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Designing Token Economies and Point Systems: Research and Guidelines for Implementation

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Outline

- 1. Definitions and reinforcement schedules within token economies
- 2. Troubleshooting existing systems
- 3. Key research & interesting findings

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Token Economies Defined

- **Behavior-change technology that can be used…**
  - … to strengthen desirable behavior
  - … to decrease undesirable behavior
  - … w/individuals of all ages and diagnoses

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Token Economies Defined

- **1. Behaviors to be strengthened or eliminated**
  - Operationally defined
- **2. Tokens or points**
  - Can be an item, visual indicator
  - Valuable because of what they are exchangeable for
- **3. Back-up reinforcers**
  - *Must* be important to the individual
  - Identified through a preference assessment or an FBA

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Identifying Back-Up Reinforcers

- **Preference Assessments**
  - Interviews (e.g., Fisher, Piazza, Bowman, & Amari, 1996; Worthington & Gargiulo, 1998)
  - Observations – Direct methods (MSWO, free operant, etc.) (DeLeon & Iwata, 1996; Fisher et al., 1992)
- **Functional Assessments**
  - Using functional reinforcer for problem behavior as back-up for appropriate behavior

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Token Economies Defined: Example

- **Jess receives a token (an x on a chart) for about every 3 letters she traces without engaging in problem behavior**
  - Behavior – letter tracing
  - Token – an x

x		

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Token Economies Defined: Example

- **Jess receives a token (an x on a chart) for about every 3 letters she traces without engaging in problem behavior**
  - Behavior – letter tracing
  - Token – an x

x	x	x
x	x	x
x	x	x

- **Once she has earned 9 tokens, Jess can exchange her tokens for 2 min of free time with the therapist**
  - Back-up reinforcer – attention, preferred items (identified through FBA)

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Token Economies Defined: Example

- **Aaron receives one token (a sticker) for every 5 math problems he completes correctly**
  - Behavior – math problem completion
  - Token – a sticker
- **At the end of the work period, Aaron can exchange each sticker for 1 min of time w/preferred item**
  - Back-up reinforcer – iPad (identified through preference assessment)

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Token Economies Defined: *Non-Example*

- **Aaron receives one token (a sticker) for every 5 math problems he completes correctly**
  - Behavior – math problem completion
  - Token – a sticker
- **Aaron continues to earn stickers all day but does not exchange them for anything**
  - Back-up reinforcer?
- **In any case, not a token economy**
  - Best case: stickers are reinforcers
  - Worst case: no effect of reinforcement

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Token Economies Defined: Example

- **Winston receives a token (a smiley face on a good behavior chart) for every class period w/out disruptive behavior**
  - Behavior – talking out, leaving the room
  - Token – smiley face
- **At the end of the week, Winston can exchange his smiley faces for preferred item(s) from menu w/ items of his choosing**
  - Back-up reinforcer – activity/item

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Token Economies Defined: *Non-Example?*

- **Winston receives a token (a smiley face on a good behavior chart) for every class period w/out disruptive behavior**
  - Behavior – talking out, leaving the room
  - Token – smiley face
- **At the end of the week, Winston can exchange his smiley faces for one of several items from a treasure box**
  - Back-up reinforcer? Best/worst case?

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Token Economies: Reinforcement Schedules

Token delivery & exchange dictated by 3 schedules:

- **1. Token production – how often tokens are delivered**
- **2. Token exchange – the cost of back-up reinforcers**
- **3. Exchange production – how often tokens can be exchanged**

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Token Economies: Reinforcement Schedules

- **Jess receives a token (an x on a chart) for about every 3 letters she traces w/out problem behavior**
- **Once she has earned 9 tokens, Jess can exchange her tokens for 2 min of free time w/therapist**
  - Token production: Variable-ratio 3 (~ 3 responses → 1 token)
  - Token exchange: Fixed-ratio 9 (9 tokens → Sr)
  - Exchange-production: Fixed-ratio 9 (9 tokens → exchange)

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Token Economies: Reinforcement Schedules

- **Aaron receives one token (a sticker) for every 5 math problems he completes correctly**
- **At the end of the work period, Aaron can exchange each sticker for 1 min of time w/preferred item**
  - Token production: Fixed-ratio 5 (5 responses → 1 token)
  - Token exchange: Fixed-ratio 1 (1 token → 1 min w/Sr)
  - Exchange-production: Fixed-time (end of work period)

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Token Economies: Reinforcement Schedules

Initially rich schedules for all three

- **1. Token production – how often tokens are delivered**
  - Frequent token delivery
- **2. Token exchange – cost of back-up reinforcers**
  - "Cheap" back-up reinforcers
- **3. Exchange production – how often tokens can be exchanged**
  - Frequent exchanges

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Troubleshooting

- **Implement intervention so you can identify if it is effective**
  - Token economies are effortful – justify your effort
- **First, do you have a back-up reinforcer?**
  - Reinforcement-based interventions rely on *reinforcement*
- **Second, is your exchange-production schedule too "lean"?**
  - Infrequent or improbable exchange periods weaken value of back-up reinforcer – take data on obtained back-up Sr delivery
- **Third, is your back-up reinforcer too expensive?**
  - Will it ever become impossible to earn the back-up reinforcer?
  - Response cost may increase this possibility

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Key Token Research: Ayllon & Azrin (1965)

- **Historical context & rationale of study**
  - Behavior analysis was restricted to animal and simple human techniques
  - Complex human techniques required high staff to patient ratios
  - Purpose was to increase many desirable behaviors with many kinds of reinforcers w/patients with varying degrees of mental illness

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Key Token Research: Ayllon & Azrin (1965)

- **Participants (patients on the ward, ages 20s-50s) received tokens for behaviors that were "necessary or useful to the patient"**
  - Behaviors – variety of self-care, food-preparation, janitorial, administrative tasks
  - Token – metal chips

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Table 6

Types and Number of On-Ward Jobs

Types of Jobs	*No. of Jobs*	*Duration*	*Tokens paid*
DIETARY ASSISTANT			
1. Kitchen Chores Patient assembles necessary supplies on table. Puts one (1) pat of butter between two (2) slices of bread for all patients. Squeezes juice from fruit left over from meals. Puts supplies away. Cleans table used.	3	10 min	1
2. Coffee Urn Patient assembles cleaning compound and implements. Washes five (5) gallon coffee urn using brush and cleaning compound. Rinses inside, washes and dries outside. Puts implements away.	1	10 min	2
3. Ice Carrier Patient goes with attendant to area adjacent to ward where ice machine is located taking along ten (10) gallon ice container. Scoops flaked ice from machine into container and carries it to the kitchen.	1	10 min	2
4. Shakers Patient assembles salt, sugar and empty shakers on table, fills shakers and puts supplies away.	2	10 min	2
5. Pots and Pans Patient runs water into sink, adds soap, washes and rinses all pans used for each meal. Stacks pans and leaves them to be put through automatic dishwasher.	3	10 min	6

Ayllon & Azrin (1965)

Key Token Research: Ayllon & Azrin (1965)

- **Participants (patients on the ward, ages 20s-50s) received tokens for behaviors that were "necessary or useful to the patient"**
  - Behaviors – variety of self-care, food-preparation, janitorial, administrative tasks
  - Token – metal chips
- **Tokens were exchangeable three times each day for preferred activities**
  - Back-up reinforcer – high-probability activities

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Table 1

List of Reinforcers Available for Tokens

	No. of Tokens Daily
I. Privacy	
Selection of Room 1	0
Selection of Room 2	4
Selection of Room 3	8
Selection of Room 4	15
Selection of Room 5	30
Personal Chair	1
Choice of Eating Group	1
Screen (Room Divider)	1
Choice of Bedspreads	1
Coat Rack	1
Personal Cabinet	2
Placebo	1-2
	Tokens
II. Leave from the Ward	
20-min walk on hospital grounds (with escort)	2
30-min grounds pass (3 tokens for each additional 30 min)	10
Trip to town (with escort)	100
III. Social Interaction with Staff	
Private audience with chaplain, nurse	5 min free
Private audience with ward staff, ward physician (for additional time —1 token per min)	5 min free

	Tokens
III. Social Interaction with Staff—Cont.	
Private audience with ward psychologist	20
Private audience with social worker	100
IV. Devotional Opportunities	
Extra religious services on ward	1
Extra religious services off ward	10
V. Recreational Opportunities	
Movie on ward	1
Opportunity to listen to a live band	1
Exclusive use of radio	1
Television (choice of program)	3
VI. Commissary Items	
Consumable items such as candy, milk, cigarettes, coffee, and sandwich	1-5
Toilet articles such as Kleenex, toothpaste, comb, lipstick, and talcum powder	1-10
Clothing and accessories such as gloves, headscarf, house slippers, handbag, and skirt	12-400
Reading and writing materials such as stationary, pen, greeting card, newspaper, and magazine	2-5
Miscellaneous items such as ashtray, throw rug, potted plant, picture holder, and stuffed animal	1-50

Ayllon & Azrin (1965)

- **Experiment III**
  - 44 Participants
  - Within-subject (ABA) design
  - A – contingent tokens
  - B – noncontingent tokens
  - Tokens always exchangeable for back-ups
  - Contingent tokens increased desirable behaviors

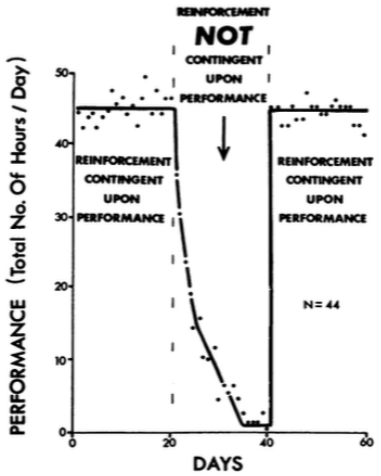

Fig. 4. The total number of hours of the on-ward performance by a group of 44 patients, Exp III.

Ayllon & Azrin (1965)

Key Token Research: Barrish, Saunders, & Wolf (1965)

- **"Good Behavior Game" (tokens + group contingency)**
- **Children (4th graders) received points for engaging in *disruptive* behavior**
  - Behaviors – talking out, getting up from desk, etc.
  - Tokens – points
    - Contingent point delivery meant to be a *punisher*
- **At end of period, if < 5 points had been delivered, children earned items and activities**
  - Back-up reinforcers – victory badges, stickers, lining up for lunch first/ early, free time
    - The fewer points the better

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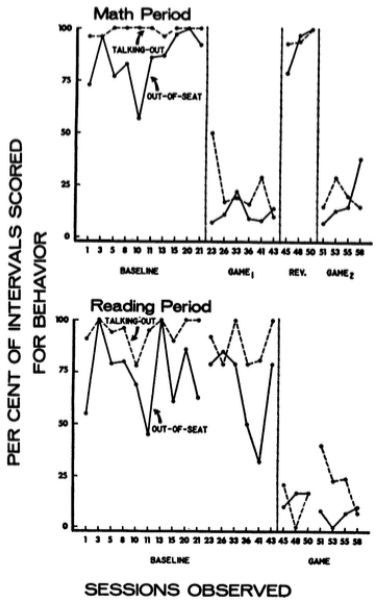
Two settings (math and reading)

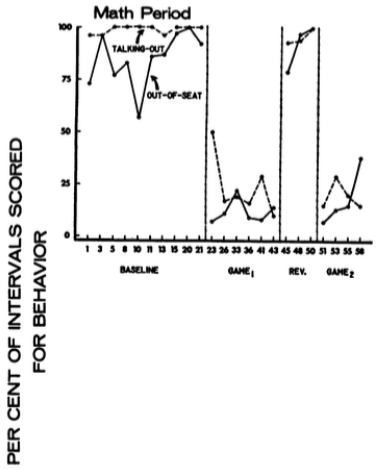
- **Within-subject designs**
  - Multiple-BL across settings



Barrish, Saunders, & Wolf (1969)

Two settings (math and reading)

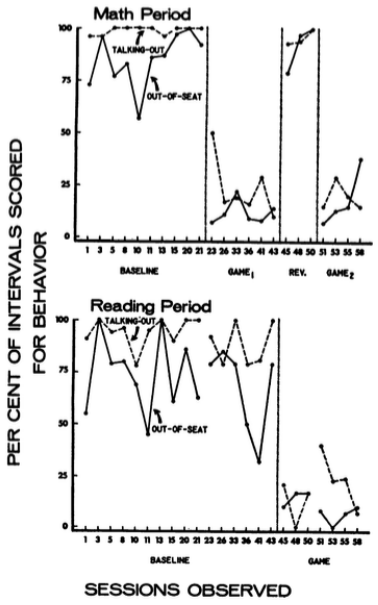
- **Within-subject designs**
  - Multiple-BL across settings
  - ABAB in math
  - Both DVs decreased w/ introduction of game, recovered in BL



Barrish, Saunders, & Wolf (1969)

Two settings (math and reading)

- **Within-subject designs**
  - Multiple-BL across settings
  - ABAB in math
  - Both DVs decreased w/ introduction of game, recovered in BL
  - AB in reading
  - Both DVs decreased only w/ introduction of game



Barrish, Saunders, & Wolf (1969)

Interesting Findings: Donaldson, DeLeon, Fisher, & Kahng (2014)

- **Compared effectiveness and preference for earning versus losing tokens w/children (1st graders)**
  - Behaviors – disruptive (e.g., banging on the table, stomping feet, etc.)
  - Tokens – check marks on individual charts
    - *Earn condition*: token delivered for absence of problem behavior
    - *Loss condition*: token removed for problem behavior
- **At end of session, tokens exchanged for variety of edibles**
  - Back-up reinforcers – "higher quality" edibles required more tokens

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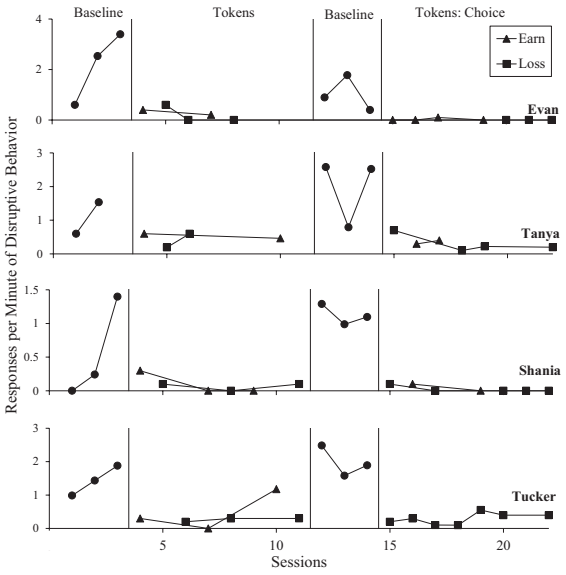
Within-subject design

- ABAC design
  - Multi-element within B
  - Choice in C
- Disruptive behavior decreased in both contingencies and recovered in baseline



Donaldson et al. (2014)

Within-subject design

- ABAB design
- Multi-element within B
- Disruptive behavior decreased in both contingencies and recovered in baseline
- On average, children preferred the ”loss” contingency
  - *And* the loss contingency took less time to implement

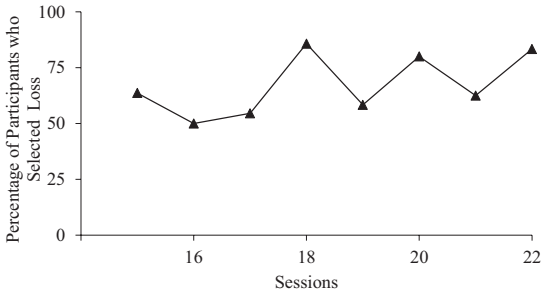


Table 2
Duration (in Minutes) of Intervention Implementation

	Small group	Whole class
Earn	4.52	7.68
Loss	1.18	0.42

Donaldson et al. (2014)

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Designing Token Economies and Point Systems: Research and Guidelines for Implementation

Objectives

1. Audience members will list and describe key variables that influence the effectiveness of token economies and point systems

2. Audience members will become familiar with key research on token economies and point systems used with individuals with developmental disabilities and emotional and behavioral disorders

3. Audience members will be able to troubleshoot existing ineffective token economies or point systems

References and Resources
Please do not hesitate to contact me if you need access to any of these resources or data sheets.

Token economies.

Ayllon, T., & Azrin, N. H. (1965). The measurement and reinforcement of behavior of psychotics. *Journal of the Experimental Analysis of Behavior, 8,* 357-383.

Barrish, H. H., Saunders, M., & Wolf. M. M. (1969). Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom. *Journal of Applied Behavior Analysis, 2,* 119-124.

Doll, C., McLaughlin, T. F., & Barretto, A. (2013). The token economy: A recent review and evaluation. *International Journal of Basic and Applied Science, 2,* 131-149.

Donaldson, J. M., DeLeon, I. G., Fisher, A. B., & Kahng, S. (2014). Effects of and preference for conditions of token earn versus token loss. *Journal of Applied Behavior Analysis, 47,* 537-548.

Hackenberg, T. D. (2009). Token reinforcement: A review and analysis. *Journal of the Experimental Analysis of Behavior, 91,* 257-286.

Kazdin, A. E., & Bootzin, R. R. (1972). The token economy: An evaluative review. *Journal of Applied Behavior Analysis, 5,*

Preference assessments.

Student interview.

Student Functional Assessment Interview and Reinforcement Survey (Worthington & Garguilo, 1998):
https://www.misd.net/mtss/tier3/student_functional_assessment_interview.pdf

Caregiver interview.

Reinforcement Assessment Interview for Individuals with Severe Disability (Fisher, Piazza, Bowman, & 1996):
https://www.kennedykrieger.org/sites/default/files/patient-care-files/raisd.pdf

Direct assessments.

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*, 519-533.

Fisher, W. W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and pro- found disabilities. *Journal of Applied Behavior Analysis*, *25*, 491-498.

Hagopian, L. P., Long, E. S., Rush, K. S. (2004). Preference assessment procedures for individuals with developmental disabilities. *Behavior Modification, 28,* 668-677.

Chazin and Ledford (2016)
http://vkc.mc.vanderbilt.edu/ebip/preference-assessments/

Reinforcement Assessment for Individuals with Severe Disabilities (RAISD)

Student's Name: _____

Date: _____

Recorder: _____

The purpose of this structured interview is to get as much specific information as possible from the informants (e.g., teacher, parent, caregiver) as to what they believe would be useful reinforcers for the student. Therefore, this survey asks about categories of stimuli (e.g., visual, auditory, etc.). After the informant has generated a list of preferred stimuli, ask additional probe questions to get more specific information on the student's preferences and the stimulus conditions under which the object or activity is most preferred (e.g., What specific TV shows are his favorite? What does she do when she plays with a mirror? Does she prefer to do this alone or with another person?)

We would like to get some information on _____'s preferences for different items and activities.

1. Some children really enjoy looking at things such as a mirror, bright lights, shiny objects, spinning objects, TV, etc. What are the things you think _____ most likes to watch?

   Response(s) to probe questions:

2. Some children really enjoy different sounds such as listening to music, car sounds, whistles, beeps, sirens, clapping, people singing, etc. What are the things you think _____ most likes to listen to?

   Response(s) to probe questions:

3. Some children really enjoy different smells such as perfume, flowers, coffee, pine trees, etc. What are the things you think _____ most likes to smell?

   Response(s) to probe questions:

4. Some children really enjoy certain food or snacks such as ice cream, pizza, juice, graham crackers, McDonald's hamburgers, etc. What are the things you think _____ most likes to eat?

   Response(s) to probe questions:

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment. *American Journal on Mental Retardation, 101,* 15–25.

5. Some children really enjoy physical play or movement such as being tickled, wrestling, running, dancing, swinging, being pulled on a scooter board, etc. What activities like this do you think _____ most enjoys?

Response(s) to probe questions:

6. Some children really enjoy touching things of different temperatures, cold things like snow or an ice pack, or warm things like a hand warmer or a cup containing hot tea or coffee. What activities like this do you think _____ most enjoys?

Response(s) to probe questions:

7. Some children really enjoy feeling different sensations such as splashing water in a sink, a vibrator against the skin, or the feel of air blown on the face from a fan. What activities like this do you think _____ most enjoys?

Response(s) to probe questions:

8. Some children really enjoy it when others give them attention such as a hug, a pat on the back, clapping, saying "Good job", etc. What forms of attention do you think _____ most enjoys?

Response(s) to probe questions:

9. Some children really enjoy certain toys or objects such as puzzles, toy cars, balloons, comic books, flashlight, bubbles, etc. What are _____'s favorite toys or objects?

Response(s) to probe questions:

10. What are some other items or activities that _____ really enjoys?

Response(s) to probe questions:

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment. *American Journal on Mental Retardation, 101,* 15–25.

After completion of the survey, select all the stimuli which could be presented or withdrawn contingent on target behaviors during a session or classroom activity (e.g., a toy could be presented or withdrawn, a walk in the park could not). Write down all of the specific information about each selected stimulus on a 3" x 5" index card (e.g., likes a female adult to read him the 'Three Little Pigs' story.) Then have the informant(s) select the 16 stimuli and rank order them using the cards. Finally, list the ranked stimuli below.

1. _____ 9. _____
2. _____ 10. _____
3. _____ 11. _____
4. _____ 12. _____
5. _____ 13. _____
6. _____ 14. _____
7. _____ 15. _____
8. _____ 16. _____

Notes:

Student Functional Assessment
Interview and Reinforcement Survey

Student: _____ School: _____
Date of Birth: _____ Age: ____ Grade: ____ Date Completed: _____
Interviewer: _____

Section A

	Always	Sometimes	Never
1. In general, is your work too hard for you?			
2. In general, is your work too easy for you?			
3. When you ask for help appropriately, do you get it?			
4. Do you think work periods for each subject are too long?			
5. Do you think work periods for each subject are too short?			
6. When you do seatwork, do you do better when someone works with you?			
7. Do you think people notice when you do a good job?			
8. Do you think you get the points or rewards you deserve when you do good work?			
9. Do you think you would do better in school if you received more rewards?			
10. In general, do you find your work interesting?			
11. Are there things in the classroom that distract you?			
12. Is your work challenging enough for you?			

From Worthington & Gargiulo, 1998

Section B

1. When do you think you have the fewest problems with _____ in school?
   target behavior 1

   Why do you not have problems during this/these time(s)?

   Why do you have problems during this/these time(s)?

   What changes could be made so that you have fewer problems with this behavior?

2. When do you think you have the fewest problems with _____ in school?
   target behavior 2

   Why do you not have problems during this/these time(s)?

   Why do you have problems during this/these time(s)?

   What changes could be made so that you have fewer problems with this behavior?

3. When do you think you have the fewest problems with _____ in school?
   target behavior 3

   Why do you not have problems during this/these time(s)?

   Why do you have problems during this/these time(s)?

   What changes could be made so that you have fewer problems with this behavior?

4. When do you think you have the fewest problems with _____ in school?
   target behavior 4

   Why do you not have problems during this/these time(s)?

   Why do you have problems during this/these time(s)?

   What changes could be made so that you have fewer problems with this behavior?

5. When do you think you have the fewest problems with _____ in school?
   target behavior 5

   Why do you not have problems during this/these time(s)?

   Why do you have problems during this/these time(s)?

   What changes could be made so that you have fewer problems with this behavior?

From Worthington & Gargiulo, 1998

Section C

Rate how much you like the following subjects:

	Not at All	Fair	Very Much
Reading	1	2	3
Math	1	2	3
Spelling	1	2	3
Handwriting	1	2	3
Science	1	2	3
Social Studies	1	2	3
English/Language	1	2	3
Music	1	2	3
Physical Education	1	2	3
Art	1	2	3
Other (specify: _____)	1	2	3

Section D

What do you like and dislike about:

	Like	Dislike
Reading		
Math		
Spelling		
Handwriting		
Science		
Social Studies		
English/Language		
Music		
Physical Education		
Art		
Other (specify: _____)		

From Worthington & Gargiulo, 1998

Section E – Reinforcement Survey

Directions: To complete this survey, it is recommended that each question be read to the student in an informal manner. While you should guard against pressuring a student to complete each statement, please be sure to follow-up or clarify any vague responses.

For younger children, you may want to consider placing each item on cards and use them to play a game (using a generic game board). The items can be made less threatening in a game-like format because you will be completing the statements along with the student.

Your primary goal of this survey is to determine those reinforcers that have the greatest potential for use in a plan for behavior support.

Part I: Sentence Completion

1. My favorite adult at school is:
   The things I like to do with this adult are:

2 My best friend at school is:
   Some things I like to do with my best friend at school are:

3. Some other friends I have at school are:
   Some things I like to do with them are:

4. When I do well in school, a person I'd like to know about it is:

5. When I do well in school, I wish my teacher would:

6. At school, I'd like to spend more time with:
   Some things I'd like to do with this person are:

7. One thing I'd really like to do more in school is:

8. When I have free time at school I like to:

9. I feel great in school when:

10. The person who likes me best at school is:
    I think this person likes me because:

11. I will do almost anything to keep from:

12. The kind of punishment at school that I hate most is:

13. I sure get mad at school when I can't:

14. The thing that upsets my teacher the most is:

15. The thing that upsets me the most is:

From Worthington & Gargiulo, 1998

16. Some things I like are (check all that apply):

Favorite Edible Reinforcers

- ❑ candy (specify _____)
- ❑ fruit (specify _____)
- ❑ drinks (specify _____)
- ❑ cereal (specify _____)
- ❑ snacks (specify _____)
- ❑ nuts (specify _____)
- ❑ vegetables (specify _____)
- ❑ other (specify _____)

Favorite Tangible Items

- ❑ stuffed animals
- ❑ pencils, pens, crayons
- ❑ paper (specify _____)
- ❑ trucks, tractors
- ❑ sports equipment (specify_____)
- ❑ toys (specify _____)
- ❑ books (specify _____)
- ❑ puzzles

Academic Reinforcers

- ❑ going to library
- ❑ having good work displayed
- ❑ getting good grades
- ❑ having parents praise good school work
- ❑ giving reports
- ❑ making projects
- ❑ completing creative writing projects
- ❑ earning teacher praise
- ❑ helping grade papers
- ❑ getting a good note home
- ❑ earning stickers, points, etc.
- ❑ other (specify _____)

Social Reinforcers

- ❑ teaching things to other people
- ❑ being the teacher's helper
- ❑ spending time with my friends
- ❑ spending time with the teacher
- ❑ spending time with the principal
- ❑ spending time with _____
- ❑ having class parties
- ❑ working with my friends in class
- ❑ being a tutor
- ❑ being a leader in the class
- ❑ other (specify _____)
- ❑ other (specify _____)

Activity Reinforcers

- ❑ coloring/drawing/painting
- ❑ making things (specify _____)
- ❑ going on field trips
- ❑ taking care of/playing with animals
- ❑ going shopping
- ❑ eating out in a restaurant
- ❑ going to movies
- ❑ spending time alone
- ❑ reading
- ❑ having free time in class
- ❑ having extra gym/recess time
- ❑ working on the computer
- ❑ other (specify _____)

Recreation/Leisure Reinforcers

- ❑ listening to music
- ❑ singing
- ❑ playing a musical instrument
- ❑ watching TV
- ❑ cooking
- ❑ building models
- ❑ woodworking/carpentry
- ❑ favorite sports (specify _____)
- ❑ working with crafts
- ❑ other (specify _____)
- ❑ other (specify _____)
- ❑ other (specify _____)
- ❑ other (specify _____)