

Effects of Social Reinforcers on Students' Learning Outcomes at Secondary School Level

Muhammad Ilyas Bhutto

Lecturer in Education, Jamia Millia Government College of Education Malir Karachi

Email: muhammadilyasbhutto@hotmail.com

DOI Link: <http://dx.doi.org/10.6007/IJARBSS/v1-i1/8417>

Published Date: 23 March 2011

Abstract

The existing teaching within public schools in Sindh, generally, is not learner centered. Verbal and corporal punishment and unfavorable learning environment do not satisfy the conditions from behaviorists' perspective.

Present quasi-experimental study aimed to find out the effect of verbal and nonverbal 'social reinforcers' on learning outcomes under reinforcement-based and existing teaching at available two sections of ninth grade in a public high school. The two hypotheses were formulated to find out the difference between both groups' overall and randomly selected a few below average students' learning outcomes. Both the groups were already parallel and the parallel teaching was ensured through base line observation. Pre and posttests' mean scores were analyzed using t-test.

The findings revealed and confirmed both the alternate hypotheses. The students of treatment group including its below average students excelled in achieving better and statistically significant learning outcomes than that of the control group respectively.

Keywords: Social-Rein forcers, Reinforcement, Operant Conditioning, Conditioning

Introduction

The contribution of philosophers, educationists, and psychologists across history made education interesting and learner friendly. Many psychologists like Hintzman distinguish learning in two: cognitive and behaviorist schools of thought (Davidoff, 1987, p.88). Studying mental processes and providing proper environment are focused in the two respectively (Linda L. Davidoff 1987, 3rd ed. P.94).

Prominent behaviorists like Pavlov, Thorndike, and Skinner studied environmental influences to govern organism's behavior. Many studies pointed to the use of 'operant conditioning' principles to develop voluntary behaviors of humans (Skinner, 1953, 1954; Madsen, Becker and Thomas 1968; Brownstein, Haas, and Greenway, 1986; Meyer, 1999; Potoczak, Carr and Michael, 2007).

Thorndike's 'law of effect' became founding law of behaviorism (Smith, 2001. p.240). And Skinner refined his work and coined the term 'operant conditioning' which states that reinforcers or favorable consequences strengthen exhibited behavior whereas punishers or

unfavorable consequences weaken it (Passer, 2001). But the teachers took good behavior for granted and reacted when child acted up or misbehaved (Madsen et al., 1968, p-145) Operant conditioning supports to use reinforcers and to avoid punishers in classroom teaching learning process, moreover punishers create strong negative emotions for the person who use them (Slavin, 2000, p.151). Verbal stimuli could determine operant behavior and performance (Hayes, Brownstein, Haas, and Greenway, 1986, p.137).

One of the issues of public schooling system in Sindh demanding immediate attention is the teachers' corporal punishment during classroom teaching, though it is strictly prohibited. Existing teaching does not support behaviorists' perspective at all.

This experimental study focuses on determining the effects of social reinforcers on students' learning outcomes in District Jamshoro, Sindh.

Method and Designing Experiment

A quasi experimental procedure was followed within the quantitative paradigm. This research primarily follows the quantitative approach of analyzing the data.

The procedure involved following steps:

Population and Selection of Sample

All boys secondary schools of Sindh in public sector comprised the total population, whereas, a Government Boys High School from District Jamshoro, was purposively selected for this quasi-experimental study. The school had 30 students each in two sections of class ninth; which stood as control and treatment groups. This school was considered as one of the main schools of District Jamshoro, it represented both the rural and urban students. The name of the school is not mentioned in the study to ensure confidentiality of the respondents, and to avoid any legal or departmental risks for local stake holders.

Collecting Demographic Data

Demographic data of students from both groups and of all the teachers of the district were collected using specific proformas and official seniority list available.

All the relevant information about the financial-status, family background, and other demographic data of the students from both the groups was obtained before the beginning of the experimental study. Fortunately, the treatment and control group had equality and balance among almost all the variables that could have impact on their learning outcomes. Physical facilities including area of classrooms, seating arrangement, textbooks, audio-visual aids, school-management, and other aspects as discussed earlier had no difference at all, as both the groups were selected from the same school. However, parents' occupation/ profession, monthly income, education; and students' achievement level, after-school tuition, home study duration, and their favorite subjects were carefully studied and had little difference for this experimentation process.

All the required data for above mentioned variables were sought through demographic proformas for students after obtaining their verbal consent. Each student from the treatment and non-treatment groups filled up voluntarily the prescribed proformas before the start of pre-test. Their data were triangulated using other sources of information obtained from their respective class-teacher and class-representative (student-monitor).

The number of students getting after-school tuition remained 07 and 09 students respectively in control and treatment groups, with the average duration of 111 and 90 minutes a day in both groups respectively. Both the groups equally revealed English as their

favorite subject. Regarding their parent(s) education, both groups had 17 and 19 parents who received formal education. Their average education in years remained round about 11 to 10 years in control and treatment groups respectively.

Parents' profession and occupation showed negligible difference in terms of their employment-ratio and income. The parents in both groups mostly belonged to low-paid and lower middle-class status. They led hand to mouth life. Only one student's parent's monthly income in treatment group was up to Rs: 100,000/- as he was a whole-seller businessperson, whereas parents of two students in non-treatment group had Rs: 30,000/- and Rs: 40,000/- monthly income as they both were government contractors dealing in construction of buildings. The ratio of unemployment remained almost same in both groups.

Regarding teachers demographic data, there were 206 high school male teachers (HSTs) in all boys' public secondary schools in District Jamshoro. The required qualification for the above post was graduation degree with B. Ed. It interestingly found that 06 HSTs had the required academic and professional degrees while the rest of 200 teachers had additional academic, and professional masters' degrees, either M.A. or M.Sc. with M.Ed. [source: the seniority list of male HSTs district Jamshoro, issued by the executive district officer (education)]. The professional degrees like B.Ed. and M.Ed. and the education department regard education as learner centric. Legally, there is no room for corporal punishment within the existing public educational set up, but based on the researcher's vast personal observation, and the baseline observation conducted through volunteer students within both groups which were later used as control and treatment groups, confirmed that the teachers were using corporal punishment. They used spanking, beating with sticks or canes, and frequent verbal scolding for: not memorizing the lesson; talking or moving in their seats. Teachers thus became the symbol of 'fear' for students in our public secondary education system (ninth and tenth grades).

Baseline Observation

Baseline Observation was conducted to get actual information regarding, praise, or any type of punishment used and the teaching methodology of the local teacher during class room teaching and learning process. It involved both classes to be selected as control and treatment groups respectively, and continued for one week (6 working days) through two volunteer students within each group. For this purpose their consent was sought. Volunteers were trained for this purpose. Observation did not involve any specific tool or checklist due to certain inevitable reasons because any tools might be noticeable and could put the volunteers at the risk of corporal punishment by the local teacher in our existing punishment based education system. The researcher used to meet volunteers daily for getting verbal information regarding teaching methodology and teachers' attitudes towards students. Such observatory data were then recorded in specific columns of the observatory data-sheets.

Base Line Observation revealed that the teacher used local-traditional teaching method. He used to write a question and its answer on blackboard. Then he gave students sufficient time for copying down the stuff on their notebooks. Afterwards, he explained the topic using one way lecture method. He did not allow the students to talk or even to move in their class room. No students dared to ask any questions. He did not use any other types of audio visual aids, except chalk and blackboard, though the topics needed charts and models for explanation. It was a plus point that the same teacher taught the same subject (chemistry) at both classes. He took third and fourth periods at above classes respectively.

Regarding the second aspect, baseline observation revealed that the teacher hardly used any praise or any other positive social reinforcers. He mostly reacted to the negative behaviors of students, and ignored or kept quiet on students' positive learning behaviour or accomplishments. His overall attitude remained autocratic, and displayed teacher centered approach. The class observed death-silence during teacher's presence. None dared to ask any questions from the teacher. The teacher often verbally scolded and physically punished students for making a noise and on their negative learning behaviors. He hit sticks on students' hands, and other body parts. Averagely speaking, he punished two students with stick (beat with a stick or cane on students' open hands from 2 to 5 repetitions) within each 40 minutes period at both classes.

Verbal scolding and negative body language of the teacher remained permanent feature in his class room teaching. The above demographic and baseline observatory data served as basic structure to design the experiment. It enabled the researcher to ensure maximum confounding variables constant, and to study and manipulate the effect of independent variable that was positive reinforcement based teaching against existing teaching practice.

The researcher did take every possible effort to make its teaching strategy parallel to the existing teaching practice, except the use of social reinforcers which the later lacked. For this purpose the experimenter also used to write a question and its answer on the blackboard and allowed students to copy it down in their note books, and then he explained the topic using lecture method without any audio visual adds except chalks and blackboard. But the positive encouraging attitude made students to take part in learning the topic. Initially few students were able to ask for any clarification needed, but the experimenter's social reinforcers in the form of non-verbal body language (gestures) and verbal remarks made them and others more confident. Teacher's smiling, nodding patting on the back, praising, attending and clapping served effective stimuli for the students. All this turned the lecture method into a discussion some times.

Moreover, the experimenter had selected five below average students from the treatment and control groups. In the treatment group he encouraged them to participate equally in teaching learning situation. The experimenter studied the effect of same social reinforcers to strengthen their positive learning behavior in their treatment group.

Selection of Below-Average Students

The experimenter examined the previous year's annual examination-results, and sought information from respective class teachers and students' class representatives (monitors) of both groups to find out and determine below average students from both groups, then five below-average students were selected randomly from each group.

Selection of Reinforcers

The experiment involved determining the effectiveness either of the 'reinforcement-based' or 'existing' (punishment based) teaching strategies. Therefore, it is mandatory here to let the readers know what criteria or strategy was used in 'reinforcing' the required learning behavior of the students in treatment group.

When a behavior could be strengthened by using low-cost social reinforcers like; smile, praise, attention, pat, clap, good verbal or non-verbal remarks of the teacher; then it is useless to do the same job with costly and materialistic reinforcers like a candy, chocolate-bar, a hundred rupee note, a trophy, a tasty treat etc (Slavin, 2000, pp.147-149). In this way

the operant behaviors continues to be exhibited as the people in the natural environment in one or the other way reinforce the learned behaviors with praise body language.

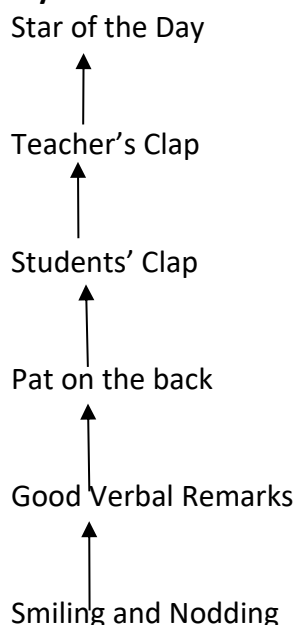
Types of Reinforcers Used

Careful efforts were taken to select specific social reinforcers for the learning and academic achievement of the students of treatment group.

Categories of Social Reinforcers:

- Gestures and Non-Verbal Reinforcers:
Encouraging gestures i.e. smile, nodding, pat on back, and claps were used for reinforcing the desired behavior of the students.
- Verbal Reinforcers:
Good verbal remarks by the teacher i.e. “Shabash” (well-done), “Sutho” or “Tamam Sutho” (good or very good), and other Sindhi equivalents phrases like: ‘you are doing well’; ‘I knew you can do this’, ‘excellent’ etc and announcement of ‘star of the day’ were used for reinforcing the desired response of the student(s).

Hierarchy of Reinforcers



The smiling and nodding, which was least social reinforce, used for encouraging and for ordinary positive learning behaviors; whereas, teacher’s clap and star of the day were the highest social reinforcers used to strengthen positive learning behaviors of students. This hierarchy might change in different context.

Instruments of Data Collection

The pre and posttests of both the control and treatment were the main source of obtaining dependent variable’s data from both groups. Whereas, the demographic data of all the students of both groups were sought through specifically designed proformas, and the seniority list of all the male HSTs of District Jamshoro were sought through Executive District Officer (Education), District Jamshoro (Seniority List, 2006).

Controlled Variables

Both the groups went through the same carefully designed pretest to collect the base line knowledge or data in the form of achievement scores in the specific areas of the particular chapter i.e. chapter number four of 'chemistry' subject at class ninth. Then after completion of the experiment, the same posttest was administered to get the data of the dependent variable i.e. the learned knowledge through treatment and existing teaching strategy. The researcher tried to control maximum conditions that might lead the result to wrong direction.

Hence, first both the groups were selected at the same school, and grade; though their classrooms (sections) were different, yet it provided the same educational and environmental conditions to them.

Secondly, demographic data revealed both the groups were parallel in terms of students' learning habits, afterschool tuition, and their parents' educational and financial backgrounds.

Additionally, baseline observation revealed that the local teacher used to write a question and its answer on the black board, and then allowed students to copy it down in their note books, finally he used lecture method to teach the curricula to their students, therefore it was necessary here to use the same mode and method of teaching in the treatment group. (The said textbook and all other textbooks were distributed in free of cost by the government of Sindh among all the students in public schooling system, and were published by the Sindh Textbook Board Jamshoro in 2008)

Pre and Posttests

Pretest was designed from the chapter four of chemistry subject taught at grade ninth at all secondary public schools, offered by the Sindh Textbook Board Jamshoro 2008. The title of the chapter was "Periodicity of the Elements" The same test was used as post-test too.

Pre-test's complexity level was determined using the criteria of Benjamin Bloom's hierarchy of six levels of cognitive domain. Items asking for knowledge and comprehension, for generalization and application, for analysis and evaluation were considered of lower, moderate and higher complexity levels respectively. The test contained 50% items (moderate) and 25% (each for lower and higher respectively) complexity level. The test contained MCQs and short-answer type questions.

Test's Validity and Reliability

The criterion for test's content validity was based on the chapter's topics taught by the control group through existing teaching practice; hence the same topics with same teaching method except the treatment aspect (use of social reinforcers) were taught to ensure maximum control on confounding variables. Therefore, items ensured 100% content validity in terms of the topics covered by the both groups. Additionally the test items were refined under the guidance of experts of Iqra University; whereas, test's reliability was determined through test-retest method. The same test was administered after 15 days of experiment in both groups. The results showed minimum variation up to 5% in the average scores of both groups.

Size of the Sample

There were 30 students each in control and treatment groups and the same appeared in their pre and post tests. It was interesting to note here that both groups actually had more than 60 students enrolled in each, but due to some unknown reasons their daily attendance remained near to half. It varied some times with the difference of two to three students. It

could be a matter of another research but it was not the researcher's focal point. Additionally, the researcher took daily attendance of both groups, and found that the same students attended the classes regularly. Absentees remained constantly absent during experimentation. This irregularity made the sample size of this quasi-experimental study parallel to the pure experimental one.

Duration of the Treatment

The treatment continued for two weeks (12 working days) involving a 40 minutes period of treatment on each working day. The Sunday remained holiday.

Findings and Discussion

The two patterns were used for analyzing data using t-test to find out any significant statistical differences in mean scores of pre and posttests of control and treatment groups.

- Pre-test versus pre-test of control and treatment groups
- Post-test versus post-test of control and treatment groups

The first pattern of analysis determined whether or not the both groups were parallel whereas, the second one determined the effect of treatment (reinforcement-based) and existing (punishment-based) teaching practice. The same patterns of analyses were used to analyze the mean scores of the selected five below-average students from each control and treatment groups respectively.

The above analyses of pre and posttests determined that both groups were parallel and there was significant statistical difference between the learning outcomes of control and treatment groups. The findings showed that students of treatment group excelled in learning outcomes than that of control group. Findings also supported that below-average students of treatment group performed better in terms of their learning outcomes than that of below-average students of control group in our context. Both major null hypotheses were rejected and consequently both alternate hypotheses were accepted on the basis of t-test analyses and findings.

The actual statistical analyses were as under:

Pre-test versus pre-test of both groups (over-all)

- Regarding pre-test scores versus pre-test scores of control and treatment group; by conventional criteria; this difference is considered to be not statistically significant. The two-tailed P value equals 0.9446. The mean of Group One minus Group Two equals -0.03. The 95% confidence interval of this difference: From -1.01 to 0.94. $t = 0.0701$. $df = 29$. Standard error of difference = 0.476. For review of statistical data, and actual mean scores of Pre-Test Scores versus Pre-Test Scores of both groups, see Tables 1 and 2 respectively. It refers to proper paralleling of both groups.

Post-test versus post-test of both groups (over-all)

- Regarding post-test versus post-test of control and treatment groups; by conventional criteria; this difference is considered to be very statistically significant. The two-tailed P value equals 0.0024. The mean of Group One minus Group Two equals -9.750. The 95% confidence interval of this difference: From -15.743 to -3.757. $t = 3.3273$. $df = 29$. Standard error of difference = 2.930. For review of statistical data, and actual mean scores of

Posttest v/s Posttest Scores of Control and Treatment Groups see Tables 3 and 4 respectively.

It refers that the treatment group got statistically significant and higher learning outcomes than that of control group.

Pre-test versus pre-test of both groups (below-average students)

- By conventional criteria, this difference is considered to be not statistically significant regarding selected below-average students’ pre-tests scores of control and treatment groups. The two-tailed P value equals 0.8541. The mean of PRE-TEST minus PRE-TEST equals -0.20. The 95% confidence interval of this difference: From -3.03 to 2.63. $t = 0.1961$. $df = 4$. Standard error of difference = 1.020. For review of statistical data, and actual mean scores of Pre-Test Scores of Control and Treatment Groups, see Tables 5 and 6 respectively.

It refers paralleling of both groups regarding randomly selected below average students.

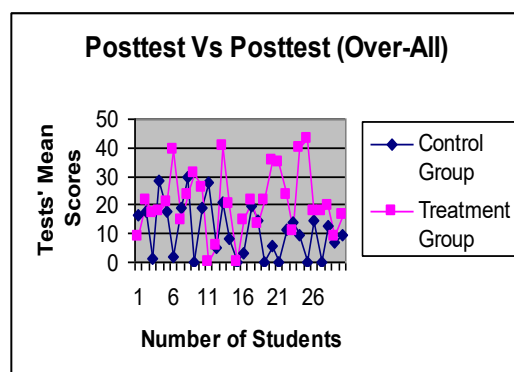
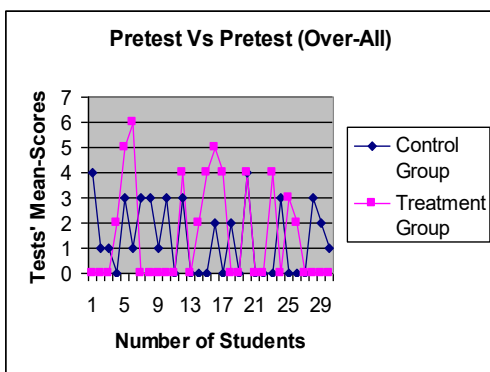
Post-test versus post-test of both groups (below-average students)

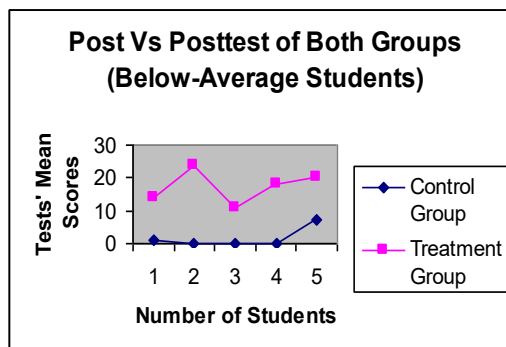
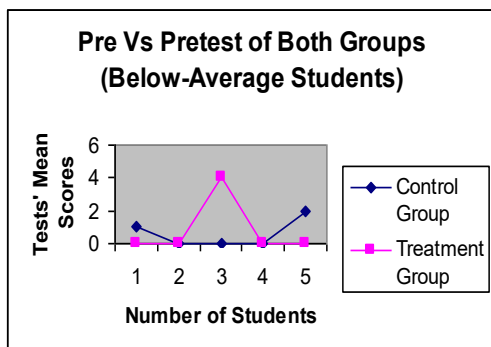
- By conventional criteria, this difference is considered to be very statistically significant regarding selected below-average students’ post-test scores of control and treatment group. The two-tailed P value equals 0.0026. The mean of POST-TEST minus POST-TEST equals -15.80. The 95% confidence interval of this difference: From -22.33 to -9.27. $t = 6.7128$. $df = 4$. Standard error of difference = 2.354. For review of statistical data and actual mean scores of Post-Test Scores of Control and Treatment Group, see Tables 7 and 8 respectively.

It referred to the statistical significance of learning outcomes of the randomly selected below average students of treatment group. It indicated of getting higher learning outcomes by the treatment group than that of the control one.

Graphs of the Mean Scores of Pre and Posttests

(Total Marks of Pre/ Posttest= 50)





Conclusion

The researcher concludes from the findings and analyses: the students of treatment group who were taught through reinforcement-based teaching achieved better learning outcomes than that of control group who were taught through existing teaching practice. Moreover, the randomly selected below-average students of the treatment group got equally better learning outcomes than that of the randomly selected below-average students of control group. It verifies the effectiveness of reinforcement-based teaching involving social reinforcers in our local context.

Recommendations

Based on present research-findings the researcher puts forward following recommendations for following stakeholders of public schooling system in order to maximize students’ learning outcomes:

Administration and Management

Administration at upper level should take effective measures in proper implementation of conducive environment especially punishment-free environment at public schooling system. The laws, rules, and regulation already exist but there is mismatch between their existence and implementation, hence they can play their role to bridge the gaps.

Professional Training Institutions & their degrees

The demographic data of the secondary school teachers of District Jamshoro and baseline observation of existing teaching revealed that almost all teachers possessed bachelors or masters’ professional but they used more or less corporal punishment and their attitude towards students was not friendly. Therefore, the above professional training institutions and their courses and degrees must incorporate effective teaching and training to shift the teacher-centered paradigm towards learner-centered education.

Refresher-Courses / In-Service training

The services of educational agencies of national and international reputation should be hired consistently to refresh, teach, and train the public sector teachers according to modern concept and theories of education.

Head Teachers or Heads of Educational Institutions

Head-teachers should take sincere efforts and the concerned higher authorities should bound them to make their teachers and sub-ordinates realize the negative impacts of

punishment; and to use low or no cost social reinforcers teaching, two way questioning, and discussions in their classrooms.

Students

Educational system exists with the main aim to develop required knowledge and skills among learners which in turn ultimately benefit the community, society, nation, and the world at large. All teaching process and educational process should revolve around the learners and their needs. In this way educational-system could produce competent individuals who can compete at national and international level. If we suppress their curiosity at initial stage, it would result in huge human and material losses across decades and centuries.

I think 'reinforcement' is the first step to start a journey towards constructivists' and other modern approaches of learning and learning through modern information networks.

Limitations

- The present study involved boys-students in its sample thus represented the target population of boys-students at secondary level in public schooling system. The findings of present research are applicable and limited to boys' high schools of Sindh in public sector. It does not include girl-students; therefore, further study should be conducted in terms of either separate study at girls'-secondary school(s) or a sample representing equal proportion of boys and girls accordingly.
- Secondly, the present study though ruled out confounding variables influencing students' learning outcomes, yet for further reliability of results the experiment may have been reversed. Reversing the treatment group as control one and vice-versa in same study would provide reliable results regarding the actual impact of 'reinforcement-based' teaching strategy.

References

- Allen, K. E., Hart, B. M., Buell, J. S., Harris, F. R., and Wolf, M. M. (1965). Effects of social reinforcement on isolate behavior of a nursery school child. In L. P. Ullmann and L. Krasner (Eds.), *Case studies in behavior modification*. New York: Holt, Rinehart, & Winston, Pp. 307-312.
- Charles, H., Madsen, Jr., Wesley, C., Becker, and Don, R. T. (1968). "Rules, praise and ignoring: Elements of elementary classroom control", *Journal of Applied Behavior Analysis*, 1,139150 retrieved from <http://www.pubmedcentral.nih.gov/tocrender.fcgi?iid=125031>
- Hall, R. V., Lund, D., and Jackson, D. (1968). Effects of teacher attention on study behavior. *Journal of Applied Behavior Analysis*, 1, 1-12.
- Linda, L. D. (1987). *Introduction to Psychology*, 3rd ed. (pp.86-122). New York: McGraw Hill Book Company.
- Meyer, K. A. (1999). Functional analysis and treatment of problem behavior exhibited by elementary school children. *Journal of Applied Behavior Analysis*, 32, 229-232.
- Michael, W. P., & Ronald, E. S. (2001). *Psychology: Frontiers and Application*. (Pp- 240-270). New York: McGraw Hill Companies.
- Robert, E. S. (2000). *Educational Psychology: Theory and Practice*, 6th ed. (pp.144-171). United States of America, Allyn and Bacon.
- Skinner, B. F. (1953) *Science and human behavior*. New York: Macmillan.

Skinner, B. F. (1954). The science of learning and the art of teaching. *Harvard educational Review*, 24, 86-97.

Steven, C., Hayes, A. J., Brownstein, J. R., Haas., and David, E. G. (1986). Instructions, multiple schedules, and extinction: Distinguishing rule-governed from schedule-controlled behavior. *Journal of the Experimental Analysis of Behavior*, 46, 137-147.