

APPENDIX A

DATA FOR EARLY VERSUS LATE RETURN ANALYSIS

Table A1

Chi-Square Analysis of Early Versus Late Respondents on Selected Questions in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Question	χ^2	df	p
Job tasks			
Take photography	0.19	1	.70
Produce video tapes	0.05	1	.83
Produce art	1.10	1	.29
Prepare media releases	1.25	1	.26
Program computers	0.49	1	.48
Prepare budget	0.73	1	.40
Perform maintenance on star-projector	0.72	1	.25
Hire staff	1.33	1	.56
Build projectors	0.34	1	.79
Write school programs	0.27	1	.61
Produce public programs	0.24	1	.63
Conduct workshops for teachers	0.12	1	.73

(table continues)

Table A1 (Continued)

Chi-Square Analysis of Early Versus Late Respondents on Selected Questions in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Question	χ^2	df	p
Teach in a classroom	0.90	1	.34
Write curriculum	0.32	1	.57
Planetarium part of school curriculum	0.74	1	.39
Teachers help develop curriculum	0.13	1	.72
Lesson guides for K - 6 grades	0.60	1	.44
Lesson guides for 7 - 12 grades	4.23	1	.04*
Planetarium integrated into curriculum	0.50	1	.48
Planetarium extension of classroom	4.03	1	.04*
Student participation encouraged	0.11	1	.74
State-mandated curriculum	0.94	1	.33
You are a certified teacher	0.96	1	.33
Planetarium purpose stated in policy	1.45	1	.23
Accessible to all in school district	1.60	1	.21
Operates autonomously	0.39	1	.53

*p \leq .05.

Table A2

Early Versus Late Response t-tests for Selected Questions in the National Survey
of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Question	Early ($\underline{n} = 43$)			Late ($\underline{n} = 43$)			t
	<u>n</u>	<u>M</u>	<u>SD</u>	<u>n</u>	<u>M</u>	<u>SD</u>	
% duties for planetarium	36	42.08	32.99	29	40.86	32.55	0.14
% administrative duties	32	9.50	11.30	27	13.93	14.11	-1.32
Number lessons per day	33	2.30	1.51	31	2.17	1.48	0.35
Number students per lesson	35	31.86	11.51	32	35.50	12.04	0.27
More effective than classroom	36	3.56	0.65	32	3.44	0.95	0.60
More difficult than classroom	35	2.40	0.65	32	2.77	0.97	-1.28
Support classroom teacher	36	3.06	0.79	32	3.38	0.55	-1.91
Integrated curriculum	36	3.56	0.56	32	3.69	0.47	-1.05
Teacher must prepare students	36	3.42	0.65	32	3.34	0.75	0.43
Participatory is better	35	3.40	0.65	32	3.41	0.50	-0.04
Maximum one hour visit	36	3.33	0.59	32	3.28	0.89	0.29
Number of staff you supervise	35	0.91	3.22	32	0.47	1.37	0.72
Number months open	36	9.32	1.75	32	9.88	1.04	-1.56
Integrated curriculum	36	2.83	0.85	32	2.75	0.92	0.39

* $p \leq .05$.

Table A3

Comparison of Early and Late Response Frequencies on Selected Questions in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Response for	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Job task spend most time on				
Teach in classroom	21	48.8	22	51.2
Write school programs	5	11.6	5	11.6
Produce public programs	2	4.7	1	2.3
Computer programing	2	4.7	0	0.0
Budget	1	2.3	1	2.3
Maintenance	1	2.3	0	0.0
No response	11	25.6	14	32.6
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>
First skill most used				
Communication	18	41.9	21	48.8
Mechanical	14	32.6	10	23.3
Creative	2	4.7	1	2.3
Electrical	1	2.3	0	0.0
No response	8	18.6	11	25.6
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

(table continues)

Table A3 (continued)

Comparison of Early and Late Response Frequencies on Selected Questions in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Response for:	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Second skill most used				
Creative	20	46.5	20	46.5
Communication	6	14.0	6	14.0
Writing	5	11.6	4	9.3
Electrical	3	7.0	2	4.7
No response	9	20.9	11	25.6
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>
Single most used skill				
Communication	19	44.2	16	37.2
Creative	4	9.3	9	20.9
Mechanical	4	9.3	2	4.7
Writing	2	4.7	2	4.7
Electrical	1	2.3	1	2.3
No response	13	30.2	13	30.2
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

(table continues)

Table A3 (continued)

Comparison of Early and Late Response Frequencies on Selected Questions in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Response for:	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Classification				
Administrator	3	7.0	0	0.0
Teacher	31	72.1	31	72.1
Other	2	4.7	0	0.0
No response	7	16.3	12	27.9
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

Table A4

Comparison of Early and Late Response Frequencies on Grade-Level Use of
Public-School-Owned Planetaria in the United States, N = 86

Grade level use	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Grade 1	24	55.8	18	41.9
Grade 2	25	58.1	16	37.2
Grade 3	27	62.8	19	44.2
Grade 4	28	65.1	21	48.8
Grade 5	30	69.8	22	51.2
Grade 6	24	55.8	20	46.5
Grade 7	18	41.9	13	30.2
Grade 8	17	39.5	19	44.2
Grade 9	16	37.2	17	39.5
Grade 10	17	39.5	20	46.5
Grade 11	21	48.8	23	53.5
Grade 12	22	51.2	22	51.2

Table A5

Comparison of Early and Late Response Frequencies on Directors' Official Titles as Reported in the National Survey of Planetarium Directors Operating Public-School-Owned Planetaria, N = 86

Official title	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Teacher	13	30.2	15	34.9
Director	10	23.3	6	14.0
Director plus other title	7	16.3	5	11.6
Resource person	1	2.3	0	0.0
Co-director	1	2.3	0	0.0
Planetarium supervisor	1	2.3	0	0.0
District science supervisor	1	2.3	0	0.0
Curator	1	2.3	0	0.0
Assistant principal	1	2.3	0	0.0
Planetarium teacher	0	0.0	4	9.3
Planetarium manager	0	0.0	1	2.3
Planetarium Coordinator	0	0.0	1	2.3
No response	7	16.3	11	25.6
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

Table A6
Comparison of Early and Late Response Frequencies on Immediate Supervisors of
Directors Operating Public-School-Owned Planetaria in the United States.

N = 86

Immediate supervisor	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Principal	24	55.8	16	37.2
Curriculum director	3	7.0	2	4.7
Science supervisor	2	4.7	3	7.0
Assistant superintendent	2	4.7	1	2.3
Director of instruction	2	4.7	0	0.0
Coordinator	1	2.3	0	0.0
Superintendent	1	2.3	1	2.3
Department chair	0	0.0	7	16.3
Assistant principal	0	0.0	1	2.3
No response	8	18.6	12	27.9
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

Table A7

Comparison of Early and Late Response Frequencies on Main Policy-MakingBody of Public-School-Owned Planetaria in the United States, N = 86

Policy maker	Early		Late	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>
Planetarium director (self)	16	37.2	7	16.3
School board	3	7.0	8	18.6
Planetarium staff	3	7.0	1	2.3
School district	2	4.7	0	0.0
Department chair	2	4.7	1	2.3
Teachers	2	4.7	0	0.0
Science supervisor	2	4.7	2	4.7
Assistant superintendent	1	2.3	1	2.3
County government	1	2.3	0	0.0
Superintendent	1	2.3	0	0.0
Planetarium committee	1	2.3	0	0.0
Director of elementary ed.	1	2.3	0	0.0
Curriculum director	0	0.0	2	4.7
Director + science supervisor	0	0.0	1	2.3
None	0	0.0	3	7.0
No response	8	18.6	17	39.5
Total	<u>43</u>	<u>100.0</u>	<u>43</u>	<u>100.0</u>

APPENDIX B

BRAINSTORMING ITEMS FOR THE DEVELOPMENT OF THE NATIONAL
SURVEY OF PLANETARIUM DIRECTORS OPERATING PUBLIC-SCHOOL-
OWNED PLANETARIA IN THE UNITED STATES

Director Items

1. Highest degree earned?
2. Did you have any special training?
3. Number of full time and part time staff?
4. Do you have an assistant?
5. Your official title?
6. Special Skills needed?
7. Special talent needed?
8. Number of years experience teaching?
9. Number of years as a planetarium director?
10. Have you been a director of other planetaria?
11. How many other planetaria?
12. How many students in you school district?
13. How many school programs are presented each day?

(appendix continues)

Appendix B (continued)

14. Your certification and type?
15. Your area of certification?
16. Grade levels most frequently taught?
17. Grade levels using the planetarium?
18. What are your working conditions?
19. What percentage elementary, middle, high are using the planetarium?
20. Is your planetarium set up for community use?
21. Are there stated objectives?
22. Do you use volunteers in the planetarium?

Curriculum Items

23. Are lessons written by the director?
24. Type of program . . . live or pre-recorded?
25. What methodology is used?
26. Does creativity play an important role in curriculum development?
27. Do you think the planetarium operated autonomously in the school system?
28. What percentage is community use?
29. What percentage is other use?

(appendix continues)

Appendix B (continued)

30. Do you incorporate poly-competence within the curriculum?
31. Is there coordination with classroom teachers on planetarium lessons?
32. Do you write lesson plans for teachers?
33. Is the purpose of the planetarium to support classroom teachers?
34. Is the purpose of the planetarium to teach the unit in place of the teacher?
35. Do you get feedback from teachers?
36. Do you get feedback from students?
37. Do you get feedback from parents?
38. Do you teach current scientific theory with respect to the formation of stars?
39. Is there an astronomy textbook linked to the planetarium lesson?
40. Do you provide printed resource materials for teachers?
41. Are you accessible to teachers?
42. Are you accessible to students?
43. Are you accessible to parents?
44. Do you conduct in-service training for teachers on astronomy?
45. Are there lesson topics for each grade level using the planetarium?
46. Do you have age limits on students visiting the planetarium?

(appendix continues)

Appendix B (continued)

47. Do you have grade-level limits on students visiting the planetarium?
48. What is the average number of students taught each day?
49. Do you teach adult programs on astronomy to the community?
50. Do you teach college student classes in the planetarium?
51. Do you offer after-school programs?
52. Do you offer pre-school programs?
53. What is the length of a school program?

Facility Questions

54. Is your planetarium located in a school?
55. If "yes," what type of school?
56. Is your planetarium a separate building?
57. Is the facility designed for community use?
58. What type of seating arrangement ... circular, directional, or other?
59. What is the dome size and tilt (0 if not tilted)?
60. What is the make of your planetarium instrument?
61. Is the star-projector automated?
62. How many slide projectors do you have, and how many are automated?

(appendix continues)

Appendix B (continued)

63. How many video projectors do you have, and are they automated?
64. How many special-effects projectors do you have, and are they automated?
65. How many self-made projectors do you have?
66. Are computer graphics used with your video projector?
67. Do you have an exhibit area adjacent to the planetarium?
68. Do you have a work area adjacent to the planetarium?
69. Would you recommend an exhibit area?
70. Is your planetarium designed to control noise levels?
71. Is your planetarium a separate building?
72. Do you have a response control system at each seat?
73. Is there an office for the director?
74. Is there an office for the secretary?
75. Yearly number served in the community?
76. Yearly number served in the school district?
77. Yearly number served in other school districts?
78. Yearly number served at the college level?
79. Is the planetarium used by other school districts?

(appendix continues)

Appendix B (continued)

80. Do you arrange bus transportation for the students?
81. What is the travel time for students to the planetarium?
82. Does the building have an exterior dome roof?
83. Prioritize a list of items needed to equip a school planetarium.
84. What type of seating do you recommend?
85. What dome size do you recommend?

Organization Items

86. What is the title of your immediate supervisor?
87. What is the title of your intermediate supervisor?
88. What is the title of your top supervisor?
89. Are you on a teacher contract at teacher pay?
90. Are you on a teacher contract at other than teacher pay?
91. Are you on an administrative contract?
92. What is your contract classification?
93. How many months is your contract?
94. List your co-workers in the planetarium.
95. How was the construction of the planetarium funded?

(appendix continues)

Appendix B (continued)

96. What is the current funding for the planetarium?
97. Is the planetarium controlled by the school board?
98. Is the planetarium controlled by an advisory council?
99. Are you considered a school administrator or teacher?
100. Do you have tenure?

APPENDIX C

FINAL QUESTIONS SELECTED FOR THE PLANETARIUM SURVEY

1. Are you currently employed by a public school system to operate a public-school-owned planetarium?

- 1 No
- 2 Yes

If your answer was “No” you do not need to fill out the remainder of this questionnaire. However, I would appreciate any comments you might like to make on public-school-owned planetaria. Above all, please return the questionnaire to me in the provided return envelope. This will allow me to record your survey number and remove it from my list.

I would like to ask you some questions about the job of planetarium director operating a public-school-owned planetarium. (Please circle your answer or fill in the blanks)

2. Do you personally write the curriculum used in the planetarium?

- 1 No
- 2 Yes

3. Do you personally schedule all planetarium visits for the school system?

- 1 No
- 2 Yes

4. What percentage of your day is spent on duties involving the planetarium? ____%

5. What percentage of your day is spent on administrative duties involving the planetarium? _____%

6. Are you assigned other duties?

- 1 No
- 2 Yes

Please list the duties and record the percentage of your day spent on each of these duties.

Other duties	%
_____	_____
_____	_____
_____	_____

7. How many lessons are presented in the planetarium on a average day? _____

8. How many students are in a typical planetarium lesson? _____

(appendix continues)

Appendix C (continued)

9. Do you perform any of the following job tasks as part of your planetarium duties?
(Please check all that apply)

- | | |
|---|---|
| <input type="checkbox"/> Take photography (slides, and/or prints) | <input type="checkbox"/> Hire staff |
| <input type="checkbox"/> Produce video tapes | <input type="checkbox"/> Build special-effects projectors |
| <input type="checkbox"/> Produce artwork for programs | <input type="checkbox"/> Write school programs |
| <input type="checkbox"/> Prepare media releases (radio, television, or newspaper) | <input type="checkbox"/> Write public programs |
| <input type="checkbox"/> Program computers for automation | <input type="checkbox"/> Produce public programs |
| <input type="checkbox"/> Prepare budget | <input type="checkbox"/> Conduct workshops for teachers |
| <input type="checkbox"/> Perform routine maintenance on star-projector | <input type="checkbox"/> Teach in a classroom |

10. On which single job task listed above do you spend the most time? _____

11. What two skills do you consider so important in the performance of your job that you could not do without them?

- | | |
|--|-------------------------------------|
| <input type="checkbox"/> Mechanical | <input type="checkbox"/> Electrical |
| <input type="checkbox"/> Artistic | <input type="checkbox"/> Creative |
| <input type="checkbox"/> Communicating | <input type="checkbox"/> Writing |

12. On what single job skill listed above do you spend the most time? _____

13. As planetarium director how are you classified by the school administration?

- 1 Administrator 2 Teacher 3 Other _____
(please specify)

**Next I would like to ask you some questions about the curriculum and the planetarium.
(Please circle you answer or fill in the blanks)**

14. Circle each grade level that uses the planetarium

- 1 2 3 4 5 6 7 8 9 10 11 12

Under each circled grade level, place the estimated number of visits per year.

- 1 2 3 4 5 6 7 8 9 10 11 12
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Appendix C (continued)

15. For each of the following grade levels, what is the main topic of your curriculum in the planetarium?

Grade level	Topic
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____

16. The planetarium experience is a part of the school system's science curriculum.

- 1 No
- 2 Yes

17. Teachers are involved in the development of the curriculum for the planetarium.

- 1 No
- 2 Yes

18. There is a planetarium lesson guide for the elementary grades (PreK - 6).

- 1 No
- 2 Yes

19. There is a planetarium lesson guide for the middle and secondary grades (7 - 12).

- 1 No
- 2 Yes

20. Is the planetarium lesson integrated into the science curriculum?

- 1 No
- 2 Yes

21. I believe principals consider the planetarium visit to be a valuable extension of the student's classroom experience.

- 1 No
- 2 Yes

22. Students are encouraged to participate **during** the planetarium lesson.

- 1 No
- 2 Yes

23. The planetarium curriculum is based on a state-mandated curriculum.

- 1 No
- 2 Yes

For each of the following statements about the curriculum in a public-school-owned planetarium, please record your level of agreement or disagreement.

(appendix continues)

Appendix C (continued)

38. A stated purpose for the planetarium is included in the policies governing the planetarium.

- 1 No
- 2 Yes

39. How many months is the planetarium open? _____

40. The planetarium is accessible to all public schools within the district

- 1 No
- 2 Yes

41. The planetarium operates autonomously in the school system.

- 1 No
- 2 Yes

42. Organizationally, the planetarium is an integral part of the school system.

- 1 Strongly disagree
- 2 Disagree
- 3 Agree
- 4 Strongly agree

Public school systems are building new planetarium facilities each year. In order to make these new facilities as cost effective as possible I would like to ask you some questions regarding the facility, equipment, and new technology necessary for a public-school-owned planetarium. (Please circle your answer or fill in the blanks)

43. Is your planetarium physically attached to a public school?

- 1 No
- 2 Yes

44. If "yes," what type of school?

- 1 Elementary
- 2 Middle
- 3 High
- 4 Other _____

45. Would you recommend the planetarium be a separate building?

- 1 No
- 2 Yes

46. Is your planetarium designed for other uses?

- 1 No
- 2 Yes

47. Is your star-projector automated?

- 1 No
- 2 Yes

(appendix continues)

Appendix C (continued)

48. Are other projectors or devices automated?

- 1 No
- 2 Yes

49. Do you use a video projector in school programs?

- 1 No
- 2 Yes

50. Do you have a work space adjacent to the planetarium?

- 1 No
- 2 Yes

51. Do you have an exhibit area adjacent to the planetarium?

- 1 No
- 2 Yes

52. Does the planetarium maintain a site on the Internet?

- 1 No
- 2 Yes

53. What is the number of seats you would recommend for a public-school-owned planetarium? _____

54. What diameter dome size would you recommend? _____(ft)

55. How was construction of your planetarium facility funded? _____

56. What company manufactured your star-projector? _____

Please record your level of agreement or disagreement with the next two items.

57. The planetarium should be located inside a public school.

- 1 Strongly disagree
- 2 Disagree
- 3 Agree
- 4 Strongly agree

58. The planetarium should only be used as a planetarium.

- 1 Strongly disagree
- 2 Disagree
- 3 Agree
- 4 Strongly agree

**I would like to ask you some questions about community use of your planetarium.
(Please circle your answer or fill in the blanks)**

59. Is the planetarium used by groups not enrolled in the public school system?

- 1 No
- 2 Yes

Appendix C (continued)

60. Does a community college and/or university use the planetarium?

- 1 No
- 2 Yes

61. Does the planetarium offer public programs to the community?

- 1 No
- 2 Yes

62. If you answered "Yes," how many times are public programs are presented each month? ____

I would like to ask some general questions. (Please circle your answer or fill in the blanks)

63. What is the enrollment of your school system for the 1998-1999 school year? _____

64. Which of the following best describes the socioeconomic-economic make-up of your school district?

- 1 High
- 2 Medium
- 3 Low

65. What year did your planetarium first open? _____

66. What is the number of seats in your planetarium. _____

67. Counting this year, how many years have you been a planetarium director? _____

68. Counting this year, how many years have you been the director at you present location? ____

69. How many other planetarium facilities have you directed? _____

70. What is your highest degree earned as of January 1, 1999?

71. Your Gender?

- 1 Male
- 2 Female

72. Your Age? ____

Is there anything else you would like to tell us about the operation of a public-school-owned planetarium? If so, please use this space and the back of the booklet if necessary.

Also, any comments you wish to make that you think might help us in future efforts to understand the educational use of public-school-owned planetaria will be appreciated, either here or in a separate letter. Thank you for your help.

APPENDIX D

CONTENT VALIDATION INSTRUMENT FOR THE NATIONAL SURVEY OF PLANETARIUM DIRECTORS OPERATING PUBLIC-SCHOOL-OWNED PLANETARIA IN THE UNITED STATES

Introduction

The purpose of this content validation instrument is to assist this researcher with the development of a questionnaire to be used in a national survey of planetarium directors operating public-school-owned planetarium facilities. This instrument is designed to explore public-school-owned planetaria using the following five domains: the job, the curriculum, the organization, the facility, and the director.

Instructions

Step 1. Please review the questions and statements attached and circle the domain in which the question or statement should be placed.

(1) Job (2) Curriculum (3) Organization (4) Facility (5) Director

Step 2. Please rate each question on how strongly you feel each question or statement is associated with the domain.

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4) Very Strong

Step 3. Please rate how clearly you think the question or statement is written.

(1) Not Clear (2) Somewhat Clear (3) Very Clear

(appendix continues)

Appendix D (continued)

Domains and Definitions

Domains	Definition
1. Job	The duties and responsibilities of a planetarium director operating a public-school-owned planetarium facility.
2. Curriculum	The subjects and teaching strategies or methodologies used in public-school-owned planetarium facilities.
3. Organization	The perceived placement of the planetarium facility director within the public school system.
4. Facility	The physical plant, equipment, and technology of a public-school-owned planetarium facility.
5. Director	The person responsible for the daily operation of a public-school-owned planetarium facility.

Association Ratings

Please indicate how strongly you feel the question or statement is associated with the domain you have selected by circling the number of your response in the column labeled “Association.” Use the following scale:

- (1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity Rating

In the column labeled “Clarity,” please indicate how clearly you think the question or statement is associated with the domain you selected. Use the following scale:

(appendix continues)

Appendix D (continued)

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Each question is associated with one of Five **domains** relating to public-school-owned planetaria:

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Each question should be rated as to how strong or weak the **association** is to the domain:

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Each Question should be rated on its **clarity**:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS					ASSOCIATION				CLARITY		
A. Are you presently employed by a public school system to operate a planetarium?	1	2	3	4	5	1	2	3	4	1	2	3
B. Do you write the curriculum used in the planetarium?	1	2	3	4	5	1	2	3	4	1	2	3
C. Do you schedule all planetarium visits for the school year?	1	2	3	4	5	1	2	3	4	1	2	3
D. Are you assigned teaching duties other than those in the planetarium?	1	2	3	4	5	1	2	3	4	1	2	3
E. If you answered “Yes,” what percentage of your day is spent on other duties?	1	2	3	4	5	1	2	3	4	1	2	3
F. Do you perform any of the following tasks as planetarium director? (Video, photography, art, media, computer...)	1	2	3	4	5	1	2	3	4	1	2	3
G. How many lessons are presented in the planetarium on a typical day?	1	2	3	4	5	1	2	3	4	1	2	3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS					ASSOCIATION				CLARITY		
H. How many students are in a typical planetarium lesson?	1	2	3	4	5	1	2	3	4	1	2	3
I. Is the planetarium experience considered part of the school system science curriculum?	1	2	3	4	5	1	2	3	4	1	2	3
J. Are teachers involved in the planetarium curriculum development process?	1	2	3	4	5	1	2	3	4	1	2	3
K. Is there a planetarium lesson guide for the elementary grades?	1	2	3	4	5	1	2	3	4	1	2	3
L. Is there a planetarium lesson guide for the secondary grades?	1	2	3	4	5	1	2	3	4	1	2	3
M. Is the planetarium lesson integrated into the science curriculum?	1	2	3	4	5	1	2	3	4	1	2	3
N. On which single task listed above do you spend the most time?	1	2	3	4	5	1	2	3	4	1	2	3
O. Are students encouraged to participate during the planetarium lesson?	1	2	3	4	5	1	2	3	4	1	2	3
P. Do you receive post-planetarium feedback from the teachers?	1	2	3	4	5	1	2	3	4	1	2	3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS					ASSOCIATION				CLARITY		
Q. Is there a stated purpose for the planetarium within the school systems' objectives?	1	2	3	4	5	1	2	3	4	1	2	3
R. Does the planetarium operate according to a nine month school calendar?	1	2	3	4	5	1	2	3	4	1	2	3
S. If you answered "No," how many months is the planetarium open?	1	2	3	4	5	1	2	3	4	1	2	3
T. Is the planetarium accessible to all public schools within the district?	1	2	3	4	5	1	2	3	4	1	2	3
U. Is your planetarium physically attached to a public school?	1	2	3	4	5	1	2	3	4	1	2	3
V. If "yes," what type of school?	1	2	3	4	5	1	2	3	4	1	2	3
W. Would you recommend the planetarium be a separate building?	1	2	3	4	5	1	2	3	4	1	2	3
X. Is your planetarium designed for other uses?	1	2	3	4	5	1	2	3	4	1	2	3
Y. Is your star-projector automated?	1	2	3	4	5	1	2	3	4	1	2	3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
Z. Are other projectors or devices automated?	1 2 3 4 5	1 2 3 4	1 2 3
AA. Do you use a video projector in school programs?	1 2 3 4 5	1 2 3 4	1 2 3
BB. Do you have a work space adjacent to the planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
CC. Do you have an exhibit area adjacent to the planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
DD. Is the planetarium used by groups not enrolled in the public school system?	1 2 3 4 5	1 2 3 4	1 2 3
EE. Does a community college or university use the planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
FF. Does the planetarium offer public programs to the community?	1 2 3 4 5	1 2 3 4	1 2 3
GG. On the average, how many public programs are presented each month?	1 2 3 4 5	1 2 3 4	1 2 3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
HH. Is the planetarium accessible over the Internet?	1 2 3 4 5	1 2 3 4	1 2 3
II. Are you a certified teacher?	1 2 3 4 5	1 2 3 4	1 2 3
JJ. If you answered “Yes,” please list the subjects you are certified to teach.	1 2 3 4 5	1 2 3 4	1 2 3
KK. Counting this year, how many years have you been a planetarium director?	1 2 3 4 5	1 2 3 4	1 2 3
LL. Counting this year, how many years have you been the director at your present location?	1 2 3 4 5	1 2 3 4	1 2 3
MM. How many other planetarium facilities have you directed?	1 2 3 4 5	1 2 3 4	1 2 3
NN. Which grade level uses the planetarium the most?	1 2 3 4 5	1 2 3 4	1 2 3
OO. How many staff are directly under your supervision?	1 2 3 4 5	1 2 3 4	1 2 3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
PP. The main governing body for your planetarium is?	1 2 3 4 5	1 2 3 4	1 2 3
QQ. What is the enrollment of your school system for the 98-99 school year?	1 2 3 4 5	1 2 3 4	1 2 3
RR. What is the socioeconomic make-up of your school district?	1 2 3 4 5	1 2 3 4	1 2 3
SS. What is the number of seats you would recommend for a school planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
TT. What dome size would you recommend for a public school planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
UU. What company manufactured the planetarium's star-projector?	1 2 3 4 5	1 2 3 4	1 2 3
VV. What year did your planetarium first open?	1 2 3 4 5	1 2 3 4	1 2 3
WW. What is the number of seats in your planetarium?	1 2 3 4 5	1 2 3 4	1 2 3
XX. What is your official title?	1 2 3 4 5	1 2 3 4	1 2 3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
YY. What is your sex?	1 2 3 4 5	1 2 3 4	1 2 3
ZZ. What is your age?	1 2 3 4 5	1 2 3 4	1 2 3
AAA. How many other planetaria have you directed?	1 2 3 4 5	1 2 3 4	1 2 3
BBB. What is the title of your immediate supervisor.	1 2 3 4 5	1 2 3 4	1 2 3
CCC. For each of the grade levels, give the lesson topic.	1 2 3 4 5	1 2 3 4	1 2 3
DDD. Which two skills do you consider important?	1 2 3 4 5	1 2 3 4	1 2 3
EEE. Which skill listed above do you consider the most important?	1 2 3 4 5	1 2 3 4	1 2 3
FFF. How was your planetarium facility funded?	1 2 3 4 5	1 2 3 4	1 2 3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
Statements:			
GGG. The planetarium is a more effective place to teach astronomy than the classroom.	1 2 3 4 5	1 2 3 4	1 2 3
HHH. The planetarium's primary purpose is to support what is taught in the classroom.	1 2 3 4 5	1 2 3 4	1 2 3
III. The curriculum used in the planetarium and the classroom should be integrated.	1 2 3 4 5	1 2 3 4	1 2 3
JJJ. Teachers must prepare their students for the planetarium experience if it is to be successful.	1 2 3 4 5	1 2 3 4	1 2 3
KKK. Student involvement in the planetarium is highly desirable.	1 2 3 4 5	1 2 3 4	1 2 3
LLL. Participatory (student interaction) lessons are better than traditional (show and tell) lessons.	1 2 3 4 5	1 2 3 4	1 2 3
MMM. Planetarium lessons should not be longer than one hour.	1 2 3 4 5	1 2 3 4	1 2 3

(appendix continues)

Appendix D (continued)

Domains

(1) The Job (2) The Curriculum (3) The Organization (4) The Facility (5) The Director

Association

(1) Very Weak (2) Somewhat Weak (3) Somewhat Strong (4)Very Strong

Clarity:

(1) Not Clear (2) Somewhat Clear (3) Very Clear

Please circle your response.

Question	DOMAINS	ASSOCIATION	CLARITY
NNN. The planetarium operates autonomously in the school system.	1 2 3 4 5	1 2 3 4	1 2 3
OOO. The planetarium is integrated into mainly the elementary schools.	1 2 3 4 5	1 2 3 4	1 2 3
PPP. The planetarium should be located inside a public school.	1 2 3 4 5	1 2 3 4	1 2 3
QQQ. The planetarium should only be used as a planetarium.	1 2 3 4 5	1 2 3 4	1 2 3
RRR. Directional seating is better than circular seating.	1 2 3 4 5	1 2 3 4	1 2 3

APPENDIX E
 SPSS RESULTS OF CONTENT VALIDITY STUDY FOR THE
 PLANETARIUM QUESTIONNAIRE

Domains: (1) job; (2) curriculum; (3) organization; (4) facility; (5) director
 Strength: (1) very weak; (2) somewhat weak; (3) somewhat strong; (4) very strong
 Clarity: (1) not clear; (2) somewhat clear; (3) very clear

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
A. Are you presently employed by a public school system to operate a planetarium?	75.0	00.0	00.0	00.0	25.0	2.0	1.8
B. Do you write the curriculum used in the planetarium?	16.7	75.0	-	-	8.3	2.1	1.0
C. Do you schedule all planetarium visits for the school year?	58.3	-	8.3	8.3	25.0	2.4	1.8
D. Are you assigned teaching duties other than those in the planetarium?	83.8	-	-	-	16.7	1.7	1.6
E. If you answered “Yes” what percentage of your day is spent on other duties?	83.3	8.3	-	-	8.3	1.4	1.2
F. Do you perform any of the following tasks as planetarium director? (list of tasks)	58.3	-	-	-	41.7	2.7	2.1

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
G. How many lessons are presented in the planetarium on a typical day?	8.3	75.0	8.3	-	8.3	2.3	1.0
H. How many students are in a typical planetarium lesson?	-	63.6	18.2	9.10	9.10	2.6	1.0
I. Is the planetarium experience considered part of the school system science curriculum?	-	91.7	8.3	-	-	2.1	0.3
J. Are teachers involved in the planetarium curriculum development process?	16.7	66.7	16.7	-	-	2.0	0.6
K. Is there a planetarium lesson guide for the elementary grades?	-	91.7	8.3	-	-	2.1	0.3
L. Is there a planetarium lesson guide for the secondary grades?	-	91.7	8.3	-	-	2.1	.03
M. Is the planetarium lesson integrated into the science curriculum?	-	100.0	-	-	-	2.0	0.0
N. On which single task listed above do you spend the most time?	72.7	9.1	18.2	-	-	1.5	0.9

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
O. Are students encouraged to participate during the planetarium lesson?	-	90.9	9.1	-	-	2.1	0.3
P. Do you receive post-planetarium feedback from the teachers?	11.1	55.6	11.1	-	22.2	2.7	1.4
Q. Is there a stated purpose for the planetarium within the school systems' objectives?	-	63.6	36.4	-	-	2.4	0.5
R. Does the planetarium operate according to a 9 month school calendar?	-	-	75.0	25.0	-	3.3	0.5
S. If you answered "No" how many months is the planetarium open?	-	-	54.5	36.1	9.10	3.5	0.7
T. Is the planetarium accessible to all public schools within the district?	-	-	25.0	75.0	-	3.8	0.5
U. Is your planetarium physically attached to a public school?	-	-	9.1	90.9	-	3.9	0.3
V. If "Yes" what type of school?	-	-	18.2	81.8	-	3.8	0.4

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
W. Would you recommend the planetarium be a separate building?	-	-	8.3	91.7	-	3.9	0.3
X. Is your planetarium designed for other uses?	-	-	8.3	91.7	-	3.9	0.3
Y. Is you star-projector automated?	-	-	-	100	-	4.0	0.0
Z. Are other projectors or devices automated?	-	-	-	100	-	4.0	0.0
AA. Do you use a video projector in school programs?-		16.7	-	83.3	-	3.7	0.8
BB. Do you have an work space adjacent to the planetarium?	-	-	-	100	-	4.0	0.0
CC. Do you have an exhibit area adjacent to the planetarium?	-	-	-	100	0	4.0	0.0
DD. Is the planetarium used by groups not enrolled in the public school system?	-	16.7	8.3	75.0	-	3.6	0.8
EE. Does a community college or university use the planetarium?	-	8.3	8.3	83.3	-	3.8	0.6
FF. Does the planetarium offer public programs to the community?	-	50.5	8.3	41.7	-	2.9	1.0

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
GG. On the average, how many public programs are presented each month?	-	66.7	25.0	8.3	-	2.4	0.7
HH. Is the planetarium accessible over the Internet?	-	27.3	27.3	45.5	-	3.2	0.9
II. Are you a certified teacher?	25.0	-	8.3	-	66.7	3.8	1.8
JJ. If you answered “Yes” please list the subjects you are certified to teach.	18.2	9.1	9.1	-	63.6	3.8	1.7
KK. Counting this year, how many years have you been a planetarium director?	-	-	8.3	-	91.7	4.8	0.6
LL. Counting this year, how many years have you been the director at your present location?	-	-	8.3	-	91.7	4.8	0.6
MM. How many other planetarium facilities have you directed?	8.3	-	8.3	-	83.3	4.5	1.2
NN. Which grade level uses the planetarium the most?	-	54.5	18.2	18.2	9.1	2.8	1.1
OO. How many staff are directly under your supervision?	8.3	-	8.3	-	83.3	4.5	1.2

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
PP. The main governing body for your planetarium is?	-	-	75.0	16.7	8.3	3.3	0.7
QQ. What is the enrollment of your school system for the 98-99 school year?	-	-	60.0	20.0	20.0	3.6	0.8
RR. What is the socioeconomic make-up of your school system?	-	-	70.0	10.0	20.0	3.5	0.9
SS. What is the number of seats you would recommend for a public school planetarium?	-	-	-	100	-	4.0	0.0
TT. What dome size would you recommend for a public school planetarium?	-	-	-	100	-	4.0	0.0
UU. What company manufactured your planetarium star projector?	-	-	-	100	0	4.0	0.0
VV. What year did your planetarium first open?	-	-	-	83.3	16.7	4.2	0.4
WW. What is the number of seats in your planetarium?	-	-	-	91.7	8.3	4.1	0.3
XX. What is your official title?	8.3	-	-	8.3	83.3	4.6	1.2

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
YY. What is your sex?	10.0	-	-	-	90.0	4.6	1.3
ZZ. What is your age?	10.0	-	-	-	90.0	4.6	1.3
AAA. How many other planetaria have you directed?	16.7	-	-	8.3	75.0	4.3	1.5
BBB. What is the title of your immediate supervisor?	10.0	-	30.0	10.0	50.0	3.9	1.4
CCC. For each of the grade levels give the Lesson topic.	-	91.7	-	-	8.3	2.3	0.9
DDD. Which two skills do you consider the most important?	30.0	50.0	-	-	20.0	2.3	1.5
EEE. Which skill listed above do you consider the most important?	30.0	50.0	-	-	20.0	2.3	1.5
FFF. How was your planetarium funded?	-	8.3	50.0	41.7	-	3.3	0.7
Statements:							
GGG. The planetarium is a more effective place to teach astronomy than the classroom.	-	50.0	-	50.0	-	3.0	1.0
HHH. The planetariums' primary purpose is to support what is taught in the classroom.	-	66.7	-	25.0	8.3	2.8	1.1

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
III. The curriculum used in the planetarium and the classroom should be integrated.	-	100	-	-	-	2.0	0.0
JJJ. Teachers must prepare their students for the planetarium experience if it is to be successful.	16.7	75.0	-	-	8.3	2.1	1.0
KKK. Student involvement in the planetarium is highly desirable.	-	75.0	16.7	-	8.3	2.4	0.9
LLL. Participatory (student interaction) lessons are better than traditional (show and tell) lessons.	-	91.7	-	-	8.3	2.3	0.9
MMM. Planetarium lessons should not be longer than one hour.	-	75.0	25.0	-	-	2.3	0.5
NNN. The planetarium operates autonomously in the school system.	-	-	83.3	16.7	-	3.2	0.4
OOO. The planetarium is integrated into mainly the elementary schools.	-	25.0	75.0	-	-	2.8	0.5
PPP. The planetarium should be located inside a public school system.	-	-	58.3	41.7	-	3.4	0.5

(appendix continues)

Appendix E (continued)

Question	Domain Percentage					<u>M</u>	<u>SD</u>
	1	2	3	4	5		
QQQ. The planetarium should only be used as a planetarium.	-	-	25.0	66.7	8.3	3.8	0.6
RRR. Directional seating is better than circular setting.	-	-	-	100	-	4.0	0.0

Note. Dash indicates 00.0 percent.

VITA

ROBERT J. HITT JR.

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EDUCATION

Bachelor Of Science, Biology Education -	Old Dominion University 1969
Masters Of Science, Space Science -	Old Dominion University 1976
Doctor Of Education	Virginia Polytechnic Institute and State University (Virginia Tech)

PROFESSIONAL EXPERIENCE

Physics & Chemistry teacher	1968-69
Director Weir Planetarium, Weirton W. VA	1969
Director Chesapeake Planetarium, VA	1970
Adjunct Professor Physics (Astronomy) ODU	1977
Instructor Gifted & Talented Program	1977
Evaluation Team Virginia Department of Education	1980
PBS Panel Member Earth Science WHRO TV	1985
Adjunct Professor Physics (Physics) ODU	1985

PUBLICATIONS

Hitt, R. J. 1998. The Sun's Family (Outer Space, Vol. 1). Grolier Educational, Danbury, Connecticut.

Hitt, R. J. 1998. The Moon (Outer Space, Vol. 2). Grolier Educational, Danbury, Connecticut.

Editor - Southern Skies	1974-1975
Planetarium Handbook	1981

Robert J. Hitt Jr.

Curriculum Vita

Planetarium Handbook (Rev.)	1995
Solar Eclipse Log, Mexico	1991
Solar Eclipse Log, South America	1994
Solar Eclipse Log, Asia	1995

RESEARCH INTERESTS

- Solar Eclipse observations
- Solar eclipse photography
- Meteor Shower Phenomena
- Children's Museum Design

TEACHING INTERESTS

- Solar Eclipse Studies
- Astronomy Education
- Physics
- Planetarium Lectures

HONORS AND AFFILIATIONS

Grant - National Science Foundation	1972
Southeastern Planetarium Association	1970 -
Mid Atlantic Planetarium Association	1970 -
International Planetarium Association	1975 -

CONSULTANT WORK

Planetarium Design - Portsmouth, VA	1970
Planetarium Design - Fredericksburg, VA	
Planetarium Design - Roanoke, VA	

Robert J. Hitt Jr.

Curriculum Vita

RELATED EXPERIENCES

Planetarium lecturer for 29 years	
Solar eclipse coordinator, Chesapeake VA	1970
Solar eclipse photography, Canada	1972
Solar eclipse cruise, Africa	1973
Lecture, Solar eclipse cruise, Mexico	1991
Lecture, Solar eclipse cruise, South America	1994
Lecture, Team leader, Scientific Expeditions Inc., Asia	1995
Lecture, Scientific Expeditions Inc., Caribbean	1998

CURRENT POSITION

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