on LOGO's effect on thinking skills. Education Week, pp. 10, 15.

Maddux, C. (1984) Educational microcomputing: The need for research. Computers in the Schools, 1, 35-41.

Morsund, D. (1983-84, December-January). Logo frightens me. Computing Teacher, Editorial, p. 3.

Papert. S. (1980). Mindstorms: Children, computers, and powerful ideas. New York: Basic Books.

Pea, R.D. (1983). Logo programming and problem solving (Tech. Rep. No. 12). New York: Bank Street College of Education, Center for Children and Technology.

Pea, R.D., & Kurland, D.M. (1983). On the cognitive effects of learning computer programming (Tech. Rep. No. 9). New York: Bank Street College of Education, Center for Children and Technology.

Segal, J., Shipman, S., & Glaser, R. (Eds.). (in press). Thinking and learning skills: Vol. 1. Relating instruction to basic research. Hillsdale, NJ: Lawrence Erlbaum Associates.

Shipman, S., Segal, J., & Glaser, R. (Eds.). (in press). thinking and learning skills: Vol. 2. Relating instruction to basic research. Hillsdale, NJ: Lawrence Erlbaum Associates.

Stallings, J.A. (1983, November). The Stallings observation system. Unpublished manuscript.

Stallings, J.A., & Kaskowitz, D. (1974). Follow through classroom observation, 1972-73. Menlo Park, CA: SRI, International.

Table 1

Percent of Interactions and Time Allotments by Group

Interaction Category	Unstructured Average n=952	Structured Average n=886	Cross Average	Criterion
1. Academic Statements	98.60	97.90	98.30	80.00
2. Organizing/ Managing Statements	0.90	1.60	1.30	15.00
3. Behavior Statements	0.30	0.10	0.20	3.00
4. Social Statements	0.30	0.20	0.30	2.00
5. Student Responds- Academically	17.80	14.40	16.10	15.00
6. Student Academic Comments	4.10	5.20	4.60	3.00
Time Allotments				
1. Teacher With one Student	56.70	63.30	60.00	35.00
2. Teacher With All	23.30	23.30	23.30	45.00
3. Student Practice/ Drill	30.30	42.80	36.60	4.00
4. Student Receiving Instructions	3.60	7.10	5.40	25.00
5. Student Social Interaction	1.60	0.00	0.00	0.00
6. Student Discussion/ Review	24.50	13.20	18.80	10.00
7. Student Uninvolved	0.00	0.70	0.40	0.00
8. Student Being Disciplined	0.00	0.00	0.00	0.00

Note. The first four interaction categories encompass all observed interactions and total 100%. The remaining two interaction categories are subcategories chosen *a priori* from a pool of possible interactions. Teacher (nos. 1 & 2) and student (nos. 3 & 4) time allotments do not total 100% because time was unrelated to instruction (e.g., teacher answering door) was not considered.

Table 2

Chi Square Results: Interactions and Time Allotments

Interaction Category	Unstructered vs. Structured	Unstructured vs. Criterion	Structured vs. Criterion
	Comparison		
1. Academic Statements	0.00	1.70	1.60
2. Organizing/ Managing Statements	--	--	--
3. Behavior Statements	--	--	--
4. Social Statements	--	--	--
5. Student Responds Academically	0.02	0.00	0.00
6. Student Academic Comments	--	--	--
Time Allotments			
1. Teacher With one Student	0.30	7.60**	8.60**
2. Teacher With All	0.00	6.30*	8.30*
3. Student Practice/ Drill	1.30	13.70**	30.50**
4. Student Receiving Instructions	0.60	14.60**	8.80**
5. Student Social Interaction	--	--	--
6. Student Discussion/ Review	2.60	5.20*	0.20
7. Student Uninvolved	--	--	--
8. Student Being Disciplined	--	--	--

* $p < 0.05$
** $p < 0.01$

Note. Chi-square values were calculated using Yates' correction. Chi-square analyses were not performed if more than one cell's observed percentage value was less than 5.

BEST COPY AVAILABLE