Breaking the Silence: Using a Token Economy to Reinforce Classroom Participation

Kurt A. Boniecki
Stacy Moore
University of Central Arkansas

We propose a procedure for increasing student participation, particularly in large classes. The procedure establishes a token economy in which students earn tokens for participation and then exchange those tokens for extra credit. We evaluated the effectiveness of the procedure by recording the degree of participation in an introductory psychology class before, during, and after implementation of the token economy. Results revealed that the amount of directed and nondirected participation increased during the token economy and returned to baseline after removal of the token economy. Furthermore, students responded faster to questions from the instructor during the token economy than during baseline, and this decrease in response latency continued even after removal of the token economy.

A considerable literature attests to the importance of active learning in which students engage and process course material rather than passively receive it (e.g., Benjamin, 1991; Bligh, 2000; Bonwell & Eison, 1991). One way instructors can facilitate active learning is to challenge the class periodically with relevant questions and encourage students to offer questions and comments. However, instructors may avoid this form of classroom interaction because of a phenomenon we call "the silence," the uncomfortable time following the instructor's question when no one responds. The silence is a particular problem in large classes in which students feel relatively anonymous and are reluctant to participate (McKeachie, 2002). Instructors can use a variety of techniques to combat the silence, such as waiting out the silence (Kendall, 1994), calling on students by name (Gurung, 2002), or initiating small group discussions (McKeachie, 2002). In this article, we present another method for breaking the silence that is effective and easy to use, particularly in large classes.

Our method relies on extra credit to reinforce participation. Other faculty have used extra credit as an incentive to improve exam performance (Junn, 1995; Nation & Bourgeois, 1978), read journal articles (Carkenord, 1994), seek writing assistance (Oley, 1992), demonstrate critical thinking (Junn, 1994), improve behavior modification projects (Barton, 1982), and avoid procrastination (Lloyd & Zylla, 1981; Powers, Edwards, & Hoehle, 1973). Our method creates a token economy in which students earn tokens for participation. Immediately following participation, the instructor presents a token to the student. At the end of class, students exchange their tokens for extra credit toward their course grades.

Hodge and Nelson (1991) also used reinforcement to shape classroom participation. In their study, the instructor wrote students' initials on the board and placed plus marks next to the initials of students who exhibited the desired amount of participation. Although similar to our method, Hodge and Nelson's procedure differs from ours in several ways. For instance, their procedure is feasible only in small classes, whereas our method is relatively easy to use in classes of almost any size. Indeed, the first author has successfully used our method in classrooms that seat as many as 200 students. Also, Hodge and Nelson evaluated the effectiveness of their technique based on students' self-reported participation. In contrast, we evaluated the effectiveness of our method more objectively by having a research assistant observe the degree of student participation prior, during, and after the token economy.

Method

Participants

Sixty-three undergraduate students enrolled in an introductory psychology course at the University of Central Arkansas participated in the study.

Procedure

The class met 75 min twice weekly for 16 weeks. We conducted the study over the final 11 class meetings of the term. During each of these 11 class meetings, the instructor periodically directed relevant questions to the class, and students who wanted to answer the questions raised their hands. The instructor then called on students in the order in which they raised their hands until a student answered the question correctly. If no one raised a hand within 60 sec following a question, the instructor announced the answer and continued with the lecture.

The first 4 of the 11 class meetings served as the baseline period. During this time, students did not receive any explicit reward for answering a question correctly. Over the next 4 class meetings, the instructor implemented the token economy. The instructor announced that the first person to answer a question correctly would receive a token. The tokens were wooden checker pieces purchased from a local hobby store. The pieces were heavy enough to throw, but light

enough not to cause injury if they missed their target. At the end of each class meeting, students could exchange each token for one point added to their next exam grade. Each exam point was worth 0.25% of the course grade. If students did not turn in their tokens at the end of the class meeting, those tokens were void, and students could not exchange them for extra credit in the future. This rule ensured that the instructor had to keep a supply of tokens for only one class meeting and avoided claims of lost tokens. During the final 3 class meetings, the instructor discontinued the token economy and informed students that they could no longer earn tokens for correct answers. As required by our university's institutional review board, the instructor also provided students who had not earned extra credit during the token economy with alternative extra credit opportunities during the removal period. After the removal period, the instructor fully debriefed students about the study.

During each of the final 11 class meetings, a research assistant sat in the last row of the classroom where she had an unobstructed view of all students and posed as a student in the class (e.g., by pretending to take notes). The research assistant recorded the amount of directed participation (number of students who raised their hands in response to a question from the instructor), latency to participation (amount of time following each question until the first hand was raised), and amount of nondirected participation (number of times any student spontaneously asked the instructor a question or engaged the instructor in discussion). The research assistant measured latency using a hand-operated digital stopwatch, which she kept hidden at all times.

Results

The instructor asked 16 questions during baseline, 14 during the token economy, and 16 during removal. Overall, the instructor asked a mean of 4.18 questions per class meeting. Only once did no student raise a hand following a question from the instructor. We recorded and analyzed this question, which occurred during baseline, as zero directed participation, but removed it from the analysis of latency to participation. Table 1 presents a summary of all three dependent measures across the three phases.

Table 1. Means for the Dependent Measures Across the Three Phases

Dependent Measure	Baseline	Token Economy	Removal
Directed participation/question	1.63_a	3.64_b	1.63_a
Latency to participation/question[a]	6.16_a	0.56_b	2.93_b
Nondirected participation/class period	9.50_a	21.75_b	11.00_a

Note. Values within a row not sharing a subscript are significantly different ($p \leq .05$).
[a]Time latencies are reported in seconds.

Directed Participation

We analyzed amount of directed participation using focused chi-square tests. We adjusted the expected frequencies to control for the different number of questions across the three phases. Compared to baseline, significantly more students raised their hands in response to the instructor's questions during the token economy, $\chi^2(1, N = 77) = 11.85, p < .001$. Furthermore, students raised significantly fewer hands during removal than during the token economy, $\chi^2(1, N = 77) = 11.85, p < .001$, but the number of hands raised during removal was not significantly different from baseline, $\chi^2(1, N = 52) = 0.00$.

Latency to Participation

We conducted a one-way ANOVA of the latency data. Each question from the instructor, rather than each student in the class, constituted the unit of analysis. The ANOVA revealed a significant difference between the mean latencies of the three phases, $F(2, 42) = 8.23, p = .001, \eta = .53$. Tukey's honestly significant difference (HSD) test indicated that students raised their hands significantly faster during the token economy than during baseline ($p = .001$). However, Tukey's HSD tests showed that latency to participation during removal was not significantly slower than during the token economy ($p > .20$), but was significantly faster than during baseline ($p = .05$).

Nondirected Participation

We analyzed amount of nondirected participation using focused chi-square tests. We adjusted the expected frequencies to control for the different number of class meetings across the three phases. Compared to baseline, students spontaneously participated significantly more during the token economy, $\chi^2(1, N = 125) = 19.21, p < .001$. However, during removal students spontaneously participated significantly less than during the token economy, $\chi^2(1, N = 120) = 11.56, p < .001$. Furthermore, nondirected participation did not significantly differ between baseline and removal, $\chi^2(1, N = 71) = 0.38, p > .44$.

Discussion

As we hoped, the amount of directed and nondirected participation dramatically increased following the implementation of the token economy. Students were more than twice as likely to raise their hands following a question during the token economy than during baseline. Likewise, students were more than twice as likely to ask questions and to make comments spontaneously during the token economy than during baseline, even though the instructor did not directly reinforce this form of participation with tokens. Thus, in general, students appeared more willing to contribute to the class during the token economy. Once the instructor removed the to-

ken economy, both directed and nondirected participation fell back to baseline levels, but not below them. This result suggests that the token economy did not reduce students' intrinsic motivation to participate.

We also were impressed by the shorter amount of time it took students to respond to a question during the token economy compared to baseline. During baseline, an average of 6 sec passed before a student raised a hand, but during the token economy, this latency dropped to less than 1 sec. A person may question whether a student can formulate a thoughtful answer in less than 1 sec. Although we collected no data to address this concern directly, the instructor and research assistant noticed little change in the quality of students' responses across the phases of the study. Furthermore, we believe that, during the token economy, students often raised their hands not because they had an answer, but because they wanted to be the first to answer. Reder (1987) showed that students can quickly assess whether they know an answer before actually recalling the answer from memory. Indeed, during the token economy, many students took a few seconds to formulate their response after being called on by the instructor. In contrast, during removal, when there was no competition for tokens, students appeared to wait until they formulated an answer before raising their hands—nearly 3 sec, on average, after the instructor asked the question. However, this latency during removal was still half the latency of the baseline phase, which suggests that the token economy may have a lasting effect on the speed of participation.

The contingency between the presence of the token economy and the amount and speed of participation strongly suggests that the tokens were responsible for increasing participation. However, we are aware that the design of this study does not allow a definitive causal conclusion. A comparable control group and random assignment would have provided a stricter test of the token economy's effectiveness, but these methodological luxuries were not possible. Thus, alternative explanations abound. For example, the instructor covered different topics across the three periods—developmental psychology during baseline, personality and psychological disorders during the token economy, and therapies and social psychology during removal. Perhaps the topics covered during the token economy facilitated more participation than the topics covered during baseline and removal. Nonetheless, we have confidence in the token economy for two reasons beyond these results. First, a large body of research attests to the effectiveness of token economies and other operant techniques to modify human behavior (Glynn, 1990; Kazdin, 1982; Miltenberger, 1997). Second, the instructor in this study (the first author) has used the token economy effectively across the entire terms of several courses.

In all the classes in which the instructor has used the token economy, only one student has complained of being unable to earn tokens. One way of avoiding this complaint is to provide alternative extra credit opportunities, although too many opportunities may reduce the token economy's effectiveness. Another way is to set a maximum limit on the number of tokens that can be earned. The "faster" students reach the limit early, thereby increasing the chance of other students earning tokens.

We believe the token economy procedure is a simple and effective means of breaking the silence, especially in large classes. In addition, the procedure serves as an excellent demonstration of operant conditioning and the utility of token economies. Indeed, during the removal period, while the instructor described token economies, one student spontaneously noted that the instructor had used a token economy to increase students' participation. We believe this sudden connection promotes an "a-ha" experience for the class and a deeper understanding of the material. Furthermore, the first author has noticed an increase in student attendance, enthusiasm, and preparation when he has used the token economy. Students have commented that they enjoy the procedure because it makes class more exciting and interactive.

Finally, the token economy system described in this study is flexible and easily adapted to an instructor's teaching style. We understand that some instructors do not like to use extra credit in their courses. However, instead of extra credit toward the students' course grades, tokens could be worth credit toward "purchasing" desirable options, such as dropping a quiz or being excused from the final exam (see Komaki, 1975). Alternatively, instructors could replace tokens with other easily delivered rewards, such as candy. As long as students perceive a contingency between some positive reinforcer and their participation, instructors may develop variations to suit their teaching style.

References

Barton, E. J. (1982). Facilitating student veracity: Instructor application of behavioral technology to self modification projects. *Teaching of Psychology, 9,* 99–101.

Benjamin, L. T., Jr. (1991). Personalization and active learning in the large introductory psychology class. *Teaching of Psychology, 18,* 68–74.

Bligh, D. A. (2000). *What's the use of lectures?* San Francisco: Jossey-Bass.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom* (Rep. No. ISBN–1–878380–08–7). Washington, DC: School of Education and Human Development, George Washington University. (ERIC Document Reproduction Service No. ED 336049)

Carkenord, D. M. (1994). Motivating students to read journal articles. *Teaching of Psychology, 21,* 162–164.

Glynn, S. M. (1990). Token economy approaches for psychiatric patients: Progress and pitfalls over 25 years. *Behavior Modification, 14,* 383–407.

Gurung, R. (2002, June). Sleeping students don't talk (or learn): Enhancing active learning via class participation. In P. Price (Chair), *Active learning in the classroom: Overview and methods*. Symposium conducted at the 14th annual meeting of the American Psychological Society, New Orleans, LA.

Hodge, G. K., & Nelson, N. H. (1991). Demonstrating differential reinforcement by shaping classroom participation. *Teaching of Psychology, 18,* 239–241.

Junn, E. (1994). "Pearls of wisdom": Enhancing student class participation with an innovative exercise. *Journal of Instructional Psychology, 21,* 385–387.

Junn, E. N. (1995). Empowering the marginal student: A skills-based extra-credit assignment. *Teaching of Psychology, 22,* 189–192.

Kazdin, A. E. (1982). The token economy: A decade later. *Journal of Applied Behavior Analysis, 15,* 431–445.
Kendall, B. (1994). Moment of silence. In E. Bender, M. Dunn, B. Kendall, C. Larson, & P. Wilkes (Eds.), *Quick hits: Successful strategies by award winning teachers* (p. 18). Bloomington: Indiana University Press.
Komaki, J. (1975). Neglected reinforcers in the college classroom. *Journal of Higher Education, 46,* 63–74.
Lloyd, M. E., & Zylla, T. M. (1981). Self-pacing: Helping students establish and fulfill individualized plans for pacing unit tests. *Teaching of Psychology, 8,* 100–103.
McKeachie, W. J. (2002). *McKeachie's teaching tips: Strategies, research, and theory for college and university teachers* (11th ed.). Boston: Houghton Mifflin.
Miltenberger, R. G. (1997). *Behavior modification: Principles and procedures*. Pacific Grove, CA: Brooks/Cole.
Nation, J. R., & Bourgeois, A. E. (1978). PASS, an alternative method of teaching introductory psychology. *Research in Higher Education, 8,* 273–282.
Oley, N. (1992). Extra credit and peer tutoring: Impact on the quality of writing in introductory psychology in an open admissions college. *Teaching of Psychology, 19,* 78–81.
Powers, R. B., Edwards, K. A., & Hoehle, W. F. (1973). Bonus points in a self-paced course facilitates exam-taking. *Psychological Record, 23,* 533–538.
Reder, L. M. (1987). Strategy selection in question answering. *Cognitive Psychology, 19,* 90–138.

Notes

1. We thank Bill Lammers and Timothy Johnston for their helpful comments on an earlier draft of this article.
2. Send correspondence to Kurt A. Boniecki, University of Central Arkansas, Department of Psychology and Counseling, 201 Donaghey Avenue, UCA Box 4915, Conway, AR 72035; e-mail: kurtb@mail.uca.edu.

tures as learning devices. cannot be used as a basis for drawing cause-effect relations.